CLACKAMAS COUNTY

DAN JOHNSON
DIRECTOR

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD OREGON CITY, OR 97045

March 23, 2023 BCC Agenda Date/Item: _____

Board of County Commissioners
Acting as the Development Agency Board
Clackamas County

Approval of a Public Improvement Contract with Moore Excavation, Inc., for the Linwood Avenue Improvements project. Total contract value is $6,820,302.50. Funding is through the North Clackamas Revitalization Area. No County General Funds are involved.

Previous Board Action/Review	10/31/19- Approval of a design contract for Linwood 07/29/21- Approval of first amendment to the design contract. 07/28/22- IGA with Clackamas River Water for Linwood improvements 08/04/22- IGA with Water Environment Services for sewer main installation. 08/18/22- Approval of construction management services contract. 09/08/22- Approval of second amendment to the design contract Briefed at Issues – 3-21-23		
Performance Clackamas	This project aligns with "Ensure safe, healthy and secure communities" and "Build a strong infrastructure" by adding bicycle and pedestrian facilities, upgrading curb ramps, adding landscaping strips and stormwater system improvements, repairing the road base and installing a mini roundabout thereby ensuring safer vehicle and pedestrian travel.		
Counsel Review	Yes- 3/2/23 AN	**Procurement Review**	Yes
Contact Person	Ken Itel, Development Agency Senior Project Planner	**Contact Phone**	503-742-4324

EXECUTIVE SUMMARY:
The SE Linwood Avenue Improvement Project (the "Project") is located in the North Clackamas Revitalization Area (NCRA) urban renewal district. The Project will redesign the SE Linwood

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Avenue corridor from SE Monroe Street to SE Johnson Creek Boulevard. A priority of the NCRA urban renewal plan is to improve neighborhood streets to accommodate all modes of transportation, enhance safety and accessibility, and upgrade storm water management systems. The corridor currently has many sections that are lacking sidewalks and bike lanes, which creates unsafe conditions for pedestrians, cyclists, and motorists.

In order to carry out the public improvement goals of the NCRA urban renewal plan, the Project will complete these missing sidewalk and bike lane connections by installing a multi-use path on both sides of the street, improving safety and connectivity for pedestrians, cyclists, and motorists. The Project also includes updates to existing storm water facilities to improve storm water management, installation of a sewer main extension, and restoration and improvement of the road base and travel surface. The Project is an extension of improvements completed by the City of Milwaukie on SE Linwood Avenue from SE Harmony Road to SE Monroe Street, north of which the corridor transitions to Clackamas County jurisdiction. The typical sections for the Clackamas County portion and the City of Milwaukie portion were matched in order to provide a seamless and continuous corridor the full length of SE Linwood Avenue.

The Project provides safety and connectivity improvements to multiple modes of transportation, while also addressing infrastructure deficiencies such as sanitary sewer, storm water management and accessibility. Alternatives would not address the problems in such a comprehensive manner. Failing to carry out the project would not meet the goals of the NCRA plan and leave an underserved and affordable residential area with substandard infrastructure and accessibility.

PROCUREMENT PROCESS:

This project was advertised in accordance with ORS and LCRB Rules on December 7, 2022, Through BID# 2022-109. Bids were publicly opened on January 19, 2023. The County received five (5) Bids in response to the Bid: Kerr Contractors Oregon, LLC at $8,698,588.00; Pacific Excavation Inc at $7,574,000.00; Moore Excavation Inc. at $6,820,302.50; D&D Concrete & Utilities, Inc. at $8,893,433.00; and Tapani, Inc. at $8,722,000.00. After review of the bids, Moore Excavation, Inc., was determined to be the lowest responsive bidder.

RECOMMENDATION: Staff respectfully recommends that the Board approve and sign this Public Improvement contract with Moore Excavation, Inc., for the Linwood Avenue Improvement Project.

Respectfully submitted,

Dan Johnson

Dan Johnson, Director
Department of Transportation & Development

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT
Contract #7569

This Public Improvement Contract (the "Contract"), is made by and between the Clackamas County, a political subdivision of the State of Oregon, hereinafter called "Owner," and **Moore Excavation, Inc.**, hereinafter called the "Contractor" (collectively the "Parties"), shall become effective on the date this Contract has been signed by all the Parties and all County approvals have been obtained, whichever is later.

Project Name: # 2022-109 Linwood Avenue Improvements

1. Contract Price, Contract Documents and Work.
The Contractor, in consideration of the sum of **Six Million Eight Hundred Twenty Thousand Three Hundred Two Dollars and Fifty Cents ($6,820,302.50)** (the "Contract Price"), to be paid to the Contractor by Owner in the manner and at the time hereinafter provided, and subject to the terms and conditions provided for in the Instructions to Bidders and other Contract Documents (as defined in the project specifications) referenced within the Instructions to Bidders), all of which are incorporated herein by reference, hereby agrees to perform all Work described and reasonably inferred from the Contract Documents. The Contract Price is the amount contemplated by the Base Bid adjusted for Alternates, as indicated in the accepted Bid.

The following documents are incorporated by reference in this Contract and made a part hereof:

- Notice of Contract Opportunity
- Supplemental Instructions to Bidders
- Bid Form
- Prevailing Wage Rates
- Plans, Specifications and Drawings
- Instructions to Bidders
- Bid Bond
- Performance Bond and Payment Bond
- Payroll and Certified Statement Form
- Addenda 1 and 2

The Plans, Specifications and Drawings expressly incorporated by reference into this Contract includes, but is not limited to, the Special Provisions for Grading, Drainage, Structures, Paving, Signing, Illumination, Signals & Roadside Development, Linwood Avenue Improvement Project, Linwood Avenue, Clackamas County (the "Specifications"), together with the provisions of the Oregon Standard Specifications for Construction (2021) referenced therein.

The Contractor shall comply with the prohibitions set forth in ORS 652.220, compliance of which is a material element of this Contract and failure to comply is a material breach that entitles County to exercise any rights and remedies available under this Contract including, but not limited to, termination for default.

2. Representatives.
Contractor has named Scott Pellecer as its Authorized Representative to act on its behalf. Owner designates, or shall designate, its Authorized Representative as indicted below (check one):

☒ Unless otherwise specified in the Contract Documents, the Owner designates Terry Mungenast as its Authorized Representative in the administration of this Contract. The above-named individual shall be the initial point of contact for matters related to Contract performance, payment, authorization, and to carry out the responsibilities of the Owner.

☐ Name of Owner's Authorized Representative shall be submitted by Owner in a separate writing.

3. Key Persons.
The Contractor's personnel identified below shall be considered Key Persons and shall not be replaced during the project without the written permission of Owner, which shall not be unreasonably withheld. If the Contractor intends to substitute personnel, a request must be given to Owner at least 30 days prior to the intended time of substitution. When replacements have been approved by Owner, the Contractor shall provide a transition period of at least 10 working days during which the original and replacement personnel shall be working on the project concurrently. Once a replacement for any of these staff members is authorized, further replacement shall not occur without the written permission of Owner. The Contractor's project staff shall consist of the following personnel:

Project Executive: Scott Pellecer shall be the Contractor's project executive, and will provide oversight and guidance throughout the project term.

Project Manager: Tanner Wickwire shall be the Contractor's project manager and will participate in all meetings throughout the project term.

Job Superintendent: Robert Clevenger shall be the Contractor's on-site job superintendent throughout the project term.

Project Engineer: Tanner Wickwire shall be the Contractor's project engineer, providing assistance to the project manager, and subcontractor and supplier coordination throughout the project term.

4. Contract Dates.
COMMENCEMENT DATE: Upon Issuance of Notice to Proceed ("NTP")
SUBSTANTIAL COMPLETION DATE: November 15, 2023
FINAL COMPLETION DATE: November 30, 2023

Time is of the essence for this Contract. It is imperative that the Work in this Contract reach Substantial Completion and Final Completion by the above specified dates.

5. Insurance Certificates and Required Performance and Payment Bonds.

5.1 In accordance with Section 00170.70 of the Specifications, Contractor shall furnish proof of the required insurance naming Clackamas County as an additional insured. Insurance certificates may be returned with the signed Contract or may be emailed to Procurement@clackamas.us.

5.2 Primary Coverage: Insurance carried by Contractor under the Contract shall be the primary coverage. The coverages indicated are minimums unless otherwise specified in the Contract Documents.

5.2.1 Workers' Compensation: All employers, including Contractor, that employ subject workers who work under the Contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. This shall include Employer's Liability Insurance with coverage limits of not less than the minimum amount required by statute for each accident. Contractors who perform the Work without the assistance or labor of any employee need not obtain such coverage if the Contractor certifies so in writing. Contractor shall ensure that each of its Subcontractors complies with these requirements. The Contractor shall require proof of such Workers' Compensation coverage by receiving and keeping on file a certificate of insurance from each Subcontractor or anyone else directly employed by either the Contractor or its Subcontractors.

5.3 Builder's Risk Insurance: During the term of the Contract, for new construction the Contractor shall obtain and keep in effect Builder's Risk insurance on an all risk forms, including earthquake and flood, for an amount equal to the full amount of the Contract, plus any changes in values due to modifications, Change Orders and loss of materials added. Such Builder's Risk shall include, in addition to earthquake and flood, theft, vandalism, mischief, collapse, transit, debris removal, and architect's fees "soft costs" associated with delay of Project due to insured peril. Any deductible shall not exceed $50,000 for each loss, except the earthquake and flood deductible which shall not exceed 2 percent of each loss or $50,000, whichever is greater. The deductible shall be paid by Contractor. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear.

5.4 Builder's Risk Installation Floater: For Work other than new construction, Contractor shall obtain and keep in effect during the term of the Contract, a Builder's Risk Installation Floater for coverage of the Contractor's labor, materials and equipment to be used for completion of the Work performed under the Contract. The minimum amount of coverage to be carried shall be equal to the full amount of the Contract. The policy will include as loss payees Owner, the Contractor and its Subcontractors as their interests may appear. Owner may waive this requirement at its sole and absolute discretion.

5.4.1 Such insurance shall be maintained until Owner has occupied the facility.

5.4.2 A loss insured under the Builder's Risk insurance shall be adjusted by the Owner and made payable to the Owner as loss payee. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner. The Owner shall have power to adjust and settle a loss with insurers.

5.5 "Tail" Coverage: If any of the required liability insurance is arranged on a "claims made" basis, "tail" coverage will be required at the completion of the Contract for a duration of 36 months or the maximum time period available in the marketplace if less than 36 months. Contractor shall furnish certification of "tail" coverage as described or continuous "claims made" liability coverage for 36 months following Final Completion. Continuous "claims made" coverage will be acceptable in lieu of "tail" coverage, provided its retroactive date is on or before the effective date of the Contract. Owner's receipt of the policy endorsement evidencing such coverage shall be a condition precedent to Owner's obligation to make final payment and to Owner's final acceptance of Work or services and related warranty (if any).

5.6 Notice of Cancellation or Change: If the Contractor receives a non-renewal or cancellation notice from an insurance carrier affording coverage required herein, or receives notice that coverage no longer complies with the insurance requirements herein, Contractor agrees to notify Owner by fax within five (5) business days with a copy of the non-renewal or cancellation notice, or written specifics as to which coverage is no longer in compliance. When notified by Owner, the Contractor agrees to stop Work pursuant to the Contract at Contractor's expense, unless all required insurance remain in effect. Any failure to comply with the reporting provisions of this insurance, except for the potential exhaustion of aggregate limits, shall not affect the coverages provided to the Owner and its institutions, divisions, officers, and employees.
Owner shall have the right, but not the obligation, of prohibiting Contractor from entering the Project Site until a new certificate(s) of insurance is provided to Owner evidencing the replacement coverage. The Contractor agrees that Owner reserves the right to withhold payment to Contractor until evidence of reinstated or replacement coverage is provided to Owner.

5.7 Before execution of the Contract, the Contractor shall file with the Construction Contractors Board, and maintain in full force and effect, the separate public works bond required by Oregon Revised Statutes, Chapter 279C.830 and 279C.836, unless otherwise exempt under those provisions. The Contractor shall also include in every subcontract a provision requiring the Subcontractor to have a public works bond filed with the Construction Contractors Board before starting Work, unless otherwise exempt, and shall verify that the Subcontractor has filed a public works bond before permitting any Subcontractor to start Work.

5.8 When the Contract Price is $50,000 or more, the Contractor shall furnish and maintain in effect at all times during the Contract Period a performance bond in a sum equal to the Contract Price and a separate payment bond also in a sum equal to the Contract Price. Contractor shall furnish such bonds even if the Contract Price is less than the above thresholds if otherwise required by the Contract Documents.

5.9 Bond forms furnished by the Owner and notarized by Contractor's surety company authorized to do business in Oregon are the only acceptable forms of performance and payment security, unless otherwise specified in the Contract Documents.

6. Responsibility for Damages/Indemnity.

6.1 Contractor shall be responsible for all damage to property, injury to persons, and loss, expense, inconvenience, and delay that may be caused by, or result from, the carrying out of the Work to be done under the Contract, or from any act, omission or neglect of the Contractor, its Subcontractors, employees, guests, visitors, invitees and agents.

6.2 To the fullest extent permitted by law, Contractor shall indemnify, defend (with counsel approved by Owner) and hold harmless the Owner and its elected officials, officers, directors, agents, and employees (collectively "Indemnitees") from and against all liabilities, damages, losses, claims, expenses, demands and actions of any nature whatsoever which arise out of, result from or are related to: (a) any damage, injury, loss, expense, inconvenience or delay described in this Section 6.1; (b) any accident or occurrence which happens or is alleged to have happened in or about the Project Site or any place where the Work is being performed, or in the vicinity of either, at any time prior to the time the Work is fully completed in all respects; (c) any failure of the Contractor to observe or perform any duty or obligation under the Contract Documents which is to be observed or performed by the Contractor, or any breach of any agreement, representation or warranty of the Contractor contained in the Contract Documents or in any subcontract; (d) the negligent acts or omissions of the Contractor, a Subcontractor or anyone directly or indirectly employed by them or any one of them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder (except to the extent otherwise void under ORS 30.140); and (e) any lien filed upon the Project or bond claim in connection with the Work. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 6.2.

6.3 In claims against any person or entity indemnified under Section 6.2 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 6.2 shall not be limited on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

7. Tax Compliance.

Contractor must, throughout the duration of this Contract and any extensions, comply with all tax laws of this state and all applicable tax laws of any political subdivision of this state. Any violation of this section shall constitute a material breach of this Contract. Further, any violation of Contractor's warranty in this Contract

that Contractor has complied with the tax laws of this state and the applicable tax laws of any political subdivision of this state also shall constitute a material breach of this Contract. Any violation shall entitle County to terminate this Contract, to pursue and recover any and all damages that arise from the breach and the termination of this Contract, and to pursue any or all of the remedies available under this Contract, at law, or in equity, including but not limited to: (A) Termination of this Contract, in whole or in part; (B) Exercise of the right of setoff, and withholding of amounts otherwise due and owing to Contractor, in an amount equal to County's setoff right, without penalty; and (C) Initiation of an action or proceeding for damages, specific performance, declaratory or injunctive relief. County shall be entitled to recover any and all damages suffered as the result of Contractor's breach of this Contract, including but not limited to direct, indirect, incidental and consequential damages, costs of cure, and costs incurred in securing replacement performance. These remedies are cumulative to the extent the remedies are not inconsistent, and County may pursue any remedy or remedies singly, collectively, successively, or in any order whatsoever.

The Contractor represents and warrants that, for a period of no fewer than six calendar years preceding the effective date of this Contract, has faithfully complied with: (A) All tax laws of this state, including but not limited to ORS 305.620 and ORS chapters 316, 317, and 318; (B) Any tax provisions imposed by a political subdivision of this state that applied to Contractor, to Contractor's property, operations, receipts, or income, or to Contractor's performance of or compensation for any work performed by Contractor; (C) Any tax provisions imposed by a political subdivision of this state that applied to Contractor, or to goods, services, or property, whether tangible or intangible, provided by Contractor; and (D) Any rules, regulations, charter provisions, or ordinances that implemented or enforced any of the foregoing tax laws or provisions.

8. Confidential Information.
Contractor acknowledges that it and its employees or agents may, in the course of performing their responsibilities under this Contract, be exposed to or acquire information that is confidential to Owner. Any and all information of any form obtained by Contractor or its employees or agents in the performance of this Contract shall be deemed confidential information of Owner ("Confidential Information"). Contractor agrees to hold Confidential Information in strict confidence, using at least the same degree of care that Contractor uses in maintaining the confidentiality of its own confidential information, and not to copy, reproduce, sell, assign, license, market, transfer or otherwise dispose of, give, or disclose Confidential Information to third parties or use Confidential Information for any purpose unless specifically authorized in writing under this Contract.

9. Counterparts.
This Contract may be executed in several counterparts, all of which when taken together shall constitute an agreement binding on all Parties, notwithstanding that all Parties are not signatories to the same counterpart. Each copy of the Contract so executed shall constitute an original.

10. Integration.
All provisions of state law required to be part of this Contract, whether listed in the General or Special Conditions or otherwise, are hereby integrated and adopted herein. Contractor acknowledges the obligations thereunder and that failure to comply with such terms is a material breach of this Contract.

The Contract Documents constitute the entire agreement between the parties. There are no other understandings, agreements or representations, oral or written, not specified herein regarding this Contract. Contractor, by the signature below of its authorized representative, hereby acknowledges that it has read this Contract, understands it, and agrees to be bound by its terms and conditions.

11. Liquidated Damages
The Contractor acknowledges that the Owner will sustain damages as a result of the Contractor's failure to substantially complete the Project in accordance with the Contract Documents. These damages may include,

but are not limited to delays in completion, use of the Project, and costs associated with Contract administration and use of temporary facilities.

11.1 Liquidated Damages shall be as follows if the actual Substantial Completion exceeds the required date of Substantial Completion:

11.1.1. $ 2,000 per Calendar day past the Substantial Completion date as identified in section 00180.85 (b) and 00180.85 (c).

12. Compliance with Applicable Law. Contractor shall comply with all federal, state, county, and local laws, ordinances, and regulations applicable to the Work to be done under this Contract including, but not limited to, compliance with the prohibitions set forth in ORS 652.220, compliance of which is a material element of this Contract and failure to comply is a material breach that entitles County to exercise any rights and remedies available under this Contract including, but not limited to, termination for default.

13. Responsibility for Taxes. Contractor is solely responsible for payment of any federal, state, or local taxes required as a result of the Contract or the Work including, but not limited, to payment of the corporate activity tax imposed under enrolled HB 3427 (2019 Oregon regular legislative session). Contractor may not include its federal, state, or local tax obligations as part of the cost to perform the Work.

14. Escrow and Retainage. If retainage is withheld, unless the Contractor requests and the Owner accepts a form of retainage permitted under ORS 279C.560, the Owner will deposit the retainage in an interest-bearing escrow account as required by ORS 279C.570(2). The Contractor shall execute such documentation and instructions respecting the interest-bearing escrow account as the Owner may require to protect its interests, including but not limited to a provision that no funds may be paid from the account to anyone without the Owner's advance written authorization.

15. No Attorney Fees. In the event any arbitration, action or proceeding, including any bankruptcy proceeding, is instituted to enforce any term of this Contract, each party shall be responsible for its own attorneys' fees and expenses.

Signature page to follow.

In witness whereof, Clackamas County executes this Contract and the Contractor does execute the same as of the day and year first above written.

Contractor DATA:
Moore Excavation, Inc.
P.O. Box 789
Fairview, Oregon 97024

Contractor CCB # 28397 Expiration Date: 10/10/2024
Oregon Business Registry # 090067-19 Entity Type: DBC State of Formation: Oregon

Payment information will be reported to the IRS under the name and taxpayer ID# provided by the Contractor. Information must be provided prior to contract approval. Information not matching IRS records could subject Contractor to 28 percent backup withholding.

Moore Excavation, Inc.		Clackamas County	
	2/20/2023		
Authorized Signature	Date	Chair	Date
Scott Pellecer, President			
Name / Title Printed		Recording Secretary	

APPROVED AS TO FORM

03/02/2023

County Counsel Date

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT OPPORTUNITY

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CLACKAMAS COUNTY
NOTICE OF PUBLIC IMPROVEMENT CONTRACT OPPORTUNITY

INVITATION TO BID #2022-109
Linwood Avenue Improvements
December 7, 2022

Clackamas County Development Agency ("Agency") through its Board of County Commissioners is accepting sealed bids for the **Linwood Avenue Improvements** Project until **January 19, 2023, 2:00 PM,** Pacific Time, ("Bid Closing") at the following location:

Bidding Documents can be downloaded from the state of Oregon procurement website ("OregonBuys") at the following address: https://oregonbuys.gov/bso/view/login/login.xhtml, Document No.S-C01010-00005073.
Prospective Bidders will need to sign in to download the information and that information will be accumulated for a Plan Holder's List. Prospective Bidders are responsible for obtaining any Addenda from Website listed above.

Submitting Proposals: Bid Locker
Proposals will only be accepted electronically thru a secure online bid submission service, **Bid Locker**.
Email submissions to Clackamas County email addresses will no longer be accepted.

A. Completed proposal documents must arrive electronically via Bid Locker located at https://bidlocker.us/a/clackamascounty/BidLocker.
B. Bid Locker will electronically document the date and time of all submissions. Completed documents must arrive by the deadline indicated in Section 1 or as modified by Addendum. LATE PROPOSALS WILL NOT BE ACCEPTED.
C. Proposers must register and create a profile for their business with Bid Locker in order to submit for this project. It is free to register for Bid Locker.
D. Proposers with further questions concerning Bid Locker may review the Vendor's Guide located at https://www.clackamas.us/how-to-bid-on-county-projects .

Engineers Estimate: $6,564,368.00

Contact Information
Procurement Process and Technical Questions: Tralee Whitley at TWhitley@clackamas.us

Bids will be opened and publicly read aloud at the above Delivery address after the Bid Closing. Bid results will also be posted to the OregonBuys listing shortly after the opening.

To be eligible for award under this Invitation to Bid, bidders (prime contractors) must submit a prequalification application (either ODOT or County) to the County at least two business days prior to the Bid Closing. County will reject bids from bidders who are not prequalified for the class of work indicated prior to the Bid Closing. **Bidders must be prequalified in Asphalt Concrete Paving (ACP), Earthwork and Drainage (EART).**

State Prevailing Wage
Prevailing Wage Rates requirements apply to this Project because the maximum compensation for all Owner-contracted Work is more than $50,000. Contractor and all subcontractors shall comply with the provisions of ORS 279C.800 through 279C.870, relative to Prevailing Wage Rates. The Bureau of Labor and Industries (BOLI) wage rates and requirements set forth in the following BOLI booklet (and any

listed amendments to that booklet), which are incorporated herein by reference, apply to the Work authorized under this Agreement:

PREVAILING WAGE RATES for Public Works Contracts in Oregon, July 1, 2022 and amended on October 1, 2022, which can be downloaded at the following web address: http://www.oregon.gov/boli/WHD/PWR/Pages/pwr_state.aspx The Work will take place in Clackamas County, Oregon.

Clackamas County encourages bids from Minority, Women, and Emerging Small Businesses.

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

INSTRUCTIONS TO BIDDERS

Clackamas County Local Contract Review Board Rules ("LCRB Rules") govern this procurement process. LCRB Rules may be found at: http://www.clackamas.us/code/documents/appendixc.pdf. The Instructions to Bidders is applicable to the procurement process for Clackamas County, or any component unit thereof identified on the Notice of Public Improvement Contract Opportunity, herein after referred to as the "Owner."

Article 1. Scope of Work

The work contemplated under this contract with the Owner, includes all labor, materials, transportation, equipment and services necessary for, and reasonably incidental to, the completion of all construction work in connection with the project described in the Project Manual which includes, but is not necessarily limited to, the Notice of Public Improvement Contract Opportunity, Instructions to Bidders, Supplemental Instructions to Bidders, Bid Form, Bid Bond, Public Improvement Contract Form, Performance Bond, Payment Bond, and Plans, Specifications and Drawings.

Article 2. Examination of Site and Conditions

Before making a Bid, the Bidder shall examine the site of the work and ascertain all the physical conditions in relation thereto. The Bidder shall also make a careful examination of the Project Manual including the plans, specifications, and drawings and other contract documents, and shall be fully informed as to the quality and quantity of materials and the sources of supply of the materials. Failure to take these steps will not release the successful Bidder from entering into the contract nor excuse the Bidder from performing the work in strict accordance with the terms of the contract at the price established by the Bid.

The Owner will not be responsible for any loss or for any unanticipated costs, which may be suffered by the successful Bidder, as a result of such Bidder's failure to be fully informed in advance with regard to all conditions pertaining to the work and the character of the work required, including site conditions. No statement made by an elected official, officer, agent, or employee of the Owner in relation to the physical or other conditions pertaining to the site of the work will be binding on the Owner, unless covered by the Project Manual or an Addendum.

Article 3. Interpretation of Project Manual and Approval of Materials Equal to Those Provided in the Specifications

If any Bidder contemplating submitting a Bid for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications or forms of contract documents, or detects discrepancies or omissions, such Bidder may submit to the Architect (read "Engineer" throughout in lieu of Architect as appropriate) a written request for an interpretation thereof at least ten (10) calendar days prior to the date set for the Bid Closing.

When a prospective Bidder seeks approval of a particular manufacturer's material, process or item of equal value, utility or merit other than that designated by the Architect in the Project Manual, the Bidder may submit to the Architect a written request for approval of such substitute at least ten (10) calendar days prior to the date set for the Bid Closing. The prospective Bidder submitting the request will be responsible for its prompt delivery.

Requests of approval for a substitution from that specified shall be accompanied by samples, records of performance, certified copies of tests by impartial and recognized laboratories, and such other information as the Architect may request.

To establish a basis of quality, certain processes, types of machinery and equipment or kinds of materials may be specified in the Project Manual either by description of process or by designating a

manufacturer by name and referring to a brand or product designation or by specifying a kind of material. Whenever a process is designated or a manufacturer's name, brand or item designation is given, or whenever a process or material covered by patent is designated or described, it shall be understood that the words "or approved equal" follow such name, designation or description, whether in fact they do so or not.

Any interpretation of the Project Manual or approval of manufacturer's material will be made only by an Addendum duly issued. All Addenda will be posted to the OregonBuys listing and will become a part of the Project Manual. The Owner will not be responsible for any other explanation or interpretation of the Project Manual nor for any other approval of a particular manufacturer's process or item for any Bidder.

When the Architect approves a substitution by Addendum, it is with the understanding that the Contractor guarantees the substituted article or material to be equal or better than the one specified.

Article 4. Security to Be Furnished by Each Bidder

Each Bid must be accompanied by either 1) a cashier's check or a certified check drawn on a bank authorized to do business in the State of Oregon, or 2) a Bid bond described hereinafter, executed in favor of the Owner, for an amount equal to ten percent (10%) of the total amount Bid as a guarantee that, if awarded the contract, the Bidder will execute the contract and provide a performance bond and payment bond as required. The successful Bidder's check or Bid bond will be retained until the Bidder has entered into a contract satisfactory to Owner and furnished a one hundred percent (100%) performance bond and one hundred percent (100%) payment bond. The Owner reserves the right to hold the Bid security as described in Article 10 hereof. Should the successful Bidder fail to execute and deliver the contract as provided for in Article 12 hereof, including a satisfactory performance bond and payment bond within twenty (20) calendar days after the Bid has been accepted by the Owner, then the contract award made to such Bidder may be considered canceled and the Bid security may be forfeited as liquidated damages at the option of the Owner. The date of the acceptance of the Bid and the award of the contract as contemplated by the Project Manual shall mean the date of acceptance specified in the Notice of Intent to Award.

Article 5. Execution of Bid Bond

Should the Bidder elect to utilize a Bid bond as described in Article 4 in order to satisfy the Bid security requirements, such form must be completed in the following manner:

A. Bid bonds must be executed on the County forms, which will be provided to all prospective Bidders by the Owner.

B. The Bid bond shall be executed on behalf of a bonding company licensed to do business in the State of Oregon.

C. In the case of a sole individual, the bond need only be executed as principal by the sole individual. In the case of a partnership, the bond must be executed by at least one of the partners. In the case of a corporation, the bond must be executed by stating the official name of the corporation under which is placed the signature of an officer authorized to sign on behalf of the corporation followed by such person's official capacity, such as president, etc. The corporation seal should then be affixed to the bond.

D. The name of the surety must be stated in the execution over the signature of its duly authorized attorney-in-fact and accompanied by the seal of the surety corporation.

Article 6. Execution of the Bid Form

Each Bid shall be made in accordance with: (i) the sample Bid Form accompanying these instructions; (ii) the appropriate signatures for a sole individual, partnership, corporation or limited liability corporation shall be added as noted in Article 5C above; (iii) numbers pertaining to base Bids shall be stated both in writing and in figures; and (iv) the Bidder's address shall be typed or printed.

The Bid Form relates to Bids on a specific Project

Manual. Only the amounts and information asked for on the Bid Form furnished will be considered as the Bid. Each Bidder shall Bid upon the work exactly as specified and provided in the Bid Form. The Bidder shall include in the Bid a sum to cover the cost of all items contemplated by the Contract. The Bidder shall Bid upon all alternates that may be indicated on the Bid Form. When Bidding on an alternate for which there is no charge, the Bidder shall write the words "No Charge" in the space provided on the Bid Form. If one or more alternates are shown on the Bid Form, the Bidder shall indicate whether each is "add" or "deduct."

Article 7. Prohibition of Alterations to Bid

Bids that are incomplete, or contain ambiguities or have differing conditions required by the Bidder, including requested changes or exceptions to the Public Improvement Contract form or other portions of the Project Manual, may be rejected in Owner's sole and absolute discretion.

Article 8. Submission of Bid

Each Bid shall be sealed in an envelope, properly addressed to the Owner, showing on the outside of the envelope the name of the Bidder and the name of the project. Bids will be received at the time and place stated in the Notice of Public Improvement Contract Opportunity.

Article 9. Bid Closing and Opening of Bids

All Bids must be received by the Owner at the place and time set for the Bid Closing. Any Bids received after the scheduled Bid Closing time for receipt of Bids will be rejected.

At the time of opening and reading of Bids, each Bid received will be publicly opened and read aloud, irrespective of any irregularities or informalities in such Bids.

Generally, Bid results will be posted to the Procurement Website within a couple hours of the opening.

Article 10. Acceptance or Rejection of Bids by Owner

Unless all Bids are rejected, the Owner will award a contract based on the lowest responsive Bid from a responsible Bidder. If that Bidder does not execute the contract, it will be awarded to the next lowest responsible Bidder or Bidders in succession.

The Owner reserves the right to reject all Bids and to waive minor informalities. The procedures for contract awards shall be in compliance with the provisions of the LCRB Rules in effect at that time.

The Owner reserves the right to hold the Bid and Bid security of the three lowest Bidders for a period of thirty (30) calendar days from and after the time of Bid opening pending award of the contract. Following award of the contract the Bid security of the three lowest Bidders may be held twenty (20) calendar days pending execution of the contract. All other Bids will be rejected and Bid security will be returned.

In determining the lowest Bidder, the Owner reserves the right to take into consideration any or all authorized base Bids as well as alternates or combinations indicated in the Bid Form.

If no Bid has been accepted within thirty (30) calendar days after the opening of the Bids, each of the three lowest Bidders may withdraw the Bid submitted and request the return of the Bid security.

Article 11. Withdrawal of Bid

At any time prior to the Bid Closing, a Bidder may withdraw its Bid. This will not preclude the submission of another Bid by such Bidder prior to the time set for the Bid Closing.

After the time set for the Bid Closing, no Bidder will be permitted to withdraw its Bid within the time frames specified in Article 10 for award and execution, except as provided for in that Article.

Article 12. Execution of Contract, Performance Bond and Payment Bond

The Owner will provide the successful Bidder with contract forms within seven (7) calendar days after

the completion of the award protest period. The Bidder is required to execute the contract forms as provided, including a performance bond and a payment bond from a surety company licensed to do surety business in the State of Oregon, within seven (7) calendar days after receipt of the contract forms. The contract forms shall be delivered to the Owner in the number called for and to the location as instructed by the Owner.

Article 13. Recyclable Products

Contractors will use recyclable products to the maximum extent economically feasible in the performance of the Contract.

Article 14. Clarification or Protest of the Solicitation Document or Specifications

Any request for clarification or protest of the solicitation document or specifications must be submitted in the manner provided for in the applicable section of the LCRB Rules to the Procurement Representative referenced in the Notice of Public Improvement Contract Opportunity.

A protest of the Solicitation Document must be received within seven (7) business days of the issuance of the Bid or within three (3) business days of issuance of an addendum.

Requests for clarification may be submitted no less than five (5) business days prior to the Bid Closing Date.

Article 15. Protest of Intent to Award

Owner will name the apparent successful Bidder in a "Notice of Intent to Award" letter. Identification of the apparent successful Bidder is procedural only and creates no right in the named Bidder to the award of the contract. Competing Bidders will be notified by publication of the Notice of Intent to Award on the Clackamas County Procurement Website of the selection of the apparent successful Bidder(s) and Bidders shall be given seven (7) calendar days from the date on the "Notice of Intent to Award" letter to review the file at the Procurement Division office and file a written protest of award, pursuant to C-049-0450. Any award protest must be in writing and must be delivered by hand delivery or mail to the Procurement Division Director at: Procurement Division, 2051 Kaen Road, Oregon City, OR 97045.

Article 16. Disclosure of First-Tier Subcontractors

Within two (2) working hours after the Bid Closing, all Bidders shall submit to the County a disclosure form identifying any first-tier subcontractors (those entities that would be contracting directly with the prime contractor) that will be furnishing labor and materials on the contract, if awarded, whose subcontract value would be equal to or greater than: (a) Five percent (5%) of the total contract price, but at least $15,000; or (b) $350,000, regardless of the percentage of the total contract price.

Disclosures may be submitted with the Bid or may be hand delivered to the Bid Closing address or emailed to procurement@clackamas.us.

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

Project Name: # 2022-109 Linwood Avenue Improvements

The following modify the Clackamas County "Instructions to Bidders" for this Project. Where a portion of the Instructions to Bidders has been modified by these Supplemental Instructions to Bidders, the unaltered portions shall remain in effect.

1. To be eligible for award under this Invitation to Bid, bidders (prime contractors) must submit a prequalification application (either ODOT or County) to the County at least two business days prior to the Bid Closing. County will reject bids from bidders who are not prequalified for the class of work indicated prior to the Bid Closing. **Bidders must be prequalified in Asphalt Concrete Paving & Oiling (ACP), and Earthwork and Drainage (EART).**

2. **Email of Bids -** The County is requiring all bids for this project be electronically submitted. Complete Bids (including all attachments) must be received by the closing time and date 2:00 p.m. Pacific Time, **January 19, 2023**. The Bid must be emailed to the following address: https://bidlocker.us/a/clackamascounty/BidLocker**.** **The email subject line must read "Bid for #2022-109 Linwood Avenue Improvements."** Upon receiving of the bid, the County will send bidders an email confirmation acknowledging receipt. Bids delayed or lost by email system filtering or failures may be considered at Clackamas County's sole and absolute discretion.
   Bids will be publicly read aloud via the computer application, Zoom. Bidders will be allowed to video conference or listen by phone to the bid results. The projects Zoom meeting can be accessed via the information below:

ZOOM LINK

Join Zoom Meeting
https://clackamascounty.zoom.us/j/84512220630

Meeting ID: 845 1222 0630
One tap mobile
+13462487799,,84512220630# US (Houston)
+14086380968,,84512220630# US (San Jose)

Dial by your location
+1 346 248 7799 US (Houston)
+1 408 638 0968 US (San Jose)
+1 669 444 9171 US
+1 669 900 6833 US (San Jose)

+1 719 359 4580 US
+1 253 205 0468 US
+1 253 215 8782 US (Tacoma)
+1 646 931 3860 US
+1 689 278 1000 US
+1 301 715 8592 US (Washington DC)
+1 305 224 1968 US
+1 309 205 3325 US
+1 312 626 6799 US (Chicago)
+1 360 209 5623 US
+1 386 347 5053 US
+1 507 473 4847 US
+1 564 217 2000 US
+1 646 876 9923 US (New York)
Meeting ID: 845 1222 0630
Find your local number: https://clackamascounty.zoom.us/u/kqpXGscyP

****The Apparent Low bid results will be posted to the projects OregonBuys listing as soon as possible following the bid opening.**

3. **Good Faith Effort:** Clackamas County encourages participation in contracts by Historically Underrepresented Businesses. "Historically Underrepresented Businesses" are State of Oregon-certified and self-identified minority, women and emerging small business as well as firms that are certified federally or by another state or entity with substantially similar requirements as the State of Oregon.

   Bidders must perform Good Faith Effort (defined below) and submit **Form 1 and Form 2** for the Bidders Bid to be considered responsive. **Form 1 and Form 2** must be submitted within **two (2) hours** after the Closing Date and Time. Form 1 and Form 2 may be submitted by hand delivery to the location the Bid was due or may email the completed Forms to https://bidlocker.us/a/clackamascounty/BidLocker ."Good Faith Effort" is a requirement of a prime contractor to reach out to at least three Historically Underrepresented Business Subcontractors for each division of work that will be subcontracted out and to complete the required forms. If fewer than three Historically Underrepresented Business Subcontractors are reasonably available for a particular division of work, the Bidder must specifically note the reason for there being fewer than three contacts. The outreach should be performed with sufficient time to give the subcontractors at least 5 calendar days to respond to the opportunity. Form 3, which documents the actual amount of subcontractors on the project, must be submitted with the project final pay application. Compliance with the Good Faith Effort and submission of Forms 1, 2 and 3 is a contractual requirement for final payment.

The sufficiency of the documentation or the performance of Good Faith Effort shall be in the sole and absolute determination of Clackamas County. Only those Bidders that Clackamas County has determined have not sufficiently performed Good Faith Effort shall have protest rights of the determination for such Bidder. No Bidder shall have protest rights of the sufficiency of any other Bidder completing Good Faith Effort.

CLACKAMAS COUNTY
GOOD FAITH EFFORT
SUBCONTRACTOR AND SELF-PERFORMED WORK LIST
(FORM 1)

Prime Contractor Name: Moore Excavation, Inc.

Total Contract Amount:

Project Name: # 2022-109 Linwood Avenue Improvements

PRIME SELF-PERFORMING: Identify below **ALL** GFE Divisions of Work (DOW) to be self-performed. Good Faith Efforts are otherwise required.

DOW BIDDER WILL SELF-PERFORM ***(GFE not required)***

Cellular Concrete	Fence
Flagging	Erosion Control
Tree Removal	CCTV
Trucking Partial	Rock Walls

PRIME CONTRACTOR SHALL DISCLOSE AND LIST ALL SUBCONTRACTORS, including those Minority-owned, Woman-owned, and Emerging Small Businesses ("M/W/ESB") that you intend to use on the project. Hand delivery to Procurement, 2051 Kaen Road, Oregon City, OR 97045 or email to procurement@clackamas.us within 2 hours of the BID/Quote Closing Date/Time

LIST ALL SUBCONTRACTORS BELOW Use **correct legal name** of Subcontractor (No Assumed Business Names)	**Division of Work** (Painting, electrical, landscaping, etc.) List **ALL** DOW performed by Subcontractors	**DOLLAR AMOUNT OF SUBCONTRACT**	If Certified or self-reporting MBE/WBE/ESB Subcontractor Check box ☑		
			MBE	WBE	ESB
Name Vancouver Paving Address 1201 NE 154th St City/St/Zip Vancouver, WA 98665 Phone# (360) 573-7973 OCCB# 63227	asphalt paving	665,500	☐	☐	☐
Name Hicks Striping and Curbing Address P.O. Box 9127 City/St/Zip Brooks, OR 97305 Phone# 503-364-4577 OCCB# 240403	Striping	89,449.50	☐	☐	☐
Name AAKEN Corp. Address 31625 NW Hillcrest St. City/St/Zip North Plains, OR 97133 Phone# 541-330-9545 OCCB# 170901	Electrical	451,285	☐	☐	☐
Name Cutter Construction Address 21410 S. Levi Rd City/St/Zip Beavercreek, OR 97004 Phone# 503-969-5116 OCCB# 666797	Trucking	25,000	☐	☑	☐

GFE SUBCONTRACTOR AND SELF-PERFORMED WORK LIST (FORM 1) cont'd

Prime Contractor Name: Moore Excavation, Inc.
Project Name: # 2022-109 Linwood Avenue Improvements

Total Contract Amount:

LIST ALL SUBCONTRACTORS BELOW Use **correct legal name** of Subcontractor (No Assumed Business Names)	**Division of Work** (Painting, electrical, landscaping, etc.) List **ALL** DOW performed by Subcontractors	**DOLLAR AMOUNT OF SUBCONTRACT**	If Certified or self-reporting MBE/WBE/ESB Subcontractor Check box ☑		
			MBE	WBE	ESB
Name Auden Construction Address 2104 Teakwood AVE City/St/Zip Salem, OR 97304 Phone# 971-304-5552 OCCB# 242599	Bridge	228,800	☐	☐	☐
Name Coral Construction Corp. Address PO Box 347 City/St/Zip Wilsonville, OR 97070 Phone# 503 682 2252 OCCB# 628116	Guardrail	37,777	☐	☐	☐
Name Brothers Concrete Cutting Inc Address 1721 Fescue St SE City/St/Zip Albany, OR 97322 Phone# 541-928-2502 OCCB# 486661	Sawcutting	18,000	☑	☐	☐
Name West Coast Soil Solutions Address 4545 NE 148th St City/St/Zip Portland, OR 97230 Phone# 360-521-2613 OCCB# 206801	Cold Plane	13,915	☐	☐	☐
Name D and D concrete / utilities Address 8319 S Gribble Rd. City/St/Zip Canby, OR 97013 Phone# 503-266-5229 OCCB# 219262	Concrete	1,196,110	☐	☐	☐
Name Knife River Corp. Address 21305 SW Koehler Rd. City/St/Zip Beaverton, OR 97007 Phone# 503-642-2531 OCCB# 2101	Signs	55,810	☐	☐	☐
Name Andres Landscape Address P.O Box 1131 City/St/Zip Oregon City, OR 97045 Phone# 503-632-3366 OCCB# 203183	Landscape	220,501.93	☐	☐	☐

GFE SUBCONTRACTOR AND SELF-PERFORMED WORK LIST (FORM 1) cont'd

Prime Contractor Name: Moore Excavation, Inc.
Project Name: # 2022-109 Linwood Avenue Improvements

Total Contract Amount:

LIST ALL SUBCONTRACTORS BELOW Use **correct legal name** of Subcontractor (No Assumed Business Names)	**Division of Work** (Painting, electrical, landscaping, etc.) List **ALL** DOW performed by Subcontractors	**DOLLAR AMOUNT OF SUBCONTRACT**	If Certified or self-reporting MBE/WBE/ESB Subcontractor Check box ✓		
			MBE	WBE	ESB
Name KeyWest Retaining Systems Address PO Box 1049 City/St/Zip Wilsonville, OR 97070 Phone# 503-682-8400 OCCB# 74421	Retaining Wall	45,955.50	☐	☐	☐
Name Carlson Testing, Inc. Address 8430 SW Hunziker St. City/St/Zip Tigard, OR 97223 Phone# 503-684-3460 OCCB#	Testing	28,000	☐	☐	☐
Name Address City/St/Zip Phone# OCCB#			☐	☐	☐
Name Address City/St/Zip Phone# OCCB#			☐	☐	☐
Name Address City/St/Zip Phone# OCCB#			☐	☐	☐
Name Address City/St/Zip Phone# OCCB#			☐	☐	☐
Name Address City/St/Zip Phone# OCCB#			☐	☐	☐

CLACKAMAS COUNTY
GOOD FAITH EFFORT
M/W/ESB CONTACT / BIDS RECEIVED LOG
(FORM 2)

Prime Contractor: Moore Excavation, Inc.
Project: # 2022-109 Linwood Avenue Improvements

Prime Contractor must contact or endeavor to contact at least 3 M/W/ESB Subcontractors for each Division of Work. Prime Contractor shall record its contacts with M/W/ESB Subcontractors through use of this log (or equivalent) entering all required information. All columns shall be completed where applicable. Additional forms may be copied if needed.

NAME OF M/W/ESB SUBCONTRACTOR	Divisions of Work (Painting, electrical, landscaping, etc.)	Date Sollicitation Letter / Fax Sent	PHONE CONTACT		BID ACTIVITY Check Yes or No			REJECTED BIDS (if bid received & not used)		Notes
			Date of Call	Person Receiving Call	Will Bid	Bid Received	Bid Used	Bid Amount	Reason Not Used (Price, Scope or Other. If Other, explain in Notes>>)	
See attached					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			
					☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			

CLACKAMAS COUNTY

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

BID BOND

Project Name: # 2022-109 Linwood Avenue Improvements

We, Moore Excavation, Inc., as "Principal,"
(Name of Principal)

and Liberty Mutual Insurance Company, an MA Corporation,
(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto Clackamas County ("Obligee") the sum of ($ 10%)

Ten percent of bid and no/100** dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its proposal or bid to an agency of the Obligee in response to Obligee's procurement document (No. 2022-109) for the project identified above which proposal or bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to ten (10%) percent of the total amount of the bid pursuant to the procurement document.

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly authorized legal representatives this 19th day of January, 20 23.

Principal: Moore Excavation, Inc.

By: [signature]
Signature

Scott Pellecer, President
Official Capacity

Attest: Kathy Moore
Corporation Secretary Kathy Moore

Surety: Liberty Mutual Insurance Company

By: Kristen McGillvrey
Attorney-In-Fact

Kristen McGillvrey
Name

PO Box 10167
Address

Eugene, OR 97440
City State Zip

541-687-1117
Phone

541-342-8280
Fax

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: 8209163-969225

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Ashlee Baumgarter; David M. Holland; Dean R. Pollock; Erik Finrow; James R. Cox; Kristen McGilvrey; Summer Hugh; Tina A. Costa

all of the city of Eugene state of OR each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 20th day of December, 2022.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 20th day of December, 2022 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 19th day of January, 2023.

By: Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

BID FORM

PROJECT: # 2022-109 Linwood Avenue Improvements
BID CLOSING: January 19, 2023, 2:00 PM, Pacific Time
BID OPENING: January 19, 2023, 2:05 PM, Pacific Time

FROM: Moore Excavation, Inc.
Bidder's Name (must be full legal name, not ABN/DBA)

TO: https://bidlocker.us/a/clackamascounty/BidLocker.

1. Bidder is (*check one of the following and insert information requested*):

____a. An individual; or

____b. A partnership registered under the laws of the State of _____; or

_X_c. A corporation organized under the laws of the State of Oregon; or

____d. A limited liability corporation organized under the laws of the State of _____;

and authorized to do business in the State of Oregon hereby proposes to furnish all material and labor and perform all work hereinafter indicated for the above project in strict accordance with the Contract Documents for the Basic Bid as follows:
six million, eight hundred twenty thousand, three hundred two dollars and fifty cents Dollars ($ 6,820,302.50)

and the Undersigned agrees to be bound by the following documents:

- Notice of Public Improvement Contract Opportunity
- Instructions to Bidders
- Bid Bond
- Public Improvement Contract Form
- Prevailing Wage Rates
- Plans, Specifications and Drawings
- Supplemental Instructions to Bidders
- Bid Form
- Performance Bond and Payment Bond
- Payroll and Certified Statement Form

- ADDENDA numbered 1 through 2, inclusive *(fill in blanks)*

2. The Undersigned proposes to add to or deduct from the Base Bid indicated above the items of work relating to the following Alternate(s) as designated in the Specifications: **N/A**

3. The Undersigned proposes to add to or deduct from the Base Bid indicated above the items or work relating to the following Unit Price(s) as designated in the Specifications, for which any adjustments in the Contract amount will be made in accordance with the project specifications: **Provide the attached Bid Schedules with Bid.**

4. The work shall be completed within the time stipulated and specified in 00180.50(h) of the Special Provisions for **Clackamas County Development Agency Linwood Avenue Improvements.**

5. Accompanying herewith is Bid Security which is equal to ten percent (10%) of the total amount of the Basic Bid, plus the total sum of Alternatives (if any).

6. The Undersigned agrees, if awarded the Contract, to execute and deliver to Clackamas County, within twenty (20) calendar days after receiving the Contract forms, a Contract Form, and a satisfactory Performance Bond and Payment Bond each in an amount equal to one hundred percent (100%) of the Contract sum, using forms provided by the Owner. The surety requested to issue the Performance Bond and Payment Bond will be:

Liberty Mutual Insurance Company.
(name of surety company - not insurance agency)

The Undersigned hereby authorizes said surety company to disclose any information to the Owner concerning the Undersigned's ability to supply a Performance Bond and Payment Bond each in the amount of the Contract.

7. The Undersigned further agrees that the Bid Security accompanying the Bid is left in escrow with Clackamas County; that the amount thereof is the measure of liquidated damages which the Owner will sustain by the failure of the Undersigned to execute and deliver the above-named Contract Form, Performance Bond and Payment Bond, each as published, and that if the Undersigned defaults in either executing the Contract Form or providing the Performance Bond and Payment Bond within twenty (20) calendar days after receiving the Contract forms, then the Bid Security shall become the property of the Owner at the Owner's option; but if the Bid is not accepted within thirty (30) calendar days of the time set for the opening of the Bids, or if the Undersigned executes and timely delivers said Contract Form, Performance Bond and Payment Bond, the Bid Security shall be returned.

8. The Undersigned certifies that: (i) This Bid has been arrived at independently and is being submitted without collusion with and without any agreement, understanding, or planned common course of action with any other vendor of materials, supplies, equipment or services described in the invitation to bid designed to limit independent bidding or competition; and (ii) the contents of the Bid have not been communicated by the Undersigned or its employees or agents to any person not an employee or agent of the Undersigned or its surety on any Bond furnished with the Bid and will not be communicated to such person prior to the official opening of the Bid.

9. The undersigned ☒ **HAS,** ☐ **HAS NOT** (*check one*) paid unemployment or income taxes in Oregon within the past 12 months and ☒ **DOES,** ☐ **DOES NOT** (*check one*) a business address in Oregon. The undersigned acknowledges that, if the selected bidder, that the undersigned will have to pay all applicable taxes and register to do business in the State of Oregon before executing the Contract Form.

10. The Undersigned agrees, if awarded a contract, to comply with the provisions of ORS 279C.800 through 279C.870 pertaining to the payment of the prevailing rates of wage.

11. Contractor's CCB registration number is 28397. As a condition to submitting a bid, a Contractor must be registered with the Oregon Construction Contractors Board in accordance with ORS 701.035 to 701.055, and disclose the registration number. Failure to register and disclose the number will make the bid unresponsive and it will be rejected, unless contrary to federal law.

12. The successful Bidder hereby certifies that all subcontractors who will perform construction work as described in ORS 701.005(2) were registered with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time the subcontractor(s) made a bid to work under the contract.

13. The successful Bidder hereby certifies that, in compliance with the Worker's Compensation Law of the State of Oregon, its Worker's Compensation Insurance provider is SAIF Corporation, Policy No. 811138, and that Contractor shall submit Certificates of Insurance as required.

14. Contractor's Key Individuals for this project (supply information as applicable):

Project Executive:	Scott Pellecer,	Cell Phone:	503-943-0847,
Project Manager:	Eric Geortler,	Cell Phone:	503-949-3942,
Job Superintendent:	George Wells,	Cell Phone:	503-849-5891,
Project Engineer:	Eric Geortler,	Cell Phone:	503-949-3942.

15. The Undersigned certifies that it has not discriminated against minority, women, or emerging small businesses in obtaining any subcontracts for this project.

16. The Undersigned certifies that it has a drug testing program in accordance with ORS 279C.505.

REMINDER: Bidder must submit the below First-Tier Subcontractor Disclosure Form.

By signature below, Contractor agrees to be bound by this Bid.

NAME OF FIRM Moore Excavation, Inc.

ADDRESS PO Box 789

Fairview, OR 97024

TELEPHONE NO 503-674-0900

EMAIL amber.hill@themeigroup.com

SIGNATURE 1) _____
Sole Individual

or 2) _____
Partner

or 3) _____
Authorized Officer or Employee of Corporation Scott Pellecer, President

* * * * * ***END OF BID*** * * * * *

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
General Conditions						
1	00180	Work Place Harassment Prevention Plan	LS	1	3,500.00	3,500.00
2	00196	Extra Work as Authorized	FA	1	$ 250,000.00	$ 250,000.00
Part 00200 - Temporary Features and Appurtenances						
3	00210	Mobilization	LS	1	500,000.00	500,000.00
4	00221	Temporary Work Zone Traffic Control, Complete	LS	1	260,000.00	260,000.00
5	00225	Stripe Removal	Ft	2,300	1.25	2,875.00
6	00225	Legend Removal	SF	290	6.50	1,885.00
7	00270	Temporary Fence, 6 Ft Chain Link Fence with Concrete Blocks	Ft	1,500	8.00	12,000.00
8	00280	Erosion Control	LS	1	15,000.00	15,000.00
9	00280	Construction Entrance	Ea	1	4500.00	4,500.00
10	00280	Inlet Protection, Type 4 (Bio Bag Inlet Protection)	Ea	17	80.00	1,360.00
11	00280	Inlet Protection, Type 5 (Catch Basin Insert)	Ea	40	120.00	4,800.00
12	00280	Sediment Barrier, Type 3 (Straw Wattles Fiber Rolls)	Ft	1,000	4.75	4,750.00
13	00280	Concrete Washout Facility	LS	1	2,000.00	2,000.00
14	00290	Pollution Control Plan	LS	1	1,500.00	1,500.00
Part 00300 - Roadwork						
15	00310	Removal of Structures and Obstructions	LS	1	110,000.00	110,000.00
16	00310	Removal of Waterline and Steel Girder at Johnson Creek Crossing	LS	1	15,000.00	15,000.00
17	00320	Clearing and Grubbing	LS	1	110,000.00	110,000.00
18	00330	Earthwork, Excavation and Embankment	LS	1	275,000.00	275,000.00
19	00330	General Rock Excavation	CY	200	125.00	25,000.00
20	00331	12 Inch Subgrade Stabilization	SY	600	29.00	17,400.00
21	00350	Subgrade Geotextile	SY	5,000	1.00	5,000.00
22	00390	Loose Riprap, Class 50	CY	20	300.00	6,000.00
Part 00400 - Drainage and Sewers						
23	00430	6 Inch Perforated Storm Pipe with Geotextile Sock, Class "B" Backfill	Ft	765	21.00	16,065.00
24	00445	6 Inch Storm Sewer Pipe, Class "B" Backfill	Ft	174	140.00	24,360.00
25	00445	12 Inch Storm Sewer Pipe, Class "B" Backfill	Ft	281	200.00	56,200.00

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
26	00445	12 Inch Ductile Iron Storm Sewer Pipe, Class "B" Backfill	Ft	355	240.00	85,200.00
27	00445	15 Inch Storm Sewer Pipe, Class "B" Backfill	Ft	824	135.00	111,240.00
28	00445	12 Inch Restrained Sanitary Force Main Ductile Iron Pipe, Class "B" Backfill	Ft	1,708	195.00	333,060.00
29	00445	4 Inch Santiary Sewer Force Main Gravity Overflow Pipe, Class "B" Backfill	Ft	119	125.00	14,875.00
30	00445	4 Inch Sanitary Lateral Extension, Class "B" Backfill	Ea	19	2600.00	49,400.00
31	00470	Concrete Manholes, 48" Flat Top Manhole with Air Release/Air Vacuum Assembly	Ea	1	11,500.00	11,500.00
32	00470	Concrete Manholes, 48" Storm Sewer Standard Manhole	Ea	10	8200.00	82,000.00
33	00470	Concrete Manholes, Combination Curb Inlet Manhole	Ea	1	10,500.00	10,500.00
34	00470	Catch Basin, Type CG-3	Ea	10	3,100.00	31,000.00
35	00470	Catch Basin, Type GB-2	Ea	9	3,100.00	27,900.00
36	00470	Catch Basin, Type Area Drain	Ea	5	1,250.00	6,250.00
37	00470	Beehive Inlet Stormwater Planter Overflow	Ea	16	3,500.00	56,000.00
38	00470	Storm Cleanout	Ea	24	650.00	15,600.00
39	00470	Concrete Inlets, Type Steel Grate Channel Opening at Existing Bridge	Ea	3	5,500.00	16,500.00
40	00490	Minor Adjustments of Manholes	Ea	26	1,100.00	28,600.00
41	00490	Major Adjustments of Manholes	Ea	6	2,800.00	16,800.00
42	00490	Adjusting Inlets	Ea	2	2,000.00	4,000.00
43	00490	Controlled Low Strength Material	CY	60	240.00	14,400.00
44	00490	Filling Abandoned Structures	CY	150	280.00	42,000.00
45	00495	Trench Resurfacing	SY	550	98.00	53,900.00
Part 00500 - Bridges and Walls						
46	00500	Johnson Creek Crossing Structure	LS	1	150,000.00	150,000.00
47	00500	Johnson Creek Crossing Structure Foundations	LS	1	60,000.00	60,000.00
48	00596B	Retaining Wall, Segmental Block (Height 2-4 Foot)	SF	1,050	82.00	86,100.00
49	00596C	Retaining Wall, Cast in Place Concrete with Fence	LS	1	62,000.00	62,000.00
50	00596E	Retaining Wall, Rockery	SF	200	90.00	18,000.00
Part 00600 - Bases						
51	00620	Cold Plain Pavement Removal, 0-4" Deep	SY	12,300	4.75	58,425.00
52	00641	Aggregate Base	CY	2,000	65.00	130,000.00

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
53	00641	Open Graded Aggregate Base for Pervious Pavement	CY	1,200	100.00	120,000.00
54	00641	Chocker Aggregate Base for Pervious Pavement	CY	350	170.00	59,500.00
Part 00700 - Wearing Surfaces						
55	00743	1/2" PAC Mixture	Ton	1,100	215.00	236,500.00
56	00744	Level 3, 1/2" Dense ACP Mixture	Ton	4,200	125.00	525,000.00
57	00759	Concrete Curbs, Standard Curb	Ft	4,015	38.00	152,570.00
58	00759	Concrete Curbs, Curb and Gutter	Ft	7,061	24.00	169,464.00
59	00759	Concrete Curbs, Modified Thickened Curb and Gutter for Stormwater Planters	Ft	873	132.00	115,236.00
60	00759	Concrete Curbs, Vertical Curb Wall	Ft	140	80.00	11,200.00
61	00759	Concrete Curbs, Perimeter Curb Wall for Stormwater Planters	Ft	1,019	120.00	122,280.00
62	00759	Concrete Walks	SF	12,600	10.50	132,300.00
63	00759	Concrete Driveways	SF	18,735	15.00	281,025.00
64	00759	Concrete Driveways, Reinforced	SF	2,006	19.00	38,114.00
65	00759	Concrete Driveways, Reinforced with Rapid Set	SF	929	24.00	22,296.00
66	00759	Concrete Driveway Connection	SF	8,015	16.00	128,240.00
67	00759	Concrete Driveway Connection, Exposed Aggregate	SF	690	25.00	17,250.00
68	00759	Concrete Stairs	CY	10	1,850.00	18,500.00
69	00759	Truncated Domes on New Surfaces	SF	570	42.00	23,940.00
70	00759	Extra For New Curb Ramps	Ea	31	2,400.00	74,400.00
Part 00800 - Permanent Traffic Safety and Guidance Devices						
71	00810	Guardrail, Modifications at Existing Johnson Creek Bridge	LS	1	35,000.00	35,000.00
72	00865	Thermoplastic, Extruded, Surface, Non-Profiled	Ft	15,000	1.30	19,500.00
73	00867	Pavement Legend, Type B-HS: Arrows	Ea	16	250.00	4,000.00
74	00867	Pavement Legend, Type B-HS: Bicycle Lane Stencil	Ea	18	260.00	4,680.00
75	00867	Pavement Legend, Type B-HS: Yield Line Triangle	Ea	11	50.00	550.00
76	00867	Pavement Legend, Type B-HS: Shared Use Path Markings	Ea	80	225.00	18,000.00
77	00867	Pavement Bar, Type B-HS	SF	3,100	8.50	26,350.00
78	00868	Green Bicycle Lane, Preformed Thermoplastic Film	SF	1,200	10.50	12,600.00
Part 00900 - Permanent Traffic Control and Illumination Systems						

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
79	00902	Crosswalk Closure Supports	Ea	8	2,100.00	16,800.00
80	00905	Remove Existing Signs	LS	1	4,000.00	4,000.00
81	00920	Sign Support Footings	LS	1	11,000.00	11,000.00
82	00930	Perforated Steel Square Tube Anchor Sign Supports	LS	1	15,000.00	15,000.00
83	00940	Signs, Standard Sheeting, Sheet Aluminum	SF	560	22.00	12,320.00
84	00987	Telecommunications, Material	LS	1	4,500.00	4,500.00
85	00987	Telecommunications, Installation	LS	1	4,800.00	4,800.00
86	00987	Telecommunications, Splicing and Testing	LS	1	5,500.00	5,500.00
87	00990	Traffic Signal Modifications, SE Linwood Ave and SE King Rd	LS	1	250,000.00	250,000.00
88	00990	Traffic Signal Modifications, SE Linwood Ave and SE Johnson Creek	LS	1	160,000.00	160,000.00
Part 01000 - Right of Way Development and Control						
89	01015	Open Graded Aggregate Base for Stormwater Planters	Ton	80	80.00	6,400.00
90	01015	Washed Drain Rock for Stormwater Planters	Ton	320	65.00	20,800.00
91	01015	Concrete Check Dams	Ea	10	2,100.00	21,000.00
92	01030	Permanent Seeding	Acre	1.0	8,500.00	8,500.00
93	01040	Deciduous Trees, 1/2 Inch Caliper (Mitigation Plantings)	Ea	16	160.00	2,560.00
94	01040	Evergreen Trees, 1/2 Inch Caliper (Mitigation Plantings)	Ea	7	160.00	1,120.00
95	01040	Shrubs, #1 Container (Mitigation Plantings)	Ea	255	12.00	3,060.00
96	01040	Shrubs, #5 Container (Mitigation Plantings)	Ea	91	30.00	2,730.00
97	01040	Water Quality Mixture	CY	180	55.00	9,900.00
98	01040	Topsoil	CY	675	40.00	27,000.00
99	01040	Bark Mulch, 3 Inch Depth	SY	500	4.75	2,375.00
100	01040	Deciduous Trees, 2 Inch Caliper	Ea	106	300.00	31,800.00
101	01040	Groundcover, #1 Container	Ea	1,805	12.00	21,660.00
102	01040	Groundcover, #SP4 Container	Ea	2,514	7.75	19,483.50
103	01040	Wetland, #SP4 Container	Ea	3,560	7.75	27,590.00
104	01040	Root Barrier	Ft	2,120	8.50	18,020.00
105	01044	2nd and 3rd Year Plant Establishment	LS	1	35,000.00	35,000.00
106	01044	2nd and 3rd Year Plant Establishment at Mill Park	LS	1	3,000.00	3,000.00

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
107	01050	Split Rail Wood Fence at Mill Park	Ft	262	62.00	16,244.00
108	01065	Monument Boxes	Ea	10	450.00	4500.00
109	01070	Single Mailbox Supports	Ea	46	725.00	33,350.00
110	01075	Private Property Improvements - Property 4	LS	1	5,200.00	5,200.00
111	01075	Private Property Improvements - Property 17	LS	1	13,400.00	13,400.00
112	01075	Private Property Improvements - Property 20	LS	1	700.00	700.00
113	01075	Private Property Improvements - Property 24	LS	1	9300.00	9,300.00
114	01075	Private Property Improvements - Property 28	LS	1	4,700.00	4,700.00
115	01075	Private Property Improvements - Property 29	LS	1	3,500.00	3,500.00
116	01075	Private Property Improvements - Property 30	LS	1	3,500.00	3,500.00
117	01075	Private Property Improvements - Property 37	LS	1	9,300.00	9,300.00
118	01075	Private Property Improvements - Property 45	LS	1	11,500.00	11,500.00
119	01075	Private Property Improvements - Property 47	LS	1	10,000.00	10,000.00
120	01075	Private Property Improvements - Property 48	LS	1	9,200.00	9,200.00
121	01075	Private Property Improvements - Property 49	LS	1	3,900.00	3,900.00 SP
122	01075	Private Property Improvements - Property 50	LS	1	11,600.00	11,600.00
123	01075	Private Property Improvements - Property 51	LS	1	5300.00	5,300.00
124	01075	Private Property Improvements - Property 54	LS	1	9,100.00	9,100.00
125	01075	Private Property Improvements - Property 56	LS	1	6,200.00	6,200.00
126	01075	Private Property Improvements - Property 58	LS	1	8,000.00	8,000.00
127	01075	Private Property Improvements - Property 59	LS	1	900.00	900.00 SP
128	01075	Private Property Improvements - Property 61	LS	1	4,700.00	4,700.00
129	01075	Private Property Improvements - Property 64	LS	1	3,700.00	3,700.00
130	01075	Private Property Improvements - Property 65	LS	1	7,900.00	7,900.00
131	01075	Private Property Improvements - Property 66	LS	1	12,000.00	12,000.00
132	01075	Private Property Improvements - Property 72	LS	1	12,000.00	12,000.00
Part 01100 - Water Supply Systems						
133	01120	Irrigation System at Mill Park	LS	1	9,500.00	9500.00
134	01120	Repair Private Irrigation Systems	LS	1	11,500.00	11,500.00

Linwood Avenue Improvements

Bid Schedule - Addendum No. 1

January 10, 2023

ITEM	SPEC	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
135	01150	Valve Box Replacement	Ea	10	275.00	2,750.00
136	01160	Remove, Replace and Relocate Fire Hydrant	Ea	3	5,800.00	17,400.00
136.1	01160	Remove, Replace and Relocate Fire Hydrant (City of Milwaukie)	Ea	3	5,800.00	17,400.00
137	01170	Install Long Side Water Service	Ea	15	2,600.00	39,000.00
138	01170	Install Short Side Water Service	Ea	21	2,300.00	48,300.00
138.1	01170	Install Short Side Water Service (City of Milwaukie)	Ea	17	2,300.00	39,100.00
139	01170	Pressure Reducing Valve Assembly	Ea	1	1,800.00	1,800.00

Moore Excavation, Inc. Contractor Name	6,820,302.50 Total Bid (Number)

Six million, eight hundred twenty thousand, Three hundred two dollars and fifty cents

Total Bid (In Words)

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM
PROJECT: #2022-109

BID OPENING: January 19, 2023, 2:00 PM, Pacific Time

Failure to submit this Form by the disclosure deadline will result in a nonresponsive bid.

INSTRUCTIONS:
This First-Tier Subcontractor Disclosure Form ("Form") must be submitted and received at the location specified in the Notice of Public Improvement Contract Opportunity on the advertised Bid Closing, and within two working hours after the advertised Bid Closing Time.

The Form shall be submitted via the project listing on https://bidlocker.us/a/clackamascounty/BidLocker.

Subcontractor lists may be submitted with the bid in the same envelope or email at the Bid Closing date and time. Subcontractor lists **MUST** be submitted within **two (2) hours** of the Bid Closing date and time.

List below the name of each subcontractor that will be furnishing labor, or labor and materials, for which disclosure is required, the category of work that the subcontractor will be performing, and the dollar value of the subcontract. Enter **"NONE"** if the value of the project bid is less than $100,000 or there are no subcontractors that need to be disclosed. ATTACH ADDITIONAL SHEETS IF NECESSARY.

	SUBCONTRACTOR NAME	DOLLAR VALUE	CATEGORY OF WORK
1.	Aaken Corp	$451,285.00	Electrical
2.	D+D Concrete	$1,196,110.00	Concrete
3.	Vancouver Paving	$665,500.00	Asphalt Paving
4.			
5.			
6.			

The above listed first-tier subcontractor(s) are providing labor, or labor and material, with a Dollar Value equal to or greater than:

a) 5% of the total Contract Price, but at least $15,000. If the Dollar Value is less than $15,000 do not list the subcontractor above; or
b) $350,000 regardless of the percentage of the total Contract Price.

Firm Name: Moore Excavation, Inc.

Bidder Signature: _____ Phone # 503-674-0900
Scott Pellecer, President

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

PERFORMANCE BOND

Bond No.: 023224311
Solicitation: #2022-109
Project Name: Linwood Avenue Improvements

Liberty Mutual Insurance Company (Surety #1)		Bond Amount No. 1:	$ 6,820,302.50
_____ (Surety #2)*		Bond Amount No. 2:*	$
* *If using multiple sureties*		Total Penal Sum of Bond:	$ 6,820,302.50

We, Moore Excavation, Inc. as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto Clackamas County, the sum of (Total Penal Sum of Bond) Six Million Eight Hundred Twenty Thousand Three Hundred Two and 50/100** ($6,820,302.50) (Provided, that we the Sureties bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety); and

WHEREAS, the Principal has entered into a contract with Clackamas County, along with the plans, specifications, terms and conditions of which are contained in the above-referenced Solicitation; and

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Performance Bond by reference, whether or not attached to the contract (all hereafter called "Contract"); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and all authorized modifications of the Contract which increase the amount of the work, the amount of the Contract, or constitute an authorized extension of the time for performance, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal herein shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things undertaken by Contractor to be performed under the Contract, upon the terms set forth therein, and within the time prescribed therein, or as extended as provided in the Contract, with or without notice to the Sureties, and shall defend, indemnify, and save harmless Clackamas County and its elected officials, officers, employees and agents, against any direct or indirect damages or claim of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Principal or its subcontractors, and shall in

all respects perform said contract according to law, then this obligation is to be void; otherwise, it shall remain in full force and effect for so long as any term of the Contract remains in effect.

Nonpayment of the bond premium will not invalidate this bond nor shall Clackamas County, be obligated for the payment of any premiums.

This bond is given and received under authority of Oregon Revised Statutes Chapter 279C and the Clackamas County Local Contractor Review Board Rules, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES.

Dated this 20th day of February, 2023

PRINCIPAL: Moore Excavation, Inc.

By: _____
Signature

_____
Official Capacity

Attest: Kathy Moore
Corporation Secretary

SURETY: Liberty Mutual Insurance Company
[Add signatures for each if using multiple bonds]

BY ATTORNEY-IN-FACT:
[Power-of-Attorney must accompany each bond]

Kristen McGillvrey
Name

Kristen McGillvrey
Signature

PO Box 10167
Address

Eugene, OR 97440
City State Zip

541-687-1117 541-342-8280
Phone Fax

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: 8209163-969225

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Ashlee Baumgarter; David M. Holland; Dean R. Pollock; Erik Finrow; James R. Cox; Kristen McGilvrey; Summer Hugh; Tina A. Costa

all of the city of Eugene state of OR each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 20th day of December, 2022.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 20th day of December, 2022 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 20th day of February 2023

By: Renee Llewellyn
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT

PAYMENT BOND

Bond No.: 023224311
Solicitation: #2022-109
Project Name: Linwood Avenue Improvements

Liberty Mutual Insurance Company (Surety #1)		Bond Amount No. 1:	$ 6,820,302.50
(Surety #2)*		Bond Amount No. 2:*	$
** If using multiple sureties*		Total Penal Sum of Bond:	$ 6,820,302.50

We, Moore Excavation, Inc., as Principal, and the above identified Surety(ies), authorized to transact surety business in Oregon, as Surety, hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns firmly by these presents to pay unto Clackamas County, the sum of (Total Penal Sum of Bond) Six Million Eight Hundred Twenty Thousand Three Hundred Two and 50/100** ($6,820,302.50) (Provided, that we the Sureties bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as is set forth opposite the name of such Surety); and

WHEREAS, the Principal has entered into a contract with Clackamas County, along with the plans, specifications, terms and conditions of which are contained in above-referenced Solicitation; and

WHEREAS, the terms and conditions of the contract, together with applicable plans, standard specifications, special provisions, schedule of performance, and schedule of contract prices, are made a part of this Payment Bond by reference, whether or not attached to the contract (all hereafter called "Contract"); and

WHEREAS, the Principal has agreed to perform the Contract in accordance with the terms, conditions, requirements, plans and specifications, and schedule of contract prices which are set forth in the Contract and any attachments, and all authorized modifications of the Contract which increase the amount of the work, or the cost of the Contract, or constitute authorized extensions of time for performance of the Contract, notice of any such modifications hereby being waived by the Surety:

NOW, THEREFORE, THE CONDITION OF THIS BOND IS SUCH that if the Principal shall faithfully and truly observe and comply with the terms, conditions and provisions of the Contract, in all respects, and shall well and truly and fully do and perform all matters and things by it undertaken to be performed under said Contract and any duly authorized modifications that are made, upon the terms set forth therein, and within the time prescribed therein, or as extended therein as provided in the Contract, with or without notice to the Sureties, and shall defend, indemnify, and save harmless Clackamas County and its elected officials, officers, employees and agents, against any claim for direct or indirect damages of every kind and description that shall be suffered or claimed to be suffered in connection with or arising out of the performance of the Contract by the Contractor or its subcontractors, and shall promptly pay all persons supplying labor, materials or both to the Principal or its subcontractors for prosecution of the work provided in the Contract; and shall promptly pay all contributions due the State Industrial Accident Fund and the State Unemployment Compensation Fund from the Principal or its subcontractors in connection with the performance of the Contract; and shall pay over to the Oregon Department of Revenue all sums required to be deducted and retained from the wages of employees of the Principal and its subcontractors pursuant to ORS 316.167, and

shall permit no lien nor claim to be filed or prosecuted against Clackamas County on account of any labor or materials furnished; and shall do all things required of the Principal by the laws of this State, then this obligation shall be void; otherwise, it shall remain in full force and effect for so long as any term of the Contract remains in effect.

Nonpayment of the bond premium will not invalidate this bond nor shall Clackamas County be obligated for the payment of any premiums.

This bond is given and received under authority of Oregon Revised Statutes Chapter 279C and the Clackamas County Local Contractor Review Board Rules, the provisions of which hereby are incorporated into this bond and made a part hereof.

IN WITNESS WHEREOF, WE HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES:

Dated this 20th day of February, 2023.

PRINCIPAL: Moore Excavation, Inc.

By: _____
Signature

_____
Official Capacity

Attest: _____
Corporation Secretary

SURETY: Liberty Mutual Insurance Company
[Add signatures for each if using multiple bonds]

BY ATTORNEY-IN-FACT:
[Power-of-Attorney must accompany each bond]

Kristen McGillvrey
Name

_____
Signature

PO Box 10167
Address

Eugene, OR 97440
City State Zip

541-687-1117 541-342-8280
Phone Fax

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: 8209163-969225

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Ashlee Baumgarter; David M. Holland; Dean R. Pollock; Erik Finrow; James R. Cox; Kristen McGilvrey; Summer Hugh; Tina A. Costa

all of the city of Eugene state of OR each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 20th day of December, 2022.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 20th day of December, 2022 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
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Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 20th day of February 2023

By: Renee Llewellyn
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CLACKAMAS COUNTY

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT
RETAINAGE BOND

Bond No.: 023224312
Solicitation: # 2022-109
Project Name: Linwood Avenue Improvements
Liberty Mutual
Insurance Company (Surety)

Total Penal Sum of Bond: $ 341,015.28

KNOW ALL PERSONS BY THESE PRESENTS,

That Moore Excavation, Inc. ("Principal"), a Corporation,
(Name of Contractor) (Corporation, individual, partnership)

existing under and by virtue of the laws of the State of Oregon and authorized to do business in the State of Oregon, and Liberty Mutual Insurance Company ("Surety") are jointly and severally held and bound unto
(Name of Surety)
Clackamas County ("County") in the sum of Three Hundred Forty One Thousand Fifteen and 28/100*** Dollars ($341,015.28) ("Total Penal Bond Sum") which sum represents five percent (5%) of the Contract Amount on County Contract No. 8P ~~2022-109~~ 7569 ("Contract").

WHEREAS, on the 20th day February of 20 23, the Principal herein executed the Contract with the County for the following described construction project:
Linwood Avenue Improvements, Solicitation #2022-109

WHEREAS, the Contract requires, and ORS 279C.570 allows, the County to reserve as retainage from any progress payment an amount not to exceed five percent from money earned on estimates during the progress of construction, in protection of the County's interests.

IN THIS CASE, the County and Principal agree to reserve as retainage 5% (five percent) of any progress payments.

WHEREAS, the County has agreed to allow a retainage bond in lieu of earned and retained funds for amounts to be withheld.

WHEREAS, the retainage shall be withheld and released in accordance with ORS 279C.555 through 279C.570.

NOW THEREFORE, the parties agree to the following:

1. The condition of this obligation is such that the Surety is held and bound unto the County for the Total Penal Bond Sum, which shall include any increases due to change orders, increases in quantities of work or the

addition of any new item of work, so long as such increases or additions do not cause the face value of this bond to be exceeded. For any change orders or increases that would cause the amount of retainage to be withheld to be greater than the Total Penal Bond Sum, the County will retain such additional sums as necessary to maintain compliance with the County requirement of 5% withheld in accordance with ORS 279C.555 through 279C.570.

2. Neither final payment nor any remaining retained percentage shall become due until the Principal has met all the requirements which would entitle final payment under the terms of the Contract. The terms of the Contract are hereby incorporated by reference.

3. County may require payment of all or a portion of the Total Penal Bond Sum for any purpose authorized by the Contract, in which case County will provide Surety with a written demand at PO Box 34670, Seattle, WA 98124 (address), with an explanation for the reason of the demand. Surety will pay the bond amount within ten (10) days of receiving the demand.

IN WITNESS WHEREOF, THE PARTIES HAVE CAUSED THIS INSTRUMENT TO BE EXECUTED AND SEALED BY OUR DULY AUTHORIZED LEGAL REPRESENTATIVES:

Dated this 20th day of February, 2023

PRINCIPAL: Moore Excavation, Inc.

By: _____
Signature

Scott Pellecer, President
Official Capacity

Attest: _____
Kathy Moore Corporation Secretary

SURETY: Liberty Mutual Insurance Company

BY ATTORNEY-IN-FACT:
[Power-of-Attorney must accompany bond]

Kristen McGillvrey
Name

_____
Signature

PO Box 10167
Address

Eugene, OR 97440
City State Zip

541-687-1117 541-342-8280
Phone Fax

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8209163-969225**

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Ashlee Baumgarter; David M. Holland; Dean R. Pollock; Erik Finrow; James R. Cox; Kristen McGilvrey; Summer Hugh; Tina A. Costa

all of the city of Eugene state of OR each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

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Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 20th day of December, 2022 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: Teresa Pastella, Notary Public

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By: Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

CLACKAMAS COUNTY
PUBLIC IMPROVEMENT CONTRACT
PROJECT INFORMATION, PLANS, SPECIFICATIONS AND DRAWINGS

PROJECT: #2022-109 Linwood Avenue Improvements

Project Background:
The Clackamas County Development Agency is seeking services for construction of the SE Linwood Avenue Improvements Project. The contract will include construction of new sidewalks, shared-use pathways and ADA ramps, landscaping and installation of storm water swales, as well as storm water pipes, manholes and drains, signing and striping and street reconstruction and paving between SE Monroe and SE Johnson Creek Blvd. SE Linwood provides a key north-south transportation link in the neighborhood and improvements, in conjunction with a recently completed Linwood Avenue project by the City of Milwaukie, will provide continuous multi-modal facilities from SE Harmony Road to SE Johnson Creek Blvd., including a link to the Springwater Corridor.

Road improvements will also include mobilization, temporary traffic control, construction survey, drainage work, permanent traffic control, base work, shoulder construction, grading, permanent seeding, sanitary sewer main, and asphalt and concrete wearing surfaces.

Engineers Estimate: $6,564,368.00

Key Dates:
All Basic Bid Work may begin as soon as the Notice to Proceed ("NTP") is issued
Substantial Completion: November 15, 2023
Final Completion: November 30, 2023

Time is of the essence for this Project. Note the Liquidated Damages requirements as described in the project Specifications.

The Scope further includes the following Plans, Specifications and Drawings:

SPECIAL PROVISIONS FOR CONSTRUCTION- CLACKAMAS COUNTY DEVELOPMENT AGENCY, Linwood Avenue Improvements, dated November 2022

Linwood Avenue Final Storm water Report, Dates November 2022 (333 pages)

SE LINWOOD AVENUE IMPROVEMENT PROJECT drawing set (139 pages)

Storm Water Engineering Agreement

SPECIAL PROVISIONS FOR CONSTRUCTION

CLACKAMAS COUNTY DEVELOPMENT AGENCY
CLACKAMAS COUNTY, OREGON
Linwood Avenue Improvement Project

November 2022

100% PSE Submittal Package

Prepared by:

HHPR
Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

SE Linwood Avenue Improvement Project, Clackamas County
Grading, Drainage, Structures, Paving, Signing, Illumination, Signals & Roadside Development

CLACKAMAS COUNTY DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

SPECIAL PROVISIONS

FOR

Grading, Drainage, Structures, Paving, Signing, Illumination, Signals & Roadside Development
Linwood Avenue Improvement Project
Linwood Avenue
Clackamas County

PROFESSIONAL OF RECORD CERTIFICATION:

	I certify the Special Provision Section(s) listed below are applicable to the design for the subject project. Modified Special Provisions were prepared by me or under my supervision. <u>All sections in Special Provisions</u>

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Harper Houf Peterson Righellis Inc. – General Civil Engineering Plans including road improvements, structures, utilities, erosion control, storm detention and treatment, sanitary, water, temporary and permanent traffic control, and landscape plans. HHPR compiled the specification booklet and provided input or information related to special provisions for the above-mentioned sections of work.

DKS Associates – Temporary and permanent traffic control, traffic signals, signing, pavement markings, and street lighting. DKS Associates provided input or information related to the special provisions for the above-mentioned sections of work.

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INFORMATION PROVIDED UNDER SEPARATE COVER

- LINWOOD AVENUE IMPROVEMENTS BID SET DRAWINGS
- BID SCHEDULE

OTHER DOCUMENTS AVAILABLE FOR DOWNLOAD FROM FTP SITE:

FTP site: www.tinyurl.com/LinwoodAve-SupportDocs

- Geotechnical and Pavement Design Reports
- Supplemental Design Information and Project CAD files (incl. surfaces for earthwork)
- Private Utility Designs or Records – PGE, Lumen, etc.
- Contech - 90x10 Sample Bridge Plan
- Clackamas River Water Technical Specifications and Details
- WES – Painting and Coating Specification

SPECIAL PROVISIONS

WORK TO BE DONE

The Plan Sets for this project is entitled:

SE LINWOOD AVENUE IMPROVEMENT PROJECT, CLACKAMAS COUNTY

The Linwood Avenue Project includes the construction of roadway improvements to Linwood Avenue from SE Monroe Street to SE Johnson Creek Boulevard.

Improvements include new curbs, concrete driveways and ADA ramps, widening of the roadway section to add multi-use pathways on both sides of the roadway, storm drainage facilities, landscaping, street lighting, utility adjustments, construction of new bike and pedestrian bridge over Johnson Creek and also to perform additional and incidental Work, as called for by the Specifications and Plan.

APPLICABLE SPECIFICATIONS

The Specifications that are applicable to the Work on this Project are the 2021 edition of the "Oregon Standard Specifications for Construction", as modified by these Special Provisions. All Sections in Part 00100 apply, whether or not modified or referenced in the Special Provisions.

All number references in these Special Provisions shall be understood to refer to the Sections and subsections of the General Conditions or Standard Specifications bearing like numbers and to Sections and subsections contained in these Special Provisions in their entirety.

The construction drawings may include standard drawings or details within the plan set or they may be included by reference. If standard drawings or details are included, it is intended to indicate that this specific drawing be used. If standard drawings or details are referenced, it is intended to indicate that the latest available drawing should be used.

CLASS OF PROJECT

This is a Clackamas County Development Agency Funded Project.

SECTION 00110 - ORGANIZATION, CONVENTIONS, ABBREVIATIONS, AND DEFINITIONS

Comply with Section 00110 of the General Conditions for Construction for Clackamas County modified as follows:

00110.05(a) Grammar - Add the following bullet to the bullet list:

- For the purposes of this Contract, the terms "sidewalk ramp" and "sidewalk ramps" shall respectively referred to and shall be read to mean "curb ramp" and "curb ramps".

00110.05(d) References to Laws, Acts, Regulations, Rules, Ordinances, Statutes, Orders, and Permits

Add the following to the first bullet (Statutes and Rules):

Clackamas County's Local Contract Review Board (LCRB) Rules are accessible online on the County's website:

https://dochub.clackamas.us/documents/drupal/ef976bc9-14f4-495b-9bd8-c69ee7334685

00110.05(e) Reference to Websites - Add the following bullet list to the end of this subsection:

- American Traffic Safety Services Association (ATSSA)

www.atssa.com

Clackamas County's Local Contract Review Board (LCRB) Rules

https://dochub.clackamas.us/documents/drupal/ef976bc9-14f4-495b-9bd8-c69ee7334685

- ODOT Construction Section

www.oregon.gov/odot/construction/pages/index.aspx

- ODOT Construction Section - Qualified Products List (QPL)

www.oregon.gov/ODOT/Construction/Pages/Qualified-Products.aspx

- ODOT Traffic Control Plans Unit

www.oregon.gov/ODOT/Engineering/Pages/Work-Zone.aspx

- ODOT Traffic Standards

www.oregon.gov/ODOT/Engineering/Pages/Signals.aspx

00110.10 Abbreviations

Add the following:

CCDA - Clackamas County Development Agency

DTD - Clackamas County Department of Transportation and Development
LCRB - Local Contract Review Board
ODFW - Oregon Department of Fish and Wildlife
UNS - Utility Notification System
WES - Water Environment Services of Clackamas County

00110.20 Definitions

Add or modify definitions as follows:

Agency – The term "Agency" shall refer to Clackamas County, including the Board of County Commissioners, employees and agents of the County authorized to administer the conditions of these contract documents.

Agreement – The written agreement between the Owner and Contractor covering the work to be performed under the contract.

Amendment – A contract modification for Additional Work, Changed Work, Extra Work, Field Directives, or other changes. An Amendment changes the contract value, scope, and/or time. Amendments require formal approval by the Board of County Commissioners, pursuant to LCRB Rule Division 160, prior to approval of such work.

Approved Equal - Materials or services proposed by the contractor and approved by the County as equal substitutes for those materials or services specified.

Award – Same as “Notice to Award”.

BCC – The Clackamas County Board of County Commissioners

Bid - A written offer by a bidder on forms furnished by the County to do work stated in the bid documents at the prices quoted. "Bid" is synonymous with "proposal" in these bid documents.

Bid Booklet – The bound paper version included in the Solicitation Documents.

Bid Documents- The following documents together comprise the Bid Documents:

- Invitation to Bid, Instructions to Bidders, Bid Form, Bid Proposal, Schedule of Prices, Bid
- Bond, Performance Bond
- Certificate of Insurance, Prevailing Wage Rates
- The "Oregon Standard Specifications for Construction" by ODOT and APWA, 2018 edition.
- Plans and drawings
- Other documents included or referenced in the bid documents
- Addenda, if any
- The Agreement Form and Special Provisions
- Minimum Contractor Qualifications Submittal Form

Bonds - The bond or surety bond is a written document given by the surety and principal to the obligee to guarantee a specific obligation.

Change Order - A price agreement for Extra Work, Changed Work, Field Directives, or other changes. A Change Order does not change the contract value, scope, or time until it is incorporated into an Amendment. Change Orders must be agreed upon, in writing, by the

County Project Manager and/or the Contractor's designated representative, prior to beginning work.

Contract - The written contract agreement, including amendments, signed by the Contractor and Clackamas County, which describes the work to be done, the contract amount, and defines the relationships and obligations of the Contractor and the County.

County - The term "County" shall mean Clackamas County, including the Board of County Commissioners, employees and agents of the County authorized to administer the conditions of these contract documents.

Department – Synonymous with Agency.

Engineer - The County's Project Manager either acting directly or through an authorized representative(s). When referring to approval of extra work or other Contract modifications, "Engineer" also refers to the County's legal authority according to the LCRB rules.

Invitation to Bid - The public announcement (Notice to Contractors) inviting bids for work to be performed or materials to be furnished.

Legal Holiday - As defined in 00170.65 "Minimum Wage and Overtime Rates for Public Works Projects".

Lump Sum - A method of payment providing for one all-inclusive cost for the work or for a particular portion of the work.

Notice of Award - A written notice from the County notifying bidders that the County intends to award to the responsible bidder submitting lowest responsive bid.

ODOT Procurement Office – Clackamas County Procurement Division.

Owner – Synonymous with Agency.

Project Manager – The Owner's representative who directly supervises the engineering and administration of the contract.

Shop Drawings – Synonymous with Working Drawings.

Solicitation Document – Synonymous with Bid Documents.

Standard Drawings – The Agency-prepared detailed drawings for Work or methods of construction that normally do not change from project to project. The Standard Drawings include the ODOT Standard Drawings.

State - Where the term "State" or "State of Oregon" or "ODOT" appears in the contract documents it shall mean "Clackamas County", "State of Oregon", or "ODOT" as applicable because of context.

Substantial Completion – The work or specified parts of the work which are sufficiently complete, in accordance with the contract documents, such that they can be utilized by the County for the purposes intended as determined by the Engineer.

Temporary – Work or Bid Items identified as "temporary" require removal once they are no longer needed. All removal costs are to be considered incidental to the temporary item.

Work Day - Any and every calendar day from January 1 to December 31 of every year, excluding Saturdays, Sundays and legal holidays.

SECTION 00120 – BIDDING REQUIREMENTS AND PROCEDURES

Comply with Section 00120 of the General Conditions for Construction for Clackamas County modified as follows:

00120.00 Prequalification of Bidders - Delete and replace with the following:
See Instructions to Bidders.

00120.01 General Bidding Requirements – Delete and replace with the following:

See Instructions to Bidders.

00120.05 Requests for Solicitation Documents – Delete and replace with the following:

See Notice of Public Improvement Contract and Instructions to Bidders.

Copies of the Oregon Standard Specifications for Construction and Supplements may be purchased from the Oregon Department of Transportation from the Plan Distribution Center in Salem, Oregon.

00120.15 Examination of Work Site and Solicitation Documents; Consideration of Conditions to be Encountered – Delete the third paragraph.

00120.17 Use of Agency-Owned Land for Staging or Storage Areas – Add the following:

Properties 47 and 48 may be available for Contractor staging. See Section 00290.10.

00120.25 Subsurface Investigations - Replace the first two sentences of the first paragraph with the following:

The Agency or its consultant has conducted subsurface or geologic investigations of the Project Site, and the results of these investigations are available at the Clackamas County's PM office and on the project FTP site. Refer to the "Other Documents Available for Download" section following the Table of Contents for link to FTP site.

00120.30 Changes to Plans, Specifications, or Quantities before Opening of Bids - Delete and replace with the following:

See Instructions to Bidders.

00120.40 Preparation of Bid – Delete and replace with the following:

See Instructions to Bidders.

00120.45 Submittal of Bids - Delete and replace with:

See Instructions to Bidders.

00120.50 Submitting Bids for More than One Contract – Delete this subsection.

00120.60 Revision or Withdrawal of Bids - Delete and replace with the following:

See Instructions to Bidders.

00120.68 Mistakes in Bids - Delete and replace with the following:

See Instructions to Bidders.

00120.70 Rejection of Bids – Delete and replace with the following:

See Instructions to Bidders.

00120.95 Opportunity for Cooperative Arrangement – Delete this section**.**

SECTION 00130 - AWARD AND EXECUTION OF CONTRACT

Comply with Section 00130 of the Standard Specifications supplemented and/or modified as follows:

00130.00 Consideration of Bids - Delete third paragraph.

00130.10 Award of Contract - Delete and replace with the following:

See Instructions to Bidders.

00130.15 Right to Protest Award – Delete and replace with the following:

See Instructions to Bidders.

00130.30 Contract Booklet – Add the following:

Other documents are part of the contract documents by reference. These include, but are not limited to:

* The "Oregon Standard Specifications for Construction", 2021 Edition, as published by the Oregon Department of Transportation (ODOT).

* “Oregon Standard Drawings” latest edition, as published by ODOT.

* Clackamas County Service District No. 1 "Surface Water Standard Specifications", latest edition.

* Clackamas County Standard Drawings located at www.clackamas.us/engineering/roadway.html

* Clackamas River Water Specifications and Standard Details located at https://crwater.com/engineering-specifications/

00130.40 Contract Bonds, Certificates, and Registrations - Delete and replace with the following:

See Instructions to Bidders.

00130.50(a) By the Bidder – Delete and replace with the following:

See Instructions to Bidders.

00130.50(b) By the Agency – Delete and replace with the following:

Within 10 Working Days after the Agency has received and verified the properly executed documents specified in the Instructions to Bidders, and received legal sufficiency approval from the Agency's attorney, the Agency will request Clackamas County Board of Commissioners or County Administrator's Approval of the Contract. Approval will occur within 21 Calendar Days after the Agency has received and verified the properly executed documents. The Agency will then send a fully executed Public Improvement Contract (Contract Form) to the successful Bidder, who then officially becomes the Contractor.

00130.70 Release of Bid Guaranties – Delete and replace with the following:

Security deposited by unsuccessful bidders will be returned as soon as practicable after the bid opening.

SECTION 00140 - SCOPE OF WORK

Comply with Section 00140 of the Standard Specifications supplemented and/or modified as follows:

00140.30 Agency-Required Changes in the Work – Delete and replace the last paragraph with the following:

Upon receipt of an Engineer's written order modifying the Work, the Contractor shall perform the Work as modified.

If an Amendment incorporating changes to the Work increases the Contract amount, the Contractor shall notify its Surety of the increase and shall provide the Agency with a copy of any resulting modification to bond documents. The Contractor's performance of Work pursuant to Amendments shall neither invalidate the Contract nor release the Surety. Payment for changes in the Work shall be made in accordance with 00195.20. Contract Time adjustments shall be made in accordance with 00180.80.

00140.31 "As-Built" Records - Add the following section:

Maintain a current and accurate record of the work completed during the course of this contract. This may be in the form of "as-built" drawings kept by accurately marking a designated set of the contract plans with the specified information as the work proceeds. The Contractor's "as-built"

drawings shall be made available for inspection or review at any time throughout construction. Maintenance of accurate, complete and current "as-built" drawings will be a requirement for full partial payment of the work completed. At project completion and as a condition of final payment, the Contractor shall deliver to the Project Manager a complete and legible set of "as-built" drawings.

The "as-built" drawings must show the information listed below. Where the term "locate" or "location" is used, it shall mean record of position with respect to both the construction vertical datum and either construction horizontal datum or a nearby permanent improvement.

1) Record location of underground services and utilities as installed.

2) Record location of existing underground utilities and services that are to remain and that are encountered during the course of the work.

3) Record changes in dimension, location, grade or detail to that shown on the plans.

4) Record changes made by change order.

5) Record details not in the original plans.

6) Provide fully completed shop drawings reflecting all revisions.

00140.70(c) Consideration of Proposal - Add the following to the end of this paragraph:

Cost Reduction Proposals will not be considered during the bidding process.

SECTION 00150 - CONTROL OF WORK

Comply with Section 00150 of the Standard Specifications supplemented and/or modified as follows:

00150.00 Authority of the Engineer – Delete and replace the first sentence with the following:

Except as indicated elsewhere in the Contract (e.g. Amendment approval by the BCC), the Engineer has full authority over the Work and its suspension.

00150.15 Construction Stakes, Lines and Grades – Add the following to the end of Paragraph (b):

The Agency will provide construction staking for all design elements that are specifically identified (by STA/Offset) on the plans, or that can be directly calculated from provided design information. The contractor is responsible for providing their own construction layout for items are shown schematically on construction drawings or that cannot be precisely staked due to field adjustments. These items will need to be laid out in the field (by the contractor) and may need to be field adjusted to fit within project constraints.

The Agency will stake the following:

- Right-of-way or easement lines
- Limits of clearing and limits for demolition of structures (sawcut lines are not staked)
- Utility installation (manholes, catch basins, waterlines, hydrants, etc.)
- Major utility vaults (PGE)
- Rough grading, road subgrade, top of aggregate base
- Road Improvements (curbs, sidewalks, planters, median, etc.)
- Driveways – Stake centerline and width. Contractor field layout remaining points as required for construction
- ADA Ramps (based on Contractor's working drawings). Agency will stake enough to facilitate construction (i.e. front center, back of walk, other critical match points such as signal pole and ped pole elevations). Agency will not stake every sidewalk node/deflection points as contractor is require to field fit & verify ADA requirements are met prior to placing concrete. See 00759.46.
- Signal pole and pedestrian pole installations. Note – Pedestrian pole locations need to be field verified with regard to curb locations and sidewalk joints to ensure ADA requirements are met. Final location may require adjustment to meet field requirements.
- Private property improvements such as parking lots, driveway connections, etc.
- Wall alignments and wall foundations (if shown in plans)
- Station Marks (100-ft stations) to aid contractor-provided striping/marker layout. Agency is not responsible for layout of actual stripes or markers.
- Other items not listed but applicable to similar conditions (location precisely identified in plans)
- All stakes will be one-time only. Any staking requested beyond the "one-time", will be charged at the Agency consultant's rates and deducted from progress payments.

The Agency <u>will not</u> stake the following:

- Temporary Signs (or other Temporary Items) – Temporary signs are shown schematically on plans as minimum distances along an alignment. Temporary signs need to be field located (by contractor) completing the work. Sign locations may need to be adjusted (while meeting minimum requirements) to resolve field conflicts.
- Tree Removal – Typically shown on plans. Inspector can assist.
- Erosion Control – Shown schematically on plans and often varies from field conditions. Contractor to submit erosion control plans following field observation and locate material as required to meet erosion needs. Field adjustments may be required to improve function.
- Signal Loops – Per traffic plans, signal loops are to be located as specific distances from the crosswalk at center of lane. This requires field layout (by contractor).
- Joint trench alignment – Plans show schematic alignments and width/depth varies according to need. Agency will stake other controlling features such as back of walk and obstructions to be avoided to assist in field layout
- Junction Boxes and/or smaller utility vaults. Often shown schematically and installed at sidewalk grade. Agency will stake other controlling design features or obstructions to facilitate placement and structure orientation. Final locations may require adjustment to avoid utility conflicts or to fit within final curb/sidewalk configurations
- Sawcut lines – Utility sawcut lines are a contractor-generated item (dependent on contractor equipment/shoring). Agency will provide staking of actual utility, but

contractor is responsible to generate their own sawcut layout based on the staked alignments. Agency may provide sawcut lines at project limits if field layout not required.

- Temporary and Final striping/ pavement marker layout. Stripe layout to be completed (by contractor) in the field, utilizing actual roadway conditions and plan dimensions. Agency will provide station marks along the alignment (at 100-ft stations) to aid in contractor-layout
- Landscaping and Irrigation
- Other items not listed but meeting any of the following criteria:
  - Shown schematically on plans
  - Requires field adjustment to fit project requirements
  - Dependent on contractor means/methods
  - Other staking requests for contractor convenience

If the contractor requires (or desires) additional layout or convenience staking that is not provided by the Agency, they should include costs for that work in their respective bid items.

00150.40 Cooperation and Superintendence by Contractor:

00150.40(a) General – Add the following:

- Attend weekly construction meeting with the Engineer either on-site or at a location to be determined by the Engineer.

00150.50 Cooperation with Utilities: Add the following to the end of Paragraph (a):

There may be other utility servers who are not specifically listed in these Special Provisions or on the Plans that may be adjusting or inspecting their facilities within the project limits.

00150.50(c) Contractor Responsibilities – Add the following bullet to the end of the bulleted list:

- Hold a Utility scheduling meeting and monthly Utility coordination meetings (see also 00180.42)
- The Contractor will make arrangements for the removal, relocation, or adjustment of utilities and show utility work on the project schedule. The Contractor shall be responsible for coordinating, communicating, and scheduling work with the utility companies through the entire project. The Contractor shall obtain the available plans for utility relocations in the project area from the utility servers.
- The existing underground utilities shown on the Plans have been determined by as-built records and field surveys, but are not guaranteed to be complete or accurate. The Contractor shall be responsible for contacting the individual utility companies to mark locations and arranging with them for any relocation work that should be required.
- The Contractor shall make excavations and borings ahead of the work where necessary to determine the exact location of underground pipes or other features, which might interfere with construction. The Contractor shall support and protect pipes or other services where they cross the trench and shall be responsible for all damages incidental in interruptions of service that may be caused by Contractor operations. Where a new utility line crosses an existing pipeline or other conduit, the trench backfill shall be well compacted in a manner that provides for the required backfill and compaction standards while protecting the utility in question.

- The Contractor shall anticipate that some infrastructure adjustments/modifications (i.e. planters, storm infrastructure, curbs, sidewalks, landscaping, etc.) may be required due to existing utility conflicts. The Contractor shall coordinate with engineer and utility representatives and allow sufficient time to resolve conflicts with design revisions if appropriate
- The Contractor shall coordinate with property owners and utility representatives and make every effort to minimize disruption when transitioning between existing and new utility services.

Add the following subsection:

(f) Utility Contact Information: The following organizations have been identified to possess utilities within the project area:

Utility and Representative

PGE – Power
Brent Baldwin
1705 NE Burnside
Gresham, OR 97030
(503) 736-5470 Office
(503) 351-7345 Cell
Brent.Baldwin@pgn.com

Description of Work/Duration:
PGE power improvements include installation/relocation of poles and adjustment of power lines. Close coordination with PGE by the contractor is critical to the completion of the project within the project timeline. PGE crews may install temporary barriers in front of relocated poles to protect from traffic during construction. PGE crews can be expected to be on-site at any time during the entire duration of the project. Energized power lines overhang portions of the Work with a minimum vertical clearance of 18 feet. Contractor shall maintain at least 10 feet of safety clearance.

PGE – Lighting Services
Rico Torres Solis
(503) 403-9084
209 Warner Milne Road
Oregon City, OR 97045
rodrigo.solis@pgn.com

Description of Work/Duration:
PGE will be installing new street lighting on the relocated power poles. PGE will also be supplementing the lighting along with corridor by installing new wooden poles. Close coordination with PGE by the contractor is critical to the completion of the project within the project timeline. PGE crews can be expected to be on-site at any time during the entire duration of the project.

N.W. Natural Gas
Jeremy Lorence
(503) 226-4211 Ext. 6772
220 NW Second Avenue

Portland, OR 97209
Jeremy.Lorence@nwnatural.com

Description of Work/Duration:
N.W. Natural Gas (NWN) has utilities within the project area. Close coordination with NWN by the contractor is critical to the completion of the project within the project timeline. Contractor to identify existing NWN conflicts and coordinate relocation with NWN. It is expected that individual gas services will need to be relocated to accommodate the new design. NWN crews can be expected to be on-site at any time during the entire duration of the project.

Comcast
Brent Christiansen
7900 NE Killingsworth St
Portland, OR 97218
503-347-0854
Brent_Christiansen@comcast.com

Description of Work/Duration
Comcast will be transferring existing aerial facilities to relocated power poles as well as making adjustments for service drops and any existing vaults/pedestals. Comcast may be relocating their facilities throughout the duration of the project. Close coordination with Comcast by the contractor is critical to the completion of the project within the project timeline. Comcast crews can be expected to be on-site at any time during the entire duration of the project.

CBX Fiber
Duke Dexter
121 Library Ct.
Oregon City, 97045
503-672-5438
Ddexter@clackamas.us

Description of Work/Duration
CBX Fiber will be transferring existing aerial facilities to relocated power poles as well as making adjustments for service drops and any existing vaults/pedestals. CBX Fiber will also require coordination for reconnecting to the signal at King. CBX Fiber may be relocating their facilities throughout the duration of the project. Close coordination with CBX Fiber by the contractor is critical to the completion of the project within the project timeline. CBX Fiber crews can be expected to be on-site at any time during the entire duration of the project.

Lumen
David Dodd
8021 SW Capitol Hill Rd. Rm
Portland, OR 97219
503-242-8849
david.dodd@lumen.com

Description of Work/Duration
Lumen will be transferring existing aerial facilities to relocated power poles as well as making adjustments for service drops and any existing vaults/pedestals. Lumen to relocate existing facilities north of Johnson Creek to accommodate change in grades. Lumen may be relocating their facilities throughout the duration of the project. Close coordination with Lumen by the

contractor is critical to the completion of the project within the project timeline. Lumen crews can be expected to be on-site at any time during the entire duration of the project.

Clackamas River Water District
Joe Eskew
(503) 723-2565
16770 SE 82nd Drive
Clackamas, OR 97015
Jeskew@crwater.com

Description of Work/Duration:
Clackamas River Water District (CRW) relocation work is included in the contract work. This includes but not limited to new water services and hydrant relocations. In addition, CRW may be relocating their facilities and/or observing contracted water improvements throughout the duration of the project. Close coordination with CRW by the contractor is critical to the completion of the project within the project timeline. CRW District personnel can be expected to be on-site at any time during the duration of the project.

City of Milwaukie Water
Ronell Spears
City of Milwaukie
SearsR@milwaukieoregon.gov

Description of Work/Duration:
City of Milwaukie (MWK) work includes relocation of existing water services and hydrants. MWK will be relocating their facilities throughout the duration of the project. Close coordination with the City of Milwaukie by the contractor is critical to the completion of the project within the project timeline. City personnel can be expected to be on-site at any time during the duration of the project.

Clackamas County - Water Environment Services (WES)
Don Kemp
150 Beavercreek Road
Oregon City, OR 97045
503-742-4577
DonKem@co.clackamas.or.us

Description of Work/Duration:
Water Environment Services (WES) improvements are included with the contract work. WES, or a designated authority, will be inspecting and observing relocations and/or adjustments of the sanitary systems. Contractor to coordinate directly with project surveyor during installation of the sanitary force main and allow them to collect GPS survey asbuilt records, as requested, prior to backfill. WES personnel can be expected to be on-site at any time during the duration of the project.

00150.70 Detrimental Operations – Add the following:

Portions of this project will be constructed in close proximity to existing private improvements. All private improvements disturbed by the Contractor's operations shall be repaired or replaced to equal or better condition at the Contractor's expense. To aid in the defense of private property claims against the Contractor and the County, the Contractor shall, prior to start of construction,

provide to the Engineer a digital video recording showing all private property which may be disturbed during construction. The Contractor shall include in the video any areas, public or private, that are to be used as staging to document the pre-construction condition of the surface and limits.

SECTION 00160 - SOURCE OF MATERIALS

Comply with Section 00160 of the General Conditions for Construction for Clackamas County modified as follows:

00160.20 Preferences for Materials – Add "Federal highway funds are NOT involved on this Project."

SECTION 00165 - QUALITY OF MATERIALS

Comply with Section 00165 of the Standard Specifications.

SECTION 00170 - LEGAL RELATIONS AND RESPONSIBILITIES

Comply with Section 00170 of the Standard Specifications supplemented and/or modified as follows:

00170.02 Permits, Licenses, and Taxes – Add the following:

The portion of this project that will be constructed in Clackamas County road right of way and streets will not require any further street opening permits from Clackamas County to perform the work required under this contract.

The contractor must take out all necessary electrical permits and pay all fees for the project including but not limited to the following:

- Signal Installation
- Private lighting modifications
- Private sign connections
- Irrigation power connections
- Plumbing permits for reconnecting private water services
- All other private or public connections

00170.03 Furnishing Right-of-Way and Permits – Add the following:

Add the following bullet items:

- The Contactor must comply with all special requirements of the written agreements between the County and the Property Owners for work on Private property within the limits of the Temporary Construction Easements or as established by the right-of-entries signed by the

property owners to connect driveways to the new roadway. Copies of these agreements are available at Clackamas County upon request.

- The Contractor may not store materials or equipment within project TCE's unless specifically approved by the Project Manager.

00170.61(a) Workers' Compensation - In the paragraph, replace "00170.70(d)" with "the Agreement".

Add the following subsection:

00170.67 Fees - The fee required by ORS 279C.825(1) will be paid by the Agency to the Commissioner of the Oregon Bureau of Labor and Industries under the administrative rules of the Commissioner.

00170.70(a) Insurance Coverages - Add the following to the end of this subsection:

The following insurance coverages and dollar amounts are required pursuant to this subsection:

Insurance Coverages	Combined Single Limit per Occurrence	Annual Aggregate Limit
Commercial General Liability	$1,000,000	$2,000,000
Commercial Automobile Liability	$1,000,000	(aggregate limit not required)

Add the following:

The Contractor shall require that all subcontractors of any tier provide insurance coverage (including additional insured provisions) and limits identical to the insurance required of the Contractor under this contract, unless this requirement is expressly modified or waived by the Agency in writing.

00170.70(d) Additional Insured - Add the following paragraph and bullets to the end of this subsection:

Add the following as Additional Insureds under the Contract:

- Clackamas County and its officers, agents, and employees
- Clackamas County Board of Commissioners
- Harper Houf Peterson Righellis Inc, officers, agents, and employees

00170.72 Indemnity/Hold Harmless - Add the following paragraph and bullets to the end of this subsection:

Extend indemnity, defense and hold harmless to the Agency and the following:

- Clackamas County and its officers, agents, and employees
- Clackamas County Board of Commissioners

- Harper Houf Peterson Righellis Inc. and its officers, agents, and employees

SECTION 00180 - PROSECUTION AND PROGRESS

Comply with Section 00180 of the Standard Specifications supplemented and/or modified as follows:

00180.06 Assignment of Funds Due Under the Contract - Delete first bulleted item.

00180.21 Subcontracting - Add the following to subsection (a):

All contracts with subcontractors or suppliers shall have provisions making the contract assignable to the County, at the option of the County, if the Contractor terminates, goes out of business, declares bankruptcy, or otherwise is unable to perform provided that the County gives the subcontractor notice of assignment within fourteen (14) days of learning of the inability of the Contractor to perform.

00180.40 Limitation of Operations - Add the following to subsection (a):

The Contractor must provide, at a minimum, a 48-hour notice to the Clackamas County Project Manager in order to perform any work on Saturdays.

Some local businesses and private property owners will be affected by construction activities on this project and the Contractor is expected to coordinate and work with them to minimize impacts to homes, businesses and to their customers. Access to homes and businesses impacted by this project must be maintained at all times. The Contractor shall coordinate with owners regarding all work on their property or impacting their parking and/or access to ensure minimal impact or specific needs during construction are met.

Some properties within the project area have negotiated contract work to be included or restrictions that limit construction activities on their properties. The Contractor must comply with all special requirements of the written agreements between the County and the Property Owners for work on Private property within the limits of the Temporary Construction Easements or as established by the right-of-entries signed by the property owners to connect driveways to the new roadway. Copies of these agreements are available from Clackamas County.

Add the following subsection:

00180.40(c) Specific Limitations - Limitations of operations specified in these Special Provisions include, but are not limited to, the following:

Limitations	Subsection
Cooperation with Utilities	00150.50
Cooperation with Other Contractors	00150.55
On-Site Work	00180.40(b)
Contract Time	00180.50(h)
Right-of-Way and Access Delays	00180.65
Closed Lanes	00220.40(e)(1)

Limited Duration Road Closure .....00220.40(f)
Regulated Work Areas ..... 00290.34(a)
Noise Control 00290.32
Maintenance Under Traffic 00620.43
Opening Sections to Traffic..... 00744.51

The Contractor shall be aware of and subject to schedule limitations in the Standard Specifications that are not listed in this subsection.

00180.41 Project Work Schedules – Add the following:

A Type B schedule as detailed in the Standard Specifications is required on this Contract. In addition, a three-week look-ahead schedule shall be prepared by the Contractor on a weekly basis and submitted to the Engineer. It shall include all construction activities planned for the current week and the following three-week period. The three-week look-ahead schedule shall be in a format agreed upon by the Contractor and the Engineer.

00180.42 Preconstruction Conference - Add the following to the end of this subsection:

Before beginning On-Site Work and before the preconstruction conference, the Contractor shall conduct a Utility scheduling meeting with representatives from the Utilities involved with this Project and with the Engineer. The Contractor shall incorporate the time needs of the Utilities into the Contractor's schedule submitted at the preconstruction conference.

The Contractor shall submit a written Utility Coordination Report to the Engineer not later than seven Calendar Days after the Utility scheduling meeting. The Utility Coordination Report shall:

Identify each specific Utility;

Identify Utility contact names and numbers;

Identify dates for Utility scheduling for the entire Project;

Contain documents showing that the Contractor has accomplished Utility locates; and

Contain documents showing that Utility locates, along with applicable construction activities, have been reviewed and discussed on-site with Utility representatives.

The Contractor shall hold monthly Utility coordination meetings with Utilities and the Engineer to coordinate Project activities with Utilities and on-going Utility relocation work. The Contractor shall hold monthly Utility coordination meetings in the office or in the field, as appropriate. The Utility coordination meetings shall include, but not be limited to:

Detailed discussions of existing and abandoned Utilities,

Detailed discussions of de-energizing and re-energizing service lines,

Detailed discussions of critical locations for potholing of Utilities,

Detailed discussions of Project activities, and

Detailed discussions of on-going Utility relocations in upcoming Project activity areas.

During the monthly Utility coordination meetings, the Utilities will provide Utility drawings and discuss the scope, extent, locations, and significance of all Utility facilities before the Contractor

begins work in a new activity area. The Contractor shall incorporate this information into the Project schedules and furnish the Utilities with copies of the updated Project schedules.

The Contractor shall plan and schedule all Utility adjustment operations well in advance of On-Site Work. When the Contractor becomes aware of Utility conflicts not previously identified, the Contractor shall notify the applicable Utilities in writing the same Calendar Day. The Contractor shall allow Utilities at least 30 Calendar Days to relocate (adjust) the Utility conflicts not previously identified.

Submit the following during the preconstruction conference unless otherwise directed:

- The names, addresses, and telephone numbers of two or more persons employed by the Contractor who can be reached day or night to handle emergency matters.

- Subcontractor's list including contact list for each subcontractor with phone numbers and addresses and work to be performed.

- List of personnel authorized to sign change orders and receive progress payment warrants.

- Digital video showing pre-construction record of private property potentially impacted by construction. See 00150.70.

A representative of each subcontractor shall be required to attend the pre-construction conference.

00180.43 Commencement and Performance of Work - Add the following bullet item:

- Conduct the work at all times in a manner and sequence that will ensure minimal interference with traffic. The Contractor shall not begin work that will interfere with work already started. If it is in the County's best interest to do so, the County may require the Contractor to finish a portion or unit of the project on which work is in progress or to finish a construction operation before work is started on an additional portion or unit of the project.

Add the following subsection:

00180.44 Critical Time Periods - Note the following critical time periods, where only certain types of work can be performed throughout the project, and specific completion times for those work items:

- All trees and shrubs which require removal, must be removed by February 28, 2023, to avoid additional costs related to the Migratory Bird Treaty Act (MBTA).

00180.50(h) Contract Time - There is one Contract Time on this Project as follows:

(1) The Contractor shall complete all Work to be done under the Contract, except for plant establishment, not later than November 15, 2023.

The Contractor shall complete all Work to be done under the contract, including the 1st year plant establishment (incidental), and the 2nd and 3rd Year Plant Establishment period, which follows, not later than three years following the date original planted materials are accepted by the County.

00180.65 Right-of-Way and Access Delays - Add the following paragraph:

There are anticipated Right-of-Way delays on this project.

Access for work on Properties 49 and 64 are still in negotiation and may not be available before June 1, 2023.

If a property becomes available sooner than anticipated, the project manager will release it to the Contractor. The contractor may work in the existing ROW in front of these properties.

00180.70 Suspension of Work - Add the following to the first bullet item:

If the Inspector has reason to believe that any safety provisions are not being adhered to, the Inspector will immediately notify the Contractor's site foreman and/or the appropriate person and the County Project Manager. The purpose of this discussion is to determine the validity of the alleged violation. This will also allow the Contractor a reasonable amount of time to correct or improve any of the provisions for safety on this project. If the County Project Manager finds the problem still unresolved or uncorrected, they will notify the Contractor's Project Manager and the County's Risk Management Safety Analyst. If the County's Risk Management Safety Analyst finds that the job site contains any unresolved safety issues they will take appropriate action up to and including suspension of the Contractor's operations on all or part of the Work.

00180.85(b) Liquidated Damages – Remove subsections (1) and (2) and replace with the following:

The liquidated damages for failure to complete the Work per Calendar Day is outlined below:

There shall be liquidated damages given in the following paragraphs (a) and (b):

(a) Complete all tree and shrub removal work associated with MBTA requirements not later than **February 28, 2023**. The daily amount of liquidated damages will be $ 200.

(b) Complete all the Work on time as required by 00180.50(h)(1). The daily amount of liquidated damages will be $ 2,000 per Calendar Day *.

If liquidated damages should become payable concurrently under the combination of 00180.50(h)(1) and (h)(2), liquidated damages will be $ 2,000 per Calendar Day *.

Add the following subsection:

00180.85(c) Lane Closures and Road Closures - Lane closures and road closures beyond the limits specified will inconvenience the traveling public and will be a cost to the Agency.

(1) Lane Closures - It is impractical to determine the actual damages the Agency will sustain in the event traffic lanes are closed beyond the limits listed in 00220.40(e). Therefore, the Contractor shall pay to the Agency, not as a penalty, but as liquidated damages, $500 per 15 minutes, or for

a portion of 15 minutes, per lane, for any lane closure beyond the limits listed in 00220.40(e). In addition to the liquidated damages, all added cost for traffic control measures, including flagging, required to maintain the lane closures beyond the allowed time limits, will be at no additional cost to the Agency. The required traffic control measures will be as determined by the Engineer.

The Engineer will determine when it is safe to reopen lanes to traffic. Assessment of liquidated damages will stop when all lanes have been safely reopened. Any liquidated damages assessed under these provisions will be in addition to those listed in 00180.85(b).

Add the following subsection:

00180.88 Workplace Harassment Prevention Plan – Submit a workplace harassment prevention plan for review 10 days before the preconstruction conference:

- A Contractor-developed workplace harassment prevention plan to ensure all workers, regardless of their identity or status, are guaranteed a safe and respectful work environment. The plan applies, but is not limited to, a worker's race, ethnicity, color, national origin, gender identity, gender expression, sex, sexual orientation, religion, marital or familial status, age, mental or physical disability (as defined by the Americans with Disabilities Act and state law), former incarceration, immigrant status, or veteran status.
- A description of how the plan will be implemented and monitored during the project duration.
- A list of the in-person training that will be conducted for workers of all ranks working on the project.
- A list of meaningful policies including procedures for aggrieved workers in need of recourse.
- How incidents involving bullying or harassment will be investigated and resolved in a prompt, thorough, and impartial manner.

Post on the jobsite and make available that rights of workers on the site for:

a) participation in positive jobsite trainings and
b) copies of policies about hate, intimidation, or harassment including how to report and how to receive support. Materials will be provided in languages inclusive of the workforce.

00180.89 Measurement – No measurement of quantities will be made for workplace harassment prevention plan.

00180.95 Payment – Payment for workplace harassment prevention plan will be for developing and implementing the plan during construction of the project, in-person training, developing meaningful policies, and investigating incidents.

SECTION 00190 - MEASUREMENT OF PAY QUANTITIES

Comply with Section 00190 of the Standard Specifications supplemented and/or modified as follows:

00190.20 Contractor to Provide Vehicle Weigh Scales: Delete and replace subsection (g) with the following:

The Contractor must provide a weigh technician. The Agency will not provide one for the Contractor.

SECTION 00195 - PAYMENT

Comply with Section 00195 of the Standard Specifications supplemented and/or modified as follows:

00195.10 Payment for Changes in Material Costs – Add the following:

There are no clauses for material price escalation/de-escalation in this project, including for Asphalt, Steel, or Fuel. There is no option for Contractor participation.

00195.50 Progress Payments and Retained Amounts - Modify as follows:

00195.50 (b) Retainage - Delete the first paragraph and replace with:

The amount to be retained from progress payments will be 5.0% of the value of Work accomplished and will be retained in one of the forms specified in Subsection (c) below. The County will withhold Retainage from all force account and change order work.

00195.50(c) Forms of Retainage – Delete first paragraph and replace with:

Forms of acceptable retainage are set forth below in Subsections (1) through (3). "Cash, Alternate A" or "Cash, Alternate B" are the Agency-preferred forms of retainage. Unless the Contractor notifies the County otherwise in writing, the County will automatically hold retainage per paragraph (2) "Cash, Alternate B (Interest Bearing Account). If the Agency incurs additional costs as a result of the Contractor's election to use "Bonds and Securities", the Agency may recover such costs from the Contractor by a reduction of the final payment.

Delete and replace paragraph (2) with the following:

> **(2) Cash, Alternate B (Interest Bearing Account)** – Retainage will be deducted from progress payments and held by the Agency until final payment is made in accordance with 00195.90, unless otherwise specified in the Contract.

00195.50(d) Release of Retainage- Delete the first two paragraphs and add the following bullet items:

- When the Work is 50% completed and upon written application of the Contractor and written approval of the Surety, the Engineer may reduce or eliminate retainage on remaining progress payments if the Work is progressing satisfactorily.
- When the work is 100% complete and all contract requirements have been satisfied, all retainage will be released.

SECTION 00196 - PAYMENT FOR EXTRA WORK

Comply with Section 00196 of the Standard Specifications, modified as follows:

Add the following subsection:

00196.90 Extra Work Allowance - The bid schedule of prices contains the bid item “Extra Work as Authorized”. This bid item serves as a contingency for a pre-determined amount of Engineer-ordered Extra Work. All bidders shall reflect this same amount in their total bid. No bidder shall presume in the preparation of the bid or in the course of contract work that there will be a certain payment under that item or a certain order for Extra Work.

The contractor must receive written approval from the Engineer or County Project Manager prior to start of any work to be paid as Extra Work. Any work completed prior to receipt of written approval may not be eligible for compensation.

SECTION 00197 - PAYMENT FOR FORCE ACCOUNT WORK

Comply with Section 00197 of the Standard Specifications.

SECTION 00199 - DISAGREEMENTS, PROTESTS, AND CLAIMS

Comply with Section 00199 of the Standard Specifications supplemented and/or modified as follows:

The Contractor must properly submit a claim as detailed in 00199.30.

00199.40 Claim Review Procedure - Delete the entire section and replace with the following:

The County intends to resolve claims at the lowest possible level.

The Engineer will, as soon as practicable, consider and investigate a Contractor's properly submitted claim for additional compensation. The Engineer will advise the Contractor of the decision to accept or reject the claim, and the reasons for rejecting any part of the claim.

The Contractor has 45 days from the date of the Engineer’s decision to submit a written request for a Project Manager review of the Engineer’s decision. The Project Manager will review the Engineer’s decision on the claim and advise the Contractor of the decision in writing. If the Project Manager finds the claim has merit, an equitable adjustment will be offered. It the Project Manager finds the claim has no merit, no offer of adjustment will be made and the claim will be denied.

If the Contractor does not accept the Project Manager’s decision, then the Contractor shall commence any suit or action to collect or enforce any claim filed in accordance with 00199.30 within a period of 45 days following the mailing of the decision or within 45 days following the date

of "Second Notification", whichever is later. If said suit or action is not commenced within said 45-day period, the Contractor expressly waives any and all claims for additional compensation and any and all causes of suit or action for the enforcement thereof that he might have had.

SECTION 00210 – MOBILIZATION

Comply with Section 00210 of the Standard Specifications.

SECTION 00220 - ACCOMMODATIONS FOR PUBLIC TRAFFIC

Comply with Section 00220 of the Standard Specifications modified as follows:

00220.02(a) General Requirements - Add the following bullets to the end of the bullet list:

- Before activating a modified traffic signal, revising lane usage, implementing new roadway geometry, or removing a "STOP" sign, protect traffic by installing "NEW TRAFFIC PATTERN AHEAD" (W23-2) signing according to 00222.40. Keep the signs in place for 30 Calendar Days after completing the modifications.

- When an abrupt edge is created by excavation, protect traffic according to the "Excavation Abrupt Edge" and the "Typical Abrupt Edge Delineation" configurations shown on the Standard Drawings. Modify the "Typical Abrupt Edge Delineation" configuration by replacing the tubular markers with temporary plastic drums on 40 foot maximum spacing along the abrupt edge.

- When paving operations create an abrupt edge, protect traffic by installing a "DO NOT PASS" (R4-1) sign before the Work Area at sign spacing "A" from the TCD Spacing Table" shown on the Standard Drawings. Alternate "ABRUPT EDGE" (CW21-7) signs with appropriate (CW21-8) rider and "DO NOT PASS" (R4-1) signs at 1/2 mile spacings. Install a "BUMP" (W8-1) sign 100 feet prior to the transverse paving edge.

Section 00220.40(e) Lane Restrictions – Replace this section with the following:

Do not close any traffic lanes and remove all barricades and objects from Linwood Avenue during the following periods:

(1) **Weekdays:**

- Between 7:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m. Monday through Thursday.
- Between 7:00 a.m. and 9:00 a.m. Friday morning.

(2) **Weekends -** Between noon on Friday and sunrise on Sunday.
Lane restrictions may be adjusted at the discretion of the Owner.

Sunrise and sunset hours for “Clackamas County”, for the applicable month(s), to be determined from the following website:

hhtp://www.sunrisesunset.com/USA/Oregon.asp.

(3) **Holidays –** Between noon on the day preceding a legal holiday or holiday weekend and midnight on a legal holiday or the last day of the holiday weekend, except Thanksgiving, when no lanes may be closed between noon on Wednesday and midnight on the following Sunday.

For the purposes of this Section, legal holidays are as follows:
- New Year's Day on January 1
- Memorial Day on the last Monday in May
- Independence Day on July 4
- Labor Day on the first Monday in September
- Thanksgiving Day on the fourth Thursday in November
- Christmas Day on December 25

When a holiday falls on Sunday, the following Monday shall be recognized as a legal holiday. When a holiday falls on Saturday, the preceding Friday shall be recognized as a legal holiday.

(4) **Special Events –** Between noon on the day preceding and midnight on the final day of the special event.

For the purposes of this Section, special events are as follows:
- None

All pedestrian ways will be open, traffic lanes will be unobstructed, and parking will be available to the maximum extent possible. Temporary Protection and Direction of Traffic measures will be placed as necessary for the safe movement of pedestrians, bicycles, and motor vehicles through the construction site.

SECTION 00221 - COMMON PROVISIONS FOR WORK ZONE TRAFFIC CONTROL

Comply with Section 00221 of the Standard Specifications modified as follows:

00221.01 Scope – Add the following at the end of this section:

This Work also includes providing traffic control for Agency-provided surveyors to complete construction staking or other survey services for the project.

00221.03 Traffic Safety and Operations - Replace the bullet that begins “When paving operations create…” with the following bullet:

- When paving operations create an abrupt or sloped edge drop off greater than 1 inch, protect traffic by installing signing according to the "2 Lane, 2 Way Roadway Overlay Area" detail shown on the Standard Drawings. Protect longitudinal and transverse Pavement joints by placing and maintaining an asphalt concrete wedge according to 00221.07(c)(1).

00221.07(c)(1) Paving - Replace this subsection, except subsection number and title, with the following:

When the longitudinal joint is greater than 1 inch in height, install additional TCD according to 00221.03. Complete the placing of ACP and construction of paving joints according to 00735.48, 00735.49, 00743.45, 00744.44, 00744.45, 00745.47, and 00745.48, as applicable.

00221.90(b) Temporary Protection and Direction of Traffic - Delete the bullet that begins "Moving temporary barrier to and from Contractor's stockpile areas".

Replace the bullet that begins "When the Schedule of Items does not include …" with the following bullet:

- Preparing and signing the daily "Traffic Control Inspection Report", when a TCS is not included in the Schedule of Items or when a TCS is not onsite for a work shift.

SECTION 00222 – TEMPORARY TRAFFIC CONTROL SIGNS

Comply with Section 00222 of the Standard Specifications modified as follows:

00222.40(e) Temporary Sign Placement - Add the following to the end of the bullet list:

- At least ten Calendar Days before closing the sidewalk along Linwood Avenue, place a "SIDEWALK CLOSED, Full Time" (CW11-4) sign in advance of each future closure point. Locate the sign so it is legible from the nearest alternate pedestrian pathway facing incoming pedestrian traffic. The sign may be mounted between the panels of a Type II barricade or on a single-post TSS. Do not place the sign or sign support such that it narrows the pedestrian pathway to a width of less than 4 feet.
- Before opening the TPAR, place TPAR signing and other TCM as shown, or as directed. Maintain the "SIDEWALK CLOSED, Full Time" (CW11-4) signs while the TPAR is open to pedestrian traffic.
- At least ten Calendar Days prior to the start of work, place a "SIDEWALK OPEN" (CW11-3) sign in advance of each end of the Work Area. Locate the sign so it is legible from the nearest alternate pedestrian pathway facing incoming pedestrian traffic. The sign may be mounted between the panels of a Type II barricade, or on a single-post TSS. Do not place the sign or support such that it narrows the pedestrian pathway to a width less than 4 feet.
- Before starting work, place pedestrian-specific TCM as shown in the TCP, or as directed. Maintain "SIDEWALK OPEN" (CW11-3) signs while work is affecting the pedestrian pathway.
- Place a "PEDESTRIANS ON ROADWAY" (CW11-2) sign at the beginning of each end of the Work Area, facing incoming traffic as shown, or as directed.
- Install "ROAD WORK AHEAD" (W20-1-48) signs with a 36 by 24-inch "FINES DOUBLE" (R2-6aP) rider on Linwood Ave and intersecting streets, according to the "TCD Spacing Table" shown on the Standard Drawings or as modified by the Plans except do not install the "FINES DOUBLE" rider on concrete barrier mounted signs.
- Install beyond each end of the Project, facing outgoing traffic, an "END ROAD WORK" (CG20-2A-24) sign a distance of (A ÷ 2) according to the "TCD Spacing Table" shown on the Standard Drawings or as modified by the Plans.
- For each leg of the intersection affected by changes to the traffic signal, install the following warning signs:

  - A "Signal Ahead" (W3-3) symbol sign approximately 350 feet in advance of the intersection, shown on the Standard Drawings or as modified by the Plans.
  - A "NEW TRAFFIC PATTERN AHEAD" (W23-2) sign approximately 350 feet in advance of the "Signal Ahead" sign. Keep the "NEW TRAFFIC PATTERN AHEAD" signs in place 30 Calendar Days after installing the "Signal Ahead" sign.
- Install a "NEW TRAFFIC PATTERN AHEAD" (W23-2) sign approximately 350 feet in advance of Linwood Avenue on Johnson Creek Creek Boulevard, facing eastbound incoming traffic.
- Keep the "NEW TRAFFIC PATTERN AHEAD" signs in place 30 Calendar Days after installing the right turn lane.
- Install an 18 by 24-inch "NO PARKING" (R8-3a) sign in every block where on-street parking is prohibited, facing incoming traffic.
- For paving operations on non-freeways, place “ABRUPT EDGE” (CW21-9) and “ROAD WORK XX MPH” (CW20-1a) signs as shown. Use an “XX” value equal to 10 mph below the current posted regulatory speed. If a speed is posted for a temporary regulatory speed reduction, that speed is the current posted regulatory speed.
- For all other moving operations that do not create an abrupt edge adjacent to traffic, omit the “ABRUPT EDGE” signs.
- When construction requires bicycles to use the Traffic Lanes, install a "Bicycle ON ROADWAY" (CW11-1) symbol sign on 1/2 mile spacing through the affected area. Keep the signs in place until completion of the Shoulder or bikeway final surface.

SECTION 00223 - WORK ZONE TRAFFIC CONTROL LABOR AND VEHICLES

Comply with Section 00223 of the Standard Specifications modified as follows:

00223.31(b) Traffic Control Inspection Without TCS - Replace the bullet that begins “Prepares and signs a daily “Traffic Control Inspection Report”…” with the following bullet:

- Prepares and signs a “Traffic Control Inspection Report” (Form No. 734-2474) upon the initial installation of TCM and each working day when any modification, removal, or reinstallation of TCM are made, or as directed by the Engineer. Submit completed reports to the Engineer no later than the end of the next working day.

SECTION 00224 - TEMPORARY TRAFFIC CHANNELIZING DEVICES

Comply with Section 00224 of the Standard Specifications modified as follows:

00224.46 Pavement Edge Delineation - Replace the paragraph that begins “Place tubular or conical markers…” with the following paragraph:

Place tubular or conical markers to delineate the edge of Pavement immediately after construction Work or paving operations create an abrupt or sloped edge drop-off greater than 1 inch in height along the right-hand or left-hand Shoulder.

SECTION 00225 - TEMPORARY PAVEMENT MARKINGS

Comply with Section 00225 of the Standard Specifications modified as follows:

00225.42(b) Wearing Course - Replace the bullet that begins "For left hand solid lines…" with the following bullet:

- For left hand solid lines and skip lines striping, use temporary removable tape or pavement markers.

SECTION 00228 - TEMPORARY PEDESTRIAN AND BICYCLIST ROUTING

Comply with Section 00228 of the Standard Specifications modified as follows:

00228.00 Scope - Replace this subsection, except subsection number and title, with the following:

In addition to the requirements of Section 00221, this Work consists of furnishing, installing, operating, maintaining, inspecting, and removing temporary devices for accommodating pedestrians and bicyclists through a work zone.

00228.13 Temporary Curb Ramps - Add the following sentence to the end of this subsection:

Furnish truncated dome detectable warning surface for temporary curb ramps from the QPL according to 00759.12.

00228.43 Temporary Curb Ramps - Add the following paragraph to the end of this subsection:

Install a minimum 2 foot wide truncated dome detectable warning surface on temporary curb ramps at pedestrian street crossings. Omit truncated dome detectable warning surfaces on temporary curb ramps that are not at a pedestrian street crossing.

00228.90 Payment - Add the following paragraph after the paragraph that begins "In item (c), the type…":

Item (c) includes furnishing and installing truncated dome detectable warning surfaces.

SECTION 00253 - TEMPORARY WORK ACCESS AND CONTAINMENT

Comply with Section 00253 of the Standard Specifications modified as follows:

00253.00 Scope - Add the following paragraph to the end of this subsection:

Provide temporary work access and/or containment at the existing Johnson Creek Bridge for removal of existing waterline and steel girder, and at the proposed Johnson Creek Pedestrian Crossing for installation of concrete decking.

00253.03 Submittals - Replace this subsection, except for the subsection number and title, with the following:

(a) Work Access Submittals - Submit Working Drawings showing how access will be provided to safely complete removal work at Johnson Creek

(b) Work Containment Submittals - Submit all specified drawings, specifications and design calculations for containment, according to 00150.35 at least 21 Calendar Days prior to the proposed work.

(c) Traffic Control and Equipment Staging Plan – Submit plan showing where equipment is staged and how traffic control is managed during removal efforts.

00253.90 Payment – Delete this subsection and replace with the following:

There will be no payment for work completed under this section. Temporary Work Access and Containment is incidental to the work for which it is required.

SECTION 00270 - TEMPORARY FENCES

Comply with Section 00270 of the Standard Specifications, modified as follows:

00270.90 Payment - Add the following pay item:

Pay Item	Unit of Measurement
(d) Temporary Fence, 6 Ft Chain Link Fence with Concrete Blocks……	Foot

SECTION 00280 - EROSION AND SEDIMENT CONTROL

Comply with Section 00280 of the Standard Specifications modified as follows:

00280.00 Scope - Add the following paragraph to the end of this subsection:

The Agency's NPDES 1200-CA Permit is applicable to the Project.

00280.15(f)(1) Filter Sock Material - Add the following sentence to the end of this subsection:

Furnish filter sock material with a diameter of 8 inches.

00280.48 Emergency Materials - Add the following paragraphs after the paragraph that begins "Provide, stockpile, and protect...":

Provide and stockpile the following emergency materials on the Project site:

Item	Quantity
Straw Wattles	300 LF
Biofilter Bags	50 EA

00280.62 Inspection and Monitoring - Replace this subsection, except for the subsection number and title, with the following:

Inspect the Project Site and all ESC devices for potential erosion or sediment movement on a weekly basis and when 1/2 inch or more of rainfall occurs within a 24-hour period, including weekends and holidays.

If a significant noncompliance or serious water quality issue occurs that could endanger health or the environment, verbally report it to the Engineer with 24 hours.

00280.91 Payment – Modify item (h) Concrete Washout Facility to be paid LS. Add the following:

Item (h) includes payment for all concrete washout facilities used on the project. The contractor may choose whether to use large steel boxes as shown in the standard detail or provide smaller disposable concrete washout facilities on an as-needed basis.

For item (j) “Inlet Protection, _____”, the “Type” of inlet protection is as shown in the construction drawings. See sheet 4.6 for reference.

SECTION 00290 - ENVIRONMENTAL PROTECTION

Comply with Section 00290 of the Standard Specifications modified as follows:

00290.10 Staging and Disposal Sites - Add the following to the end of this subsection:

The contractor may be able to utilize Properties 47 and 48 for staging with the following conditions:

- Coordinate with the County Project Manager prior to use
- Protect existing trees as required in 00320
- Protect existing fence. Fence should be securely closed each night.
- Ensure any equipment using or being stored in the staging area is leak free
- Contractor will keep property clean and orderly at all times. Garbage storage is not allowed.
- Fuel storage is not allowed
- Property access will be revoked for violation of these conditions, or any other property abuse.
- Contractor assumes all risk associated with use of the property

- Upon completion, restore the site by:
    - Removing all materials, equipment and other construction debris
    - Clean up any apparent spills or damages
    - Regrade/reseed as required to re-establish vegetation to pre-construction condition.

00290.20(c)(1) General - Add the following:

Railroad ties and painted curbs are to be considered hazardous waste and shall be handled/disposed of as such.

Add the following subsection:

00290.30(a)(7) Water Quality:

Do not discharge contaminated or sediment-laden water, including drilling fluids and waste, or water contained within a work area isolation, directly into any waters of the State or U.S. until it has been satisfactorily treated (using a best management practice such as a filter, settlement pond, bio-bag, dirt-bag, or pumping to a vegetated upland location).

Do not use permanent stormwater quality treatment facilities to treat construction runoff unless prescribed by an ESCP approved under Section 00280

Implement containment measures adequate to prevent pollutants or construction and demolition materials, such as waste spoils, fuel or petroleum products, concrete cure water, silt, welding slag and grindings, concrete saw cutting by-products and sandblasting abrasives, from entering waters of the State or U.S.

Implement containment measures adequate to prevent flowing stream water from coming into contact with concrete or grout within the first 24 hours after placement.

Cease Project operations under high flow conditions that may result in inundation of the Project area, except for efforts to avoid or minimize resource damage.

The Engineer retains the authority to temporarily halt or modify the Work in case of excessive turbidity or damage to natural resources.

If Work activities violate permit conditions or any requirement of this subsection, stop all in-water work activities and notify the Engineer.

00290.32 Noise Control - Add the following paragraphs to the end of this subsection:

The Contractor shall comply with the applicable noise control requirements of the ordinance for project work in Clackamas County.

Copies of the ordinance and noise control code (Title 6.05) are available at the office of the Project Manager or online at www.clackamas.us/code.

00290.36(a) Migratory Birds - Add the following to the end of this subsection:

Do not disturb migratory bird nesting habitat (shrubs, trees, and structures), or clear vegetation from March 1 to September 1 of each year without prior written approval from the Engineer. Notify the Engineer, in writing, a minimum of 10 calendar days prior to starting activities that could harm nesting birds.

Upon receiving Notice to Proceed, and confirmation that affected right-of-way and/or easements have been received, the Contractor shall clear affected vegetation and remove all nesting habitat as required for project construction. To minimize erosion, only remove vegetation above ground surface until construction work is ready to begin in each area of vegetation removal. All nesting habitat removals must be complete by February 28, 2023.

SECTION 00305 - CONSTRUCTION SURVEY WORK

Comply with Section 00305 of the Standard Specifications modified as follows:

00305.00 Scope – Replace this subsection with the following:

The Agency is providing Construction Survey on this project. Refer to 00150.15 for list of items included in this work. Typically, the Agency will stake all design elements that are specifically identified (by STA/Offset) in the plans or that can be directly calculated from provided design information.

If the Contractor desires construction staking of items not included in Agency provided staking, or for their convenience, they will need to provide their own construction survey to complete these tasks.

00305.90 Payment – There will be no payment for Construction Survey Work. Any contractor-provided construction survey will be considered incidental to the item for which it is used.

SECTION 00310 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Comply with Section 00310 of the Standard Specifications modified as follows:

00310.00 Scope - Add the following:

The work shall include the removal and/or relocation of existing landscape features that must be removed for the project. The work shall also include the removal of walls, existing fences and foundations, existing inlets, culverts, and disconnecting, protecting, and/or capping the existing utility lines as shown on the plans.

The work includes removal of the existing above-ground waterline and steel support girder at Johnson Creek. It also includes removal of the concrete support pad/wall at the south end. Remove all materials to minimum depth of 2' below existing ground. Plug and/or cap pipes abandoned in place according to 00490.43.

Add the following subsection:

00310.03 Submittals - Provide unstamped removal plans, according to 00150.35, 28 calendar days before beginning major structure removal work.

Include the following information in the submittal:

- Removal sequence, including contractor staging and traffic staging.
- Detailed schedule of waterline and steel girder removal work.
- Type of equipment that will be used, including size and capacity.
- Equipment location during removal operations.
- Containment Plan for removing materials without impacting Johnson Creek.

Do not begin major removal work until the removal plans have been approved.

00310.40 Restrictions on Removal Work – Add the following:

Prior to beginning major removal work at Johnson Creek, provide work containment to ensure the creek has been protected from miscellaneous construction material falling into it. See Section 00253.

00310.91 Lump Sum Basis – Add the following:

The estimated quantity for items to be removed and paid on the lump sum basis is as follows:

Among other removal work, item (a) includes the removal of AC Pavement, Concrete, Curb and Concrete Surface that is estimated at 10,600 Square Yards. This estimated quantity is provided for the benefit of the Contractor, however the Contractor is responsible for calculation of their own quantity of surfaces and other materials to be removed in preparation of their bid. No payment adjustment will be made based on actual quantities removed.

Sawcutting existing surfaces or structures shall be considered incidental to item (a).

Item (b) includes removal of the existing waterline, steel support structure, and concrete support pad/wall at Johnson Creek. Item (b) also includes work containment to ensure removals can be completed without impacting Johnson Creek. Refer to 00253 for specifications.

SECTION 00320 - CLEARING AND GRUBBING

Comply with Section 00320 of the Standard Specifications modified as follows:

00320.40(a) Clearing Trees and Other Vegetation - Add the following to the end of this subsection:

Trees and vegetation identified for removal within available right of way must be removed by February 28, 2022 to comply with MBTA requirements (See 00290.36(a)).

00320.42 Disposal of Matter - Replace this subsection with the following subsection:

00320.42 Ownership and Disposal of Matter - Vegetation and natural material designated for preservation and salvage are the property of the Agency. All other matter and debris accumulated from clearing and grubbing operations become the Contractor's property at the place of origin. Dispose of all matter and debris according to 00290.20.

00320.90 Payment – Add the following:

No separate or additional payment will be made for trimming existing trees or shrubs that are adjacent to sidewalks, roadways, pathways, etc. as required or as directed by the Engineer.

SECTION 00330 - EARTHWORK

Comply with Section 00330 of the Standard Specifications modified as follows:

00330.02 Definitions - Add the following:

General Rock Excavation – General Rock Excavation is defined as removal of solid bedrock, or ledge rock, which in the opinion of the engineer cannot be excavated or removed by dozers with rippers, or hydraulic excavator, but which requires the use of pneumatic rock splitters, hammers, and wedges.

00330.03 Basis of Performance - Delete this subsection and replace with the following:

00330.03 Basis of Performance – Earthwork to be performed under this specification including excavation, haul, disposal, and embankment construction, unless otherwise specified, will not be measured and will be paid for on the Lump Sum Basis.

00330.14 Selected Granular Backfill - Delete the sentence that begins “Reclaimed glass meeting the requirements of Section 02695…”

00330.15 Selected Stone Backfill - Delete the sentence that begins “Reclaimed glass meeting the requirements of Section 02695…”

00330.41(a)(5) Waste Materials - Replace this subsection, except for the subsection number and title, with the following:

Unless otherwise specifically allowed and subject to the requirements of Section 00280, dispose of materials, classed as waste materials in 00330.41(a)(3), outside and beyond the limits of the Project and Agency controlled property according to 00290.20. Do not dispose of materials on Wetlands, either public or private, or within 300 feet of rivers or streams.

Contractor shall provide written certification to Clackamas County DTD that the waste material is placed in a state approved and local agency approved location. Certification must be delivered to County prior to material leaving the site.

00330.41(e) Blasting – Replace this subsection, except for the subsection number and title, with the following:

Blasting will not be permitted on this project.

00330.42(c-3) Embankment Slope Protection - Add the following paragraph:

Construct the outer 12 inches of embankments with suitable materials to establish slope stabilization through permanent seeding. If suitable material is not available, provide suitable materials from a Contractor-provided source which conforms to the requirements of 00330.11 or 00330.13 and provides favorable conditions for germination of seed and growth of grass.

00330.80 Measurement – Replace the first paragraph and two bulleted items with the following:

- There will be no measurement of quantities for general earthwork. **The Contractor shall complete their own earthwork calculations to confirm the required quantities for their bid.** The Engineer has estimated the following quantities utilizing AutoCAD Civil 3D 2020.

  *Embankment: 400 cubic yards
  *Excavation: 5,000 cubic yards

The Contractor should consider the following when preparing their lump sum bid:

* The Engineer's earthwork volume estimates are calculated as the volume between subgrade of the roadway as indicated on the typical sections and the existing ground surface as indicated in the topographic survey. These estimated volumes do not reflect volumetric adjustments relating to stripping depths or removal of structures and obstructions such as existing asphalt concrete pavement and concrete sidewalks, curbs, and driveways that are identified to be removed. Earthwork quantities also include excavation required at storm planters and for placement of topsoil within the project limits including landscape areas, and other grading outside the limits of the roadway as shown on the plans.

A 5% contingency has been added to the earthwork quantity estimate to make grading adjustments as requested by property owners or directed by the Engineer. This additional 5% work contingency shall be reflected in the Contractor's lump sum bid and will not be measured.

*The quantities estimated above exclude excavation and embankment for the following items, which are paid under the separate specific bid items:

Trench Excavation (Incidental to Pipe Installation)
All Concrete Curbs, Sidewalks (Incidental to those items)
Wall Excavation
All other items where the specifications specifically state that excavation is a part of the bid item

Some rock excavation may be required on this project. The estimated earthwork quantities already include volumes where rock could be encountered. Thus, the bid item for "General Rock Excavation" should be considered an "additional cost" for excavating through rock instead of soil and applies to all locations where excavation may be needed, including mass earthwork, wall excavations and trench excavations.

For some locations on this project, particularly at storm planters and near protected trees, excavation may require gentle excavation techniques such as vacuum excavation or hand excavation to ensure no damage to existing utilities or critical tree roots occurs.

Supplemental design information and AutoCAD Files are available on the project FTP site. For link to the FTP site, refer to the "Other Documents Available for Download" section following the Table of Contents.

00330.91(d) General Excavation - Delete the bullet that begins "Includes unsuitable material…".

00330.92 Kinds of Incidental Earthwork - Add the following bullet to the end of the bullet list:

Earthwork required for driveways and road approaches. Earthwork for driveways and road approaches will be that which is outside the neat line limits shown on the typical sections.

Add the following subsection:

00330.93 Excavation Basis Payment – Add the following pay item:

Pay Item	Unit of Measurement
(f) General Rock Excavation	Cubic Yard

Item (f) will be payment in full for all labor, equipment, tools, removal, disposal, and incidentals necessary to complete the work as required and as specified in these special provisions.

Add the following subsection:

00330.95 Lump Sum Basis - All earthwork, including all excavation and embankment as defined under Section 00330, shall be completed on a Lump Sum Basis under the following pay item:

Pay Item	Unit of Measurement
(a) Earthwork – Excavation and Embankment	Lump Sum

Payment includes payment in full for excavating, selecting, handling, hauling, placement and compaction of the materials as specified, and all other costs associated with furnishing required embankment materials.

No additional payment will be made for gentle excavation techniques such as vacuum- or hand-excavation, where required.

SECTION 00331 - SUBGRADE STABILIZATION

Comply with Section 00331 of the Standard Specifications.

SECTION 00340 - WATERING

Comply with Section 00340 of the Standard Specifications.

SECTION 00350 - GEOSYNTHETIC INSTALLATION

Comply with Section 00350 of the Standard Specifications.

SECTION 00390 - RIPRAP PROTECTION

Comply with Section 00390 of the Standard Specifications.

SECTION 00430 - SUBSURFACE DRAINS

Comply with Section 00430 of the Standard Specifications.

SECTION 00405 – TRENCH EXCAVATION, BEDDING, AND BACKFILL

Comply with Section 00405 of the Standard Specifications modified as follows:

00405.12 Bedding - Replace this subsection, except for the subsection number and title, with the following:

Bedding material shall be ¾”-0 aggregate bedding.

00405.13 Pipe Zone Material – Replace the sentence beginning “For rigid pipes…” with the following:

For rigid pipes, furnish 3/4”-0 base aggregate, conforming to 2630.10

00405.14(b) Class B Backfill – Replace the sentence beginning “Designated size shall be…” with the following:

Designated size shall be 3/4”-0.

00405.46(c)(1) General – Replace the sentence beginning “Use Class B backfill…” with the following:

00405.46(c)(1) General – Use 3/4”-0 backfill.

00405.46(c)(2) Class A, B, C, or D Backfill - Replace the paragraph that begins “Compact the top 3 feet…” with the following paragraph:

Compact each layer of trench backfill material within the Roadway and Shoulders, and within a 2V:1H Slope line projected from each Subgrade Shoulder, to not less than 95 percent of maximum density. Compact all other trench backfill material to not less than 90 percent of maximum density.

00405.90 – Add the following:

Rock Excavation, if required, will be paid under 00330.

SECTION 00440 - COMMERCIAL GRADE CONCRETE

Comply with Section 00440 of the Standard Specifications modified as follows

00440.12 Properties of Commercial Grade Concrete - Replace the bullet that begins "**Slump** - 5 inches…" with the following bullets:

- **Slump** - 5 inches or less
  - For concrete sidewalks, ramps, driveways, or other hand finished surface applications, and when using a high range water reducing admixture, provide a slump of 8 inches or less as approved by the Engineer.

00440.13 Field-Mixed Concrete - Replace the subsection, except for subsection number and title, with the following:

CGC Work items listed in 00440.14(a) may be field-mixed conventionally, or by volumetric/mobile mixers conforming to ASTM C685. When approved, concrete sidewalks, concrete curb ramps, concrete driveways, and other flat concrete surfaces may be field-mixed using volumetric/mobile mixers conforming to ASTM C685, request approval prior to placement. For all other CGC applications, submit written request to the Engineer for approval to use volumetric/mobile mixers conforming to ASTM C685 at least 21 Days prior to placement.

Pre-packaged dry blended concrete from the QPL may be used for Work items listed in 00440.14(a).

00440.14(d) Hardened CGC - Add the following to the end of this subsection:

The ASTV at 28 Days is the average compressive strength of the three cylinders tested. Discard all specimens that show definite evidence, other than low strength, of improper sampling, molding, handling, curing, or testing. The average strength of the remaining cylinders shall then be considered the test result.

00440.40(b) Placing - Add the following bullet to the end of the bullet list:

- When haul time or placement conditions warrant exceeding the time of discharge, submit a detailed breakdown of the estimated time needed from batching to discharge of a load along with the measures that will be taken to ensure slump, temperature and uniformity will be maintained. Submit in advance to establish a new time limit at the Engineer's discretion.

SECTION 00442 - CONTROLLED LOW STRENGTH MATERIALS

Comply with Section 00442 of the Standard Specifications.

SECTION 00445 - SANITARY, STORM, CULVERT, SIPHON, AND IRRIGATION PIPE

Comply with Section 00445 of the Standard Specifications modified as follows.

00445.11 Materials - Modify as follows:

Storm Pipe: Unless otherwise noted, all storm pipe, 12" diameter and larger, shall be ADS SaniTite HP pipe or reinforced concrete pipe. Storm pipe, if required for shallow installations, shall be Class 52 Ductile Iron Pipe.

Sanitary sewer pipe and storm pipe smaller than 12" diameter shall be PVC, ASTM D3034 SDR 35 and shall comply with Clackamas County Service District No. 1 specifications.

Sanitary Force Main pipe shall be 12" Ductile Iron Pipe, meeting the requirements of Section 01140 and 02470. Provide continuous joint restraint per 02475.

00445.40 General – Add the following to the end of the section:

(h) Potholing – The Contractor must pothole all utility crossings to confirm that there are no grade conflicts. If a grade conflict is found, the Contractor shall report immediately to the Engineer. Additionally, the Contractor shall begin coordinating the relocation work with the specific utility company. Some storm or sanitary laterals may require grade adjustment to avoid existing utility conflicts.

00445.70 General – Add the following to the end of the section:

(c) Sanitary Force Main – After completing installation of the pipe, install caps, temporary blowoff assembly, and thrust restraint as required to facilitate pressure testing. Complete hydrostatic testing meeting the requirements of 01140.51.

00445.80(a) Depth – Delete this subsection. There will be no measurement for pipe depth. There will be no adjustment of quantity or payment to account for horizontal or vertical adjustments in the storm or sanitary lateral construction as required to avoid utilities

00445.91 Payment – Delete the subsection and replace with the following:

The accepted quantities of pipe and related work items performed under this Section will be paid for at the Contract unit price, per the unit of measurement, for the following items:

Pay Item	**Unit of Measurement**
(a) _____ inch _____Pipe _____, Class "B" Backfill	Foot
(b) 4 inch Sanitary Lateral Extension, Class "B" Backfill	Each

In item (a), the nominal pipe diameter will be inserted in the first blank. The type of pipe will be inserted in the second blank. If necessary, additional descriptive information will be inserted in the third blank.

Item (b) includes all work required to install a 4-inch sanitary lateral extension, as shown on the plans and in standard drawing SAN-017 on Sheet 15.6, including lateral extension, wye, cleanout riser and cap, and extension behind cleanout, as required.

The two sanitary cleanouts required on the sanitary force main drain line will be constructed similar to the storm cleanout detail and be paid as storm cleanouts.

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

Excavation and backfill for pipes greater than 72 inches in diameter will be paid for according to Section 510.

There will be no separate payment for pipe tees (including inserta tees), pipe wyes, flapper valves, slip joints, sloped end section, safety end section, concrete pipe anchors, concrete closure collars, concrete in blocks, reinforcement used in blocks, and metal pipe anchor. There will be no separate payment for connection to other structures. Installation of these items will be considered incidental and included in payment for the appropriate pipe pay item. Payment will include payment for pipe plugs, stoppers, other fittings required to accomplish the work, furnishing and installing the outer sleeve of the slip joint, furnishing and installing safety end sections, including safety bars when required.

No separate or additional payment will be made for:

- Trench excavation, bedding, pipe zone material, and trench backfill for pipes 72 inches and less in diameter, except when Class E backfill is required per 00445.46(c)(3)
- Adjusting the grade as required to avoid utilities
- pipe plugs, stoppers, and other required fittings
- metal pipe anchors
- tracer wire
- hydrostatic, air, joint, and deflection testing
- video inspection
- temporary pumping/storage of sanitary effluent during transfers (if necessary)
- detention pipe fittings, access structures, or other elements required for construction.
- Sawcutting

When the Contract Schedule of Items does not indicate payment for pipes or other work under this Section, no separate or additional payment will be made. Payment will be included in payment made for the appropriate items under which this work is required.

SECTION 00470 - MANHOLES, CATCH BASINS, AND INLETS

Comply with Section 00470 of the Standard Specifications modified as follows:

00470.42 Precast Concrete Catch Basins and Inlets – Modify as follows:

Precast Concrete Catch Basins and Inlets will not be allowed on this project.

00470.41 (c) – Grates, Frames, Covers and Fittings – Replace the sentence beginning “Set frames, covers and grates true…” with the following:

"Set frames, covers and grates true to the locations and grades established. Use tapered grade rings to ensure rims are set to match grades for both road slope and side slope and provide a smooth finished surface."

Manholes located in the shared use path or sidewalks shall have slip resistant lids.

00470.90 Payment – Modify as follows:

Add the following pay items:

Pay Item		Unit of Measurement
(l)	Beehive Inlet Stormwater Planter Overflow	Each
(m)	Storm Cleanout	Each

Item (m) includes installation of concrete pad as shown in the construction drawings. The two sanitary cleanouts required on the sanitary force main drain line will be constructed similar to the storm cleanout detail and be paid as storm cleanouts.

Bid Item "Concrete Manholes, 48" Flat Top Manhole for Air Release/Air Vacuum Assembly" includes procurement and installation of the 2 Inch Combination Air Release/Air Vacuum Valve Assembly as shown in the project plans and details. The Air Release/Air Vacuum Valve Assembly shall meet the requirements of 01150. This bid item also includes application of a coating on the exposed pipe/fittings within the manhole. Contractor to apply coating per WES requirements and direction, and per the WES Painting and Coating specification, attached to this specification by reference. Refer to the project FTP site for reference.

Delete the paragraph beginning "Payment will be…" and replace with the following:

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, appurtenances and incidentals necessary to complete the work as specified and as shown on individual details for complete installation of the specific items.

SECTION 00490 - WORK ON EXISTING SEWERS AND STRUCTURES

Comply with Section 00490 of the Standard Specifications modified as follows:

00490.10 Materials - Replace the "Precast Concrete Sections" line with the following line:

Precast Concrete Sections…….....02450

00490.43 Abandoning Pipe in Place – Delete the second paragraph and replace with the following:

Fill all abandoned pipes with controlled low-strength material meeting the requirements of Section 00442.

00490.90 Payment – Modify as follows:

Delete Pay Item (g). Connection of an existing pipe or structure to a new pipe, manhole, catch basin or inlet is considered incidental to pipe or structure installation.

Modify Pay Item (h) to pay by the cubic yard (for structures filled with aggregate).

Add Pay Item (j) "Controlled Low Strength Material", paid by the CY. This pay item will be used to pay for CLSM backfill as required and directed by the Engineer.

Valve (water/gas) or Cleanout (storm/sanitary) adjustments to finished grade are incidental and no separate or additional payment will be made. Payment will be included in payment made for the appropriate items under which this Work is required.

SECTION 00495 - TRENCH RESURFACING

Comply with Section 00495 of the Standard Specifications modified as follows.

00495.90 Payment - Add the following:

Trench Resurfacing will only be measured and paid as an interim pavement trench restoration for water lines, storm lines, and sanitary sewer in areas that will have milling and then be overlaid. The pavement thickness shall be the greater of the existing section and what is called out in the plans.

All other Trench resurfacing will be considered incidental to specific item installed.

SECTION 00500 – JOHNSON CREEK CROSSING STRUCTURE

Section 00500, which is not a Standard Specification, is included in the Project by Special Provision.

00500.00 Scope: The Johnson Creek Pedestrian Bridge structure is a design-build structure. For these Bid Plans, the Engineer has prepared a preliminary design using a Contech Continental Pedestrian Bridge System (90' x 10'), however other designs will be considered (this preliminary design is available on the project ftp site). Contractor submitted designs must include all elements of the pedestrian bridge structure, including a steel, 90' x 10' clear span pedestrian and bike bridge at/over Johnson Creek, poured-in-place concrete decking, rub rail, safety rail, and toe rails, and all work necessary for a complete installation of the bridge as shown on the plans.

The bridge foundations have been designed by the engineer and are not subject to change due to permit requirements and limited work area, so the proposed structure must work within the foundation design provided. The work includes installation of the pedestrian bridge, concrete decking, and pre-designed foundations (including drainage and backfill).

Reference the 5.7 series sheets of the construction plans for this work.

The Contractor shall submit engineer-stamped shop drawings and calculations supporting the proposed structure design and related components for review & approval. The pedestrian bridge

needs to be designed with sufficient camber to accommodate the added concrete decking, while meeting the minimum clearance requirements. Bridge structure drawings to include all components of the structure, including bridge, rails, and concrete decking, and matching the pre-engineered foundations.

00500.20 Submittals

1. Submittal Drawings

Schematic drawings and diagrams shall be submitted for review. Submittal drawings shall be unique drawings, prepared to illustrate the specific portion of the work to be done. All relative design information such as member sizes, bridge reactions, and general notes shall be clearly specified on the drawings. Drawings shall have cross referenced details and sheet numbers. All drawings shall be signed and sealed by a Professional Engineer.

2. Structural Calculations

Structural calculations for the bridge superstructure shall be submitted by the bridge manufacturer and reviewed by the approving engineer. All calculations shall be signed and sealed by a Professional Engineer. The calculations shall include all design information necessary to determine the structural adequacy of the bridge, including the following:

- All AASHTO LRFD checks for axial, bending and shear forces in the critical member of each truss member type (i.e. top chord, bottom chord, floor beam, vertical, etc.).
- Checks for the critical connection failure modes for each truss member type (i.e. vertical, diagonal, floor beam, etc.). Special attention shall be given to all welded tube on tube connections.
- All bolted splice connections.
- Main truss deflection checks.
- U-Frame stiffness checks (used to determine K factors for out-of-plane buckling of the top chord) .
- Deck design.

NOTE: The analysis and design of triangulated truss bridges shall account for moments induced in members due to joint fixity where applicable. Moments due to both truss deflection and joint eccentricity must be considered.

00500.40 Construction -

Install prefabricated bridge including preparation of foundations as shown on the plans and per manufactures recommendations.

Contractor to protect Johnson Creek and new bridge structure during placement of concrete decking. Wrap bridge rails with plastic to protect from concrete splash. Clean up any missed areas and restore to new condition. Provide Work containment to prevent concrete spillage or worker equipment from falling into the river. See Section 00253.

00500.80 Measurement - There will be no measurement of quantities for Work in this Section.

00500.90 Payment – The accepted quantities of work performed under this Section will be paid

for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Johnson Creek Crossing Structure	Lump Sum
(b) Johnson Creek Crossing Structure Foundations	Lump Sum

Item (a) includes the prefabricated pedestrian crossing structure, including Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and incidentals necessary to complete the Work as Specified.

No separate additional payment will be made for:

- Excavation, shoring, drainage, and specified backfill
- Foundation concrete, reinforcement, connections
- Concrete decking
- Work containment and/or bridge protection plastic

SECTION 00596B – PREFABRICATED MODULAR RETAINING WALLS

Comply with Section 00596B of the Standard Specifications modified as follows:

00596B.01 Proprietary Prefabricated Modular Walls – The following proprietary retaining wall systems have been preapproved for Prefabricated Modular Block Walls:

- Allan Block Retaining Wall System, telephone: (541-233-7856 - Tanner Weston).
- Approved equal

00596B.03 Definitions - Replace the "**Bin Wall**" definition with the following definition:

Bin Wall - A prefabricated modular gravity retaining wall system type composed of metal or precast concrete modules backfilled with granular material.

Replace the "**Crib Wall**" definition with the following definition:

Crib Wall - A prefabricated modular gravity retaining wall system type composed of interlocking longitudinal and transverse beams made of precast reinforced concrete and backfilled with granular material.

Replace the "**Prefabricated Modular Retaining Wall System**" definition with the following definition:

Prefabricated Modular Retaining Wall System - A basic gravity retaining wall system type composed of solid or hollow prefabricated concrete or steel modules. Hollow modules are typically backfilled with granular material. Prefabricated modular retaining walls include metal and precast concrete bin, precast concrete crib, gabion, dry cast concrete block, and wet cast concrete block gravity retaining walls.

00596B.11(b) Modular Block Core and Drainage Backfill - Replace this subsection, except for the subsection number and title, with the following:

Furnish 3/4" - No. 4 PCC Aggregate Material meeting the requirements of 02690.20(a) through (d) and 02690.20(f).

00596B.44(a)(1) Placement - In the paragraph that begins " Place granular structure backfill with…", replace the first sentence with the following sentence:

Place retaining wall granular backfill with each course of blocks.

00596B.47(b)(2) Maximum Density and Optimum Moisture Content - Replace this subsection, except for the subsection number and title, with the following:

Determine maximum density and optimum moisture content of the retaining wall granular backfill material according to AASHTO T 99 Standard Proctor Method A, with coarse particle correction according to ODOT TM 223.

00596B.80 Measurement – The quantities of Work performed under this Section will be measured on the area basis. The measured quantity will be the square foot area determined by multiplying the length along face of wall by the exposed height of wall.

00596B.90 Payment – Add the following:

The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(d) Retaining Wall, Segmental Block (Height 2-4 Foot)	Square Foot

SECTION 00596C - CAST-IN-PLACE CONCRETE RETAINING WALLS

Comply with Section 00596C of the Standard Specifications modified as follows:

00596C.00 Scope – Add the following:

This work includes construction of the cast-in-place concrete retaining wall at the north end of the Johnson Creek Concrete Structure, as required to bring the pathway to grade. This work also includes construction of 4’ black vinyl fence along the top of the wall as shown.

Add the following:

00596C.16 Fence – Provide fence materials meeting the requirements of 01050.

00596C.80 Measurement – Replace this subsection with the following:

There will be no measurement of quantities for cast-in-place concrete retaining walls

00596C.90 Payment – Replace this subsection with the following:

00596C.90 Payment - The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Retaining Wall, Cast in Place Concrete with Fence	Lump Sum

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

No separate or additional payment will be made for:

- excavation, shoring, and specified backfill
- wall drainage and filter systems
- concrete and reinforcement
- fence, fence post inserts, fence connections, or fence foundation grout

SECTION 00596E – ROCKERY WALLS

Section 000596E, which is not a Standard Specification, is included in the Project by Special Provision.

00596E.01 Scope - Construct rockery retaining walls as shown on the plans.

00596E.06 Experience and Qualifications – Products and work shall be supplied by a Contractor having a minimum 5 consecutive years of experience in rockery wall construction. Contractor shall furnish evidence to the satisfaction of the Engineer of the Contractor's successful experience with products and workmanship used in similar applications.

00596E.43 Wall Construction –

(a) Rockery Retaining Walls – Erect retaining wall components as shown. Construct rockery walls according to the latest edition of the Association of Rockery Contractors' Standard Rockery Construction Guidelines and as shown on the plans. The rockery retaining walls on the plans are custom designed walls.

00596E.80 Measurement – The quantities of Work performed under this Section will be measured on the area basis. The measured quantity will be the square foot area determined by multiplying the length along face of wall by the exposed height of wall.

00596E.90 Payment - The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Retaining Wall, Rockery	Square Foot

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

No separate or additional payment will be made for:

- excavation, shoring, and specified backfill
- wall drainage and filter systems

SECTION 00610 - RECONDITIONING EXISTING ROADWAY

Comply with Section 00610 of the Standard Specifications.

SECTION 00620 - COLD PLANE PAVEMENT REMOVAL

Comply with Section 00620 of the Standard Specifications modified as follows:

00620.40(a) General - Replace this subsection, except for the subsection number and title, with the following:

Remove the existing pavement to the depth, width, grade and cross section shown or as directed. The use of a heating device to soften the pavement is not allowed.

Match Points: At all locations where the area to be cold planed abuts up to existing asphalt roadway, the contractor shall sawcut the asphalt equal to the depth of the cold plane at the match line prior to removal of existing pavement to provide a vertical surfaced, clean joint.

The contractor may need to chip out by hand areas adjacent to existing curbs and structures (i.e. manholes, catch basins, valve boxes, etc.) that are missed by grinding equipment or at transverse joints, as necessary to provide clean edges at the required depth.

00620.43 Maintenance Under Traffic - Replace this subsection, except for the subsection number and title, with the following:

Traffic will be allowed on the cold planed surface up to 5 Calendar Days after starting asphalt grinding work. Sweep and clean the cold planed surface before opening to traffic.

Contractor is to schedule the grind and pavement inlay work to prioritize paving half of the road at a time to minimize number of transverse joints.

Before beginning paving operations, make repairs to the existing cold planed surface as directed. Payment for the repairs will be made according to 00195.20.

00620.90 Payment – Add the following to this section.

Sawcutting required at match points defined in Section 00620.40(a) shall be considered incidental to payment. No additional payment will be made for removal or disposal of pavement fabric or for the “increased cost” of hauling grindings that include pavement fabric.

SECTION 00641 - AGGREGATE SUBBASE, BASE, AND SHOULDERS

Comply with Section 00641 of the Standard Specifications modified as follows:

00641.10(a) Base and Shoulder Aggregate - In the paragraph that begins "Aggregate for bases…", add the following sentence after the first sentence:

Base aggregate shall be 1”- 0 size. Base aggregate shall be “visually” clean. Any visually dirty aggregate base delivered to the project will be rejected.

Add the following subsections:

00641.10(c) Open Graded Aggregate Base for Pervious Pavement – Open Graded Aggregate Base for Pervious Pavement shall be 1 ½” – ¾” crushed rock meeting the requirements of 02690.20.

00641.10(d) Choker Aggregate Base for Pervious Pavement – Open Graded Aggregate Base for Pervious Pavement shall be ¾” – ¼” crushed rock meeting the gradation provided in 02630.11.

00641.20 Mixing Plant - Replace the sentence that begins "Mix aggregate and water…" with the following two sentences:

Mix aggregate and water according to paragraph (a) of this subsection. Road mix is not allowed on this Project.

00641.80 Volume Basis - Replace this subsection, except for the subsection number and title, with the following:

When measurement is by volume, quantities will be the theoretical neat line quantity constructed and accepted.

00641.90 Payment - Add the following Pay Items:

Pay Item	Unit of Measurement
(c) Open Graded Aggregate Base for Pervious Pavement	Cubic Yard
(d) Choker Aggregate Base for Pervious Pavement	Cubic Yard

Add the following to the end of this subsection:

Aggregate base within the road section under both the asphalt pavement section and concrete pavement, and under curb and gutters shall be 1”-0 and will be paid as “Aggregate Base” under 00641.90. See plans for depth requirements.

Crushed rock required under items outside of the road section (i.e. under sidewalks, driveways, etc.) shall be 3/4" – 0 and will be considered incidental to the appropriate bid item. See plans for depth requirements.

SECTION 00730 – EMULSIFIED ASPHALT TACK COAT

Comply with Section 00730 of the Standard Specifications.

00730.90 Payment - Replace this subsection, except for the subsection number and title, with the following:

No separate or additional payment will be made for emulsified asphalt tack coat.

SECTION 00743 - POROUS ASPHALT CONCRETE (PAC)

Comply with Section 00743 of the Standard Specifications modified as follows:

00743.45(b) Drop-Offs - Replace the bullet that begins "Provide warning signs and markings…" with the following bullet:

Provide warning signs and markings according to Sections 00221, 00222, 00224 and 00225 where abrupt or sloped edge drop-offs greater than 1 inch in height occur.

SECTION 00744 - ASPHALT CONCRETE PAVEMENT

Comply with Section 00744 of the Standard Specifications modified as follows:

00744.11(a) Asphalt Cement - Add the following to the end of this subsection:

Provide PG 64-22 grade asphalt cement for this Project.

Add the following subsection:

00744.51 Opening Sections to Traffic - Schedule work so that, during the same shift, the surfaces being paved are paved full width and length through the wearing Course before opening to traffic.

SECTION 00749 - MISCELLANEOUS ASPHALT CONCRETE STRUCTURES

Comply with Section 00749 of the Standard Specifications.

SECTION 00759 - MISCELLANEOUS PORTLAND CEMENT CONCRETE STRUCTURES

Comply with Section 00759 of the Standard Specifications modified as follows:

00759.00 Scope - Add the following:

This work also includes furnishing, placing, and finishing Rapid Set concrete as required for construction of reinforced concrete driveways that need to be restored within 24 hours. Rapid Set concrete is required to achieve full strength within 8 hours of placement.

Add the following:

All work must meet the requirements of the American with Disabilities Act (ADA).

Add the following subsection:

00759.01 Terminology - According to 00110.05(a), for the purposes of this Contract, the terms "sidewalk ramp" and "sidewalk ramps" shall respectively refer to and shall be read to mean "curb ramp" and "curb ramps".

00759.03(b) Curb Ramp Plan - Replace the bullet that begins “Compliance with Working Drawings and details…” with the following bullet:

Comply with Working Drawings and details submitted under 00759.03(a)

00759.10 Materials - Add the following:

Furnish Rapid Set Concrete only where directed by the Engineer. Submit product for approval prior to placement. Rapid Set concrete is required to achieve full strength within 8 hours of placement.

00759.11 Aggregate Base - Add the following to the end of this subsection:

Aggregate base within the road section (i.e. under “Concrete Curb” or “Concrete Curb and Gutter”) shall be 1”-0 and will be paid as “Aggregate Base” under 00641.90. See plans for depth requirements.

Crushed rock required under items outside of the road section (i.e. under sidewalks, driveways, etc.) shall be 3/4” – 0 and will be considered incidental to the appropriate bid item. See plans for depth requirements.

00759.43 Foundation Preparation - Add the following to the end of this subsection:

For medians, curbs for medians, or traffic separators constructed on existing asphalt surfaces, notify Engineer when forms are set to confirm lines and grades of structures. Do not begin placement of concrete until Engineer has reviewed and approved the layout and form grades.

00759.90 Payment – Add the following Pay Items:

Pay Item	Unit of Measurement
(o) Concrete Driveways, Reinforced with Rapid Set Concrete	Square Foot
(p) Concrete Driveway Connection, _____	Square Foot

Replace the paragraph that begins " Item (k) includes the additional Work required …" with the following paragraph:

Item (k) includes the additional Work required to construct a curb ramp or replace an existing curb ramp. Payment for the area of the curb ramp will be made under the concrete walks Pay item.

Add the following:

Items “Concrete Curbs, Modified Thickened Curb and Gutter for Stormwater Planters” and “Concrete Curbs, Perimeter Curb Wall for Storm Planters, include installation of Black Plastic Liner adjacent to planter curbs as shown in the project details. “Thickened Curb and Gutter” also includes construction of inlet/outlet breaks in the curb line and installation of transition concrete between back of curb opening and concrete pad in planter.

Item (o) includes construction of concrete driveways with Rapid Set concrete, required to achieve strength within 8 hours of placement. This is intended for the reinforced concrete driveway at the Chevron gas station, Property 69/70. This driveway can be closed for a maximum of 24 hours to complete all removal and replacement work.. Contractor to coordinate with property owner to schedule a time around fuel deliveries for the driveway to be replaced. Schedule all demolition, removals, staking, grading, and installation of new driveway to restore the driveway to function within 24 hours.

Item (p) includes concrete driveway connections between back of walk and connection to existing driveway. If necessary, the type of concrete will be inserted in the blank.

Aggregate base within the road section (i.e. under “Concrete Curb” or “Concrete Curb and Gutter”) shall be 1”-0 and will be paid as “Aggregate Base” under 00641.90. See plans for depth requirements.

Crushed rock required under items outside of the road section (i.e. under sidewalks, driveways, etc.) shall be 3/4” – 0 (except as noted in 00759.11), and will be considered incidental to the appropriate bid item. See plans for depth requirements.

No separate or additional payment will be made for Sidewalk Ramp Working Drawings, Sidewalk Ramp Plan, Preplacement Conference, concrete form verification, and any necessary repair, removal or replacement of Sidewalk Ramps.

No separate or additional payment will be made for providing supervisory personnel who have an active ODOT ADA Certification for Contractors to directly supervise the curb ramp Work.

SECTION 00810 - METAL GUARDRAIL

Comply with Section 00810 of the Standard Specifications modified as follows:

00810.11 Scope – Revise this subsection as follows:

This Work consists of guardrail modifications the existing guardrail at the Johnson Creek Crossing, and includes removal of portions of the existing guardrail, and replacement with new guardrail and end pieces. The work includes assembly and erection of all components, parts, and materials complete at the locations shown or directed.

00810.80 Measurement – Revise this subsection as follows:

There will be no measurement of quantities for metal guardrail.

00810.90 Payment – Delete the pay schedule and replace with the following:

Payment for "Guardrail Modifications at Existing Johnson Creek Bridge" will be paid on a Lump Sum Basis.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and incidentals necessary to complete the Work as Specified.

SECTION 00850 - COMMON PROVISIONS FOR PAVEMENT MARKINGS

Comply with Section 00850 of the Standard Specifications modified as follows:

00850.47(c) Retroreflectivity - Replace the sentence that begins "Except for paint applications…" with the following sentence:

Except for paint and colored lane marking applications, evaluate longitudinal and transverse marking retroreflectivity according to ODOT TM 777.

SECTION 00865 - LONGITUDINAL PAVEMENT MARKINGS - DURABLE

Comply with Section 0865 of the Standard Specifications.

SECTION 00867 - TRANSVERSE PAVEMENT MARKINGS - LEGENDS AND BARS

Comply with Section 00867 of the Standard Specifications.

SECTION 00868 - COLORED LANE MARKINGS

Section 00868, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00868.00 Scope - In addition to the requirements of Section 00850, install colored lane markings according to the following Specifications.

Labor

00868.30 Manufacturer's Representative - Provide a manufacturer's representative according to 00850.30.

00868.31 Manufacturer-Certified Installers - Provide certified installers according to 00850.31.

Construction

00868.45 Installation - Place markings only when the manufacturer's representative determines that the pavement is ready for the pavement marking material.

Apply the material to the pavement according to the manufacturer's installation instructions to the full width shown in the Plans. Joints will be allowed with no overlap or gap allowed at the joint.

Do not install reflective elements.

Install the pavement marking material surface according to the manufacturer's installation instructions to achieve a uniform initial skid resistance greater than or equal to 50 British Pendulum Number (BPN) when tested according to ASTM E303.

Apply one or more of the following marking material types:

- **Preformed, Fused Thermoplastic Film High Skid** - Install preformed, fused thermoplastic film high skid that has factory installed crushed glass or Aggregate on the surface.

- **Methyl Methacrylate** - Apply methyl methacrylate to the pavement to the full width shown in a single application. Colored lane markings shall be 90 mils to 120 mils in thickness, exclusive of projecting surface-applied friction elements, with a continuous and uniform cross sectional configuration.

00868.75 Manufacturer's Warranty - Furnish a manufacturer warranty that unconditionally warrants to the Agency the product(s) and installation under this Section against failure , according to this subsection and 00170.85(c)(1). Use Agency-supplied warranty forms, available from the Engineer.

"Unconditionally warrant" means that the warranty covers all failures, regardless of the source or cause of the failure, including, without limitation, whether the source or cause is or may be related to workmanship, inspection, or choice of materials.

The Agency inspection of any portion of the Work during the Contract and during the product installation, the Agency acceptance of the Work, corrections under the warranty, or expiration of the warranty shall not relieve the obligations under this warranty.

(a) Warranty Period - The warranty period shall be for 18 months.

(b) Failure - For purposes of this warranty, failure is defined as one or more of the following:

- **Insufficient Color Stability:**
  - Green markings fail to meet the requirements of the Federal Highway Administration Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14) tested according to ASTM D6628.

- **Loss of Adhesion** - Markings show 5 percent or greater loss of marking material due to non-adhesion.

- **Skid Resistance** - Markings fail to maintain an average skid resistance greater than or equal to 50 British Pendulum Number (BPN) when tested in an equal number of test locations in both wheel path and non-wheel path locations according to ASTM E303.

(c) Remedy - Upon notification by the Engineer of a failure, provide the following remedy at no additional cost to the Agency:

- Repair or replace, at the discretion of the Engineer, all failed pavement markings within 6 months of the Agency's request to do so.
- Use materials and procedures meeting the Specifications.
- Match repairs to adjoining Work.
- Coordinate timing of repair Work with the Engineer.

(d) Agency's Right to Make Repairs - If, in the opinion of the Engineer, a failure causes or may cause a hazard, the failure may be temporarily corrected by Agency or other forces at no additional cost to the Agency. Replace temporary repairs with permanent repairs at no additional cost to the Agency and according to the Specifications and within the time specified in 00868.75(c).

Measurement

00868.80 Measurement - The quantities of colored lane markings will be measured on the area basis.

Payment

00868.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Green Bicycle Lane, Preformed Thermoplastic Film	Square Foot

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

Payment for Work under this Section will be limited to 75 percent of the amount due until the Agency has received the signed warranty.

SECTION 00902 - CROSSWALK CLOSURE SUPPORTS

Section 00902, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00902.00 Scope - This Work consists of constructing crosswalk closure supports and associated signs as shown.

Materials

00902.10 Materials - Furnish Materials meeting the following requirements:

Commercial Grade Concrete 00440
Steel ..... 01070.10 and 01070.12
Signs..... 00940

Construction

00902.40 General - Install crosswalk closure supports and associated signs as shown or directed.

Measurement

00902.80 Measurement - The quantities of crosswalk closure supports will be measured on the unit basis. No separate measurement will be made for signs attached to crosswalk closure supports.

Payment

00902.90 Payment - The accepted quantities of Work done under this Section will be paid for at the Contract unit price, per each, for the item "Crosswalk Closure Supports".

Payment will be payment in full for furnishing and placing all Materials, including signs, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

SECTION 00905 - REMOVAL AND REINSTALLATION OF EXISTING SIGNS

Comply with Section 00905 of the Standard Specifications modified as follows:

00905.40 General - Add the following:

Protect existing signs and posts that are designated for "removal only". Deliver removed signs and posts to Clackamas County at 902 Abernethy Road, Oregon City. Contact the Clackamas County Inspector, 48 hours prior to removal.

SECTION 00920 - SIGN SUPPORT FOOTINGS

Comply with Section 00920 of the Standard Specifications modified as follows:

00920.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of concrete for minor sign supports are:

Support Type	Quantity
Perforated Steel Square Tube Anchor Sign Supports	1.00 cu. yd.

SECTION 00930 - METAL SIGN SUPPORTS

Comply with Section 00930 of the Standard Specifications modified as follows:

00930.80 Measurement - Add the following to the end of this subsection:

The estimated quantities of structural steel are as follows:

Item	Estimated Quantity (Pound)
Minor Sign Supports	
Perforated Steel Square Tube Anchor Sign Supports	1980

SECTION 00940 - SIGNS

Comply with Section 00940 of the Standard Specifications.

SECTION 00950 - REMOVAL OF ELECTRICAL SYSTEMS

Comply with Section 00950 of the Standard Specifications modified as follows:

00950.02 Definitions - Delete this subsection.

00950.42 Salvaging and Stockpiling Materials - Add the following to the end of this subsection:

All existing traffic signal equipment to be removed that is deemed usable by Clackamas County shall be delivered to 902 Abernethy Road, Oregon City. Contact the Clackamas County Inspector, the Engineer and Carl Olson at (503) 742-4684, 48 hours prior to removal of existing traffic signal equipment. The Project Manager shall inform the Contractor which equipment the Contractor shall deliver to the County and the location of deliveries are to be received. Equipment damaged or missing during removal shall be replaced or paid for by the Contractor.

All equipment deemed unusable shall become the property of the Contractor and be removed from the project site.

Replace electrical system equipment that is deemed usable, which is damaged during salvaging and stockpiling.

SECTION 00960 - COMMON PROVISIONS FOR ELECTRICAL SYSTEMS

Comply with Section 00960 of the Standard Specifications modified as follows:

00960.01 Regulations, Standards, and Codes – Add the following to the end of this subsection:

Provide and install an illumination system satisfying the requirements and standards of Portland General Electric (PGE) Option A. Comply with the requirements of the PGE Statement of Streetlight Installation Responsibilities, latest revision.

00960.02 Equipment List and Drawing Submittals – Replace this subsection with the following subsection:

00960.02 Equipment List and Drawing Submittals – Within 30 Calendar Days after execution of the Contract, submit electronic PDF copies of the Blue Sheets (see 00160.00 and 001607.07) and the Green Sheets (see 00160.00 and 00160.07) according to 00150.37 for all materials the Contractor proposes to install. Refer to 00990 for exemptions to the Blue Sheets and Green Sheets on Clackamas County operated traffic signals.

Within 14 Calendar Days after receipt of submittals, the Engineer will review the submittals and designate them in writing as “review” or “reviewed with comments”. Then within the follow 7 Calendar Days after the Engineer review, Clackamas County Traffic Staff will review the submittals and designate them in writing “approved”, “approved as noted”, or “revise and resubmit”. Do not proceed with the Work before receiving written approval of the submittals from the Engineer or Clackamas County.

00960.10 Materials – Add the following to the end of this subsection:

Use only Schedule 80 PVC conduits and fittings for all underground conduits.

Furnish illumination system electrical materials that are listed on the PGE Approved Street Lighting Equipment list dated January 14, 2021 or latest revision. The list is available at the following website:

https://assets.ctfassets.net/416ywc1laqmd/1SII104royWwABo5gLkhmJ/aac5f473f480b4212bc9e21647276152/Approved_Materials_List.pdf

00960.30 Licensed Electricians - Replace the paragraph that begins "According to the Oregon Administrative Rule …" with the following paragraph:

According to the Oregon Administrative Rule 918-282-0120(1), no person or entity shall allow any individual to perform electrical work for which the individual is not properly registered or licensed. Every person who installs electrical systems on the Project shall submit a copy of their electrical

license or apprentice registration to the Engineer prior to performing any Work. They must be licensed as an S or a J under Oregon Administrative Rule 918-282.

Add the following subsection:

00960.42(c) Connecting Non-Metallic Conduit to Metallic Conduit - Use a nonmetallic female threaded connector to connect nonmetallic conduit to metallic conduit.

00960.43 Foundations – Add the following to the end of this subsection.

Separate the aluminum from the concrete with one layer of 30 pound nonperforated, asphalt-saturated felt. Neatly trim the felt pad to the size and shape of the base contact surface.

00960.46 Service Cabinet and Electrical Energy - Replace this subsection, except for the subsection number and title, with the following:

Table 00960-1 contains Utility contact information to arrange for the Utility to make electrical hookups:

Table 00960-1

Location	PGE Contact Person's Name, Email and Phone Number	PGE Job Number
SE Linwood Ave Street Lighting	Rico Torres Solis Rodrigo.Solis@pgn.com, 503.403.9084	M3037605
SE Linwood Ave/SE King Rd Service Connection	Rico Torres Solis Rodrigo.Solis@pgn.com, 503.403.9084	M3265750

Furnish and install a meter base approved by the serving Utility (with cover by the Utility), where shown.

SECTION 00987 - TELECOMMUNICATIONS

Section 00987, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00987.00 Scope - This Work consists of furnishing and installing fiber optic cabling for the telecommunications of signalized intersection devices.

00987.01 Regulations, Standards, and Codes - Comply with the following standards where applicable:

- Telecommunications Industry Association (TIA/EIA)

  - EIA-455-3A (FOTP-3) Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components
  - TIA-455-8 (FOTP-8) Measurement of Splice or Connector Loss and Reflectance Using an OTDR
  - TIA-526-7 (OFSTP-7) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
  - EIA-455-25 (FOTP-25) Impact Testing of Optical Fiber Cables
  - EIA-455-33 (FOTP-33) Fiber Optic Cable Tensile Loading and Bending Test
  - EIA-455-41 (FOTP-41) Compressive Loading Resistance of Fiber Optic Cables
  - EIA-455-81 (FOTP-81) Compound Flow (Drip) Test for Filled Fiber Optic Cable
  - EIA-455-82 (FOTP-82) Fluid Penetration Test for Fluid Blocked Fiber Optic Cable
  - EIA-455-104 (FOTP-104) Fiber Optic Cable Cyclic Flexing Test
  - EIA-455-171 (FOTP-171) Attenuation by Substitution Measurement for Short-Length Multimode Graded-Index and Single Mode Optical Fiber Cable Assemblies
  - EIA/TIA-568-B.3 Optical Fiber Cabling Components
  - EIA/TIA-758 Customer Owned Outside Plant Telecommunications Cabling
  - EIA-598-B Optical Fiber Cable Color Coding
- American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA)
  - ANSI/ICEA S-87-640 Standard for Optical Fiber Outside Plant Communications Cable
- International Telecommunication Union - Telecommunication Standardization Sector (ITU-T)
  - G.652 (11/09) Characteristics of a single-mode optical fiber and cable Telecommunications Industry Association (TIA)
  - G.652 (11/16) Characteristics of a single-mode optical fiber and cable

00987.02 Submittals - Within 30 Calendar Days after the execution of the Contract, submit the following:

- Disruption Request according to 00987.04
- Outside plant fiber optic cable according to 00987.10
- Fiber optic jumper/patch cables according to 00987.11.
- Fiber Optics Installer or Fiber Optics Technician Certification according to 00987.30.
- OSP cable installation procedure according to 00987.40(a)
- Fiber optic cable test plan according to 00987.41(a)
- Factory testing according to 00987.41(b)
- Arrival on-site testing according to 00987.41(c)
- Fiber optic cable testing according to 00987.41(d) and (f)

Include the manufacturer's name, model numbers, catalog sheets and other descriptive literature of proposed materials. Provide the catalog sheets and literature including technical data, physical properties and operational description in sufficient detail to demonstrate the Equipment meets these specifications.

00987.04 Existing System Disruption and Restoration - Work of this Contract requires disruptions to the specified existing systems, circuits, and equipment.

Notify the Engineer 14 Calendar Days before existing Ethernet switches are impacted.

Obtain Engineer's approval before disrupting the system. Disruptions will only be considered for non-holiday weekdays between 8 a.m. and 4 p.m. For each written disruption request include the following:

- System(s) to be affected
- Disruption start date and time
- Estimated duration required

Existing systems that require disruption include the following:

- Linwood Ave @ King
- Linwood Ave @ Johnson Creek Blvd

Do not disrupt any other communication systems not listed or approved.

Materials

00987.10 Outside Plant Fiber Optic Cable - Furnish and install outside plant (OSP) single mode fiber optic (SMFO) cable containing single mode dual window (1310 nm and 1550 nm) fibers.

(a) Optical Fiber - Meet optical, mechanical and environmental requirements for all usable fibers in buffer tubes.

(b) Fiber Characteristics and Tests - Meet the requirements in Table 00987-1 for single mode fibers:

Table 00987-1

Fiber Characteristic Table	
Parameters:	Single Mode
Type:	Step Index
Core diameter:	8.3 µm (nominal)
Cladding diameter	125 µm ± 1.0 µm
Core to cladding offset:	≤1.0 µm
Coating:	dual layer, UV-cured acrylate strippable mechanically or chemically without damaging fibers
Optical fibers:	doped silica core with concentric silica cladding
Coating diameter:	250 µm ± 15 µm
Cladding non-circularity defined as:	≤2.0% [1-(min. cladding dia÷max. cladding dia.)]x100 FOP cable: all dielectric, gel-filled or water blocking tape, duct-type
Proof/Tensile Test:	345 MPa, min
Attenuation at 1310 nm:	≤0.4 dB/km

Attenuation at 1550 nm:	≤0.4 dB/km
Design Standard:	ANSI/ICEA S-87-640
Test cable according to:	EIA-455-25 (FOTP-25) EIA-455-33 (FOTP-33 Condition II) EIA-455-41 (FOTP-41) EIA-455-81 (FOTP-81) EIA-455-82 (FOTP-82) EIA-455-104 (FOTP-104 Conditions I and II)
Test optical fiber according to:	EIA-455-3A (FOTP-3)
Attenuation at the Water Peak:	≤2.1 dB/km @ 1383 ± 3 nm
Chromatic Dispersion	
Zero Dispersion Wavelength:	1301.5 to 1321.5 nm
Zero Dispersion Slope:	≤0.092 ps/(nm^2 *km)
Maximum Dispersion:	≤3.3 ps/(nm^2 *km) for 1285 – 1330 nm ≤0.092 ps/(nm^2 *km) for 1550 nm
Cut-Off Wavelength:	<1250 nm
Mode Field Diameter	9.3 ± 0.5 µm at 1310 nm
Petermann II	10.5 ± 1.0 µm at 1550 nm

(c) Color Coding - Distinguish each fiber from others in the same tube or cable by means of color coding according to the following:

1. Blue (BL)
2. Orange (OR)
3. Green (GR)
4. Brown (BR)
5. Slate (SL)
6. White (WT)
7. Red (RD)
8. Black (BK)
9. Yellow (YL)
10. Violet (VL)
11. Rose (RS)
12. Aqua (AQ)

Target colors according to the Munsell color shades and comply with EIA/TIA-598.

The color formulation needs to be compatible with the fiber coating and the buffer tube filling compound, be heat stable, not fade, smear, be susceptible to migration, and it must not affect the transmission characteristics of the optical fibers and not cause the fibers to stick together.

(d) Cable Construction - Furnish fiber optic cables with the following components:

(1) Buffer Tubes - Furnish clearance in the loose buffer tubes with fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers are to be loose or suspended within the tubes. Do not adhere the fibers to the inside of the buffer tube. Do not exceed a maximum of 12 fibers in each buffer tube. Furnish the number of fibers per cable as shown.

Extrude loose buffer tubes from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. Furnish material that is tough and abrasion resistant to furnish mechanical and environmental protection of the fibers, yet designed to permit safe intentional “scoring” and breakout, without damaging or degrading the internal fibers.

Furnish buffer tube filling compound that is a water blocking tape or gel based filling compound with anti-oxidant additives to prevent water intrusion and migration homogenous

hydrocarbon. Furnish filling compound that is non-toxic, dermatologically safe to exposed skin, as well as chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. Furnish filling compound free from dirt and foreign matter and be readily removable with conventional nontoxic solvents.

Strand buffer tubes around a central member by a method, such as reverse oscillation stranding process that will prevent stress on the fibers when the cable jacket is placed under strain.

(2) Central Member - Furnish a central member that functions as an anti-buckling element that is a glass reinforced plastic rod with similar expansion and contraction characteristic as the optical fibers and buffer tubes. To ensure the proper spacing between buffer tubes during stranding, a symmetrical linear overcoat of polyethylene may be applied to the central member to achieve the optimum diameter.

(3) Filler Rods - Fillers may be included in the cable to maintain the symmetry of the cable cross section. Furnish filler rods that are solid medium or high-density polyethylene. Filler rods are to be the same diameter as the outer diameter of the buffer tubes.

(4) Stranding - Strand completed buffer tubes around the over-coated central member using stranding methods, lay lengths and positioning such that the cable meets mechanical, environmental and performance specifications. A polyester binding is to be applied over the stranded buffer tubes to hold them in place. Apply binders with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. Furnish a binder that is non-hygroscopic, non-wicking, and dielectric with low shrinkage.

(5) Core and Cable Flooding - Furnish a cable core that contains a water blocking tape material to prevent water ingress and migration. Furnish water blocking tape material that is either a polyolefin-based compound, which fills the cable core interstices, or an absorbent polymer, which fills voids and swells to block the ingress of water. The flooding compound or material needs to be homogeneous, non-hygroscopic, non-conductive, and non-nutritive to fungus. Furnish compound or material that is nontoxic, dermatologically safe and compatible with other cable components.

(6) Tensile Strength Member - Furnish tensile strength by high tensile strength aramid yarns or fiberglass, which are helically stranded evenly around the cable, core and not adhere to other cable components.

(7) Ripcord - Furnish cable that contains at least one ripcord under the jacket for easy sheath removal.

(8) Outerjacket - Furnish jacket that is free of holes, splits, and blisters and be medium or high density polyethylene, or medium density cross linked polyethylene with minimum nominal jacket thickness of 1 mm ± 0.076 mm. Apply jacketing material directly over the tensile strength members and water blocking materials and not adhere to the aramid strength material. The polyethylene needs to contain carbon black to provide ultraviolet light protection and not promote the growth of fungus.

Mark the jacket or sheath with the manufacturer's name, the words "Optical Cable", the number of fibers, "SM", year of manufacture, and sequential measurement markings every meter. The marking is to be of contrasting color to the cable jacket.

(e) Packaging and Shipping Requirements - Pack completed cable on reels for shipment. Wrap cable in weather and temperature resistant covering. Seal both ends of cable to prevent ingress of moisture. Secure each cable end to the reel to prevent the cable from coming loose during transit. Have at least 6 feet of cable length accessible for testing purposes.

Label each cable reel with a durable, weatherproof label showing manufacturer's name, cable type, actual length of cable on the reel, Contractor's name, contract number, and reel number. Include a shipping record in a weatherproof envelope showing the above information and include the date of manufacturer, cable characteristics (size, attenuation, bandwidth), factory test results, cable identification number and any other pertinent information.

Minimum hub diameter of reel needs to be at least thirty times the cable diameter. Fiber optic cable is to be continuous length on each reel. Mark reel indicating direction reel should be rolled to prevent loosening of cable.

Furnish installation procedures and technical support information at delivery.

00987.11 Fiber Optic Jumpers/Patch Cable - Furnish a minimum of 2 duplex or 4 simplex jumper cables in each cabinet that has new or modified fiber optic cable installation. Use jumpers of simplex or duplex design. Use duplex jumpers of duplex round cable construction. Use jumpers that are at least 6 feet in length, sufficient to avoid stress and allow orderly routing. Use an outer jacket of duplex jumpers that is yellow in color. Use the two inner simplex jackets that are contrasting colors to provide easy visual identification of polarity. Store jumpers within the cabinets. The Agency will connect at the time of commissioning.

Use connectors that are ceramic ferrule for single mode fiber with ultra-physical contact (UPC) polishing, type as shown. Furnish connector body housing that is glass-reinforced polymer. The associated coupler is to be of the same material as the connector housing. Each connector is not to exceed 0.75 dB loss as specified by EIA/TIA-568-B.3.

Furnish splice trays of the same manufacturer as the splice closure or fiber distribution panel depending on use.

00987.14 Warning Tags - Furnish warning tags with a long life material, orange in color, and marked in a permanent and consistent manner with black lettering.

Include the text "CAUTION FIBER OPTIC CABLE" on all warning tags and show the cable fiber count.

Attach warning tags to fiber optic cables using UV-resistant zip ties according to the manufacturer's recommendations. Do not affix in a manner that causes damage to the fiber.

Attach warning tags to the cables in at least two locations in junction boxes and handholes, and at least one location in cabinets.

00987.15 Labels - Use labels to identify cables and jumpers and patch cords at all termination points, junction boxes, handholes, and cabinets. Use labels to identify all communications

equipment and devices in junction boxes, handholes, and cabinets. Use yellow or white colored labels with permanent black lettering. Mechanically imprint labels, do not use handwritten labels.

Use tubular plastic labels on cables and jumpers and patch cords. Label duplex jumpers to provide a visual distinction between the two fibers. Provide labels with the following information:

- Owner
- Number of fibers
- Fiber number
- Cable origin
- Cable destination

Labor

00987.30 Fiber Optic Work - Individuals performing fiber optic installation are to possess either a Fiber Optics Installer or Fiber Optics Technician Certification recognized by the Electronics Technicians Association (ETA) or a Fiber Optics for ITS certificate from the International Municipal Signal Association (IMSA). Submit a copy of certification to the Engineer prior to performing any work.

Construction

00987.40 Fiber Optic Cable Installation and Setup:

(a) OSP Cable Installation - Submit a fiber optic cable installation plan including the manufacturer's recommended procedures for pulling fiber optic cable for review 30 Calendar Days of execution of the Contract. Use mechanical aids to install cable. Place tension measuring device or breakaway swivel between ends of cable grip and pull rope to ensure tension does not exceed 80 percent of recommended tension or 500 pounds, whichever is less. Use cable grips with a ball bearing swivel for installing fiber optic cable to prevent cable from twisting during installation.

During installation, maintain a minimum bend radius of 20 times the outside diameter of the cable per EIA/TIA-568-B.3. Do not stress the cable beyond the minimum bend radius. Install fiber optic cable using cable pulling lubricant as recommended by the manufacturer. Use a non-abrasive pull tape. Station personnel at each splice vault and hand hole to lubricate the cable and prevent kinking or other damage. Install fiber optic cable without splices, except as specifically allowed for on the plans, as described herein, or as directed. Divide slack equally on each side of splice closures. Following installation of cable in conduit, seal all entrances in cabinets, junction boxes and vaults with duct sealing compound to keep out moisture, foreign materials, and rodents.

(b) Splicing - Use fusion type splices for all optical fibers that do not exceed a maximum optical attenuation of 0.3 dB per splice as required by EIA/TIA-568-B.3. Place completed splices in a splice tray. Place splice tray in a splice closure unless using a splice enclosure. Protect all splices with a thermal shrink sleeve.

(c) Cable Terminations - At the splice closure, the cable jacket of the SMFO cable is to be removed exposing the aramid yarn, filler rods, and buffer tubes. The exposed length of the buffer tubes needs to be at least the length recommended by the splice closure manufacturer

which allows the tubes to be secured to the splice trays. Secure each buffer tube to the splice tray in which it is to be spliced. Remove the remainder of the tube to expose sufficient length of the fibers in order to properly install in the splice tray.

Splice and secure fiber optic cable with tie warps and route to its appropriate fiber distribution unit location.

When applicable, the moisture blocking gel is to be removed from the exposed buffer tubes and fibers. The transition from the buffer tube to the bundle of jacketed fibers is to be treated by an accepted procedure for sleeve tubing, shrink tube and silicone blocking of the transition to prevent future gel leak. Follow manufacturer's installation instructions to ensure that throughout the specified temperature range gel will not flow from the end of the buffer tube if using gel filled fiber optic cable. Strip and prepare the cable for splicing.

All fibers of the fiber distribution panel are to be labeled within the cabinet.

Make a transition with flexible tubing, to isolate each fiber to protect the individual coated fibers. The final transition from bundle to individual fiber tube is to be secured with an adhesive heat shrink sleeve.

00987.41 Fiber Optic Testing:

(a) Test Plan - Prior to beginning testing, submit for approval copies of installation and test plan detailing methods of installation and testing for all materials, equipment, and systems. At the same time, submit the associated schedule of activities. Notification of approval or rejection will be made within 28 Calendar Days. If the test plan is rejected, submit a revised test plan within 28 Days. Do not begin testing until receiving approval of the test plan by the Engineer. Submit all test results, including results of failed tests or re-tests to the Engineer. Supply all test equipment.

Provide 48 hours notice of intent to proceed prior to commencing each functional or subsystem test. In the notice, provide location(s) of test(s). Conduct environmental tests of field equipment as part of the functional tests. Subsystem testing and inspections are to include visual inspection from damaged or incorrect installation, adjustments, alignments, and measurement of parameters and operating conditions.

(b) Factory Testing - Documentation of compliance with the fiber specifications as listed herein is to be supplied by the original equipment manufacturer. Before shipment, but while on the shipping reel, test 100 percent of all fibers for attenuation. Maintain copies of the results on file by the manufacturer with a file identification number, attached to the cable reel in a waterproof envelope, and submitted to the Contractor and Engineer.

(c) Arrival On-Site Testing - Physically inspect each cable upon delivery. Attenuation test 100 percent of the fibers to confirm that the cable meets the requirements at wavelengths of both 1310 nm and 1550 nm with the Optical Time Domain Reflectometer (OTDR) test equipment. The failure of any single fiber in the cable is cause for rejection of the entire reel. Record test results and compare and file with the copy accompanying the shipping reel in a waterproof envelope. Do not install the cable until completion of this test sequence and the Engineer provides written approval. Submit copies of traces and test results to the Engineer. If the tests are unsatisfactory, the reel of cable is considered unacceptable and all records corresponding to that reel are to be marked accordingly. Replace the unsatisfactory reels of cable with new

reels of cable. Test the new reels of cable to demonstrate acceptability. Submit copies of the test results to the Engineer.

(d) Fiber Optic Cable Testing - Testing is to include the tests on elements of the passive fiber optic components: (1) at the factory; (2) after delivery to the project site, but prior to installation; (3) after installation, but prior to connection to any other portion of the system. Provide all personnel, Equipment, instrumentation, and Materials necessary to perform all on-site testing.

Provide documentation of all test results to the Engineer at most 3 Days after the test is completed. At least 21 Calendar Days prior to the arrival of cable on site, provide detailed field testing procedures. In the procedures include the test involved and method by which tests are to be conducted. Include in the notification the model, manufacturer, configuration, calibration, and alignment procedures for all proposed test equipment

(e) Outdoor Splices - Verify insertion loss quality of each splice prior to sealing splice closure.

(f) Cable Verification:

(1) OTDR Testing - Once the cabling system has been installed and is ready for splicing, test all fiber links with the OTDR test equipment for attenuation at wavelengths of both 1310 nm and 1550 nm. Index matching gel is not allowed in connectors during testing. Record, date and compare test results and file with previous copies. Submit hard copy printout of traces and test results to the Engineer. Use OTDR test equipment capable of recording and displaying anomalies of at least 0.02 dB. Calibrate the OTDR with traceability to a national metrology unit such as the National Institute of Standards and Technology (NIST).

(2) Power Meter and Light Source Testing - At the conclusion of the OTDR testing, 100 percent of the fiber links are to be tested end to end with a power meter and light source, according to FOTP-171 and in the same wavelength specified for the OTDR tests. Conduct tests in one direction. Calculate the insertion. Record test results, compared, and filed with the other recordings of the same links. Submit test results to the Engineer. Use a power meter that was calibrated with traceability to the National Institute of Standards and Technology (NIST).

(3) Test Failures -
If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the FO link will be rejected. Replace the unsatisfactory segments of cable, or splices with a new segment of cable or splice. Complete the OTDR testing, power meter and light source testing for the repair to determine acceptability. Submit copies of the test results to the Engineer. The removal and replacement of a segment of cable will be interpreted as the removal and replacement of a single continuous length of cable connecting two splices, two connectors. The removal of only the small section containing the failure and therefore introducing new unplanned splices is not allowed.

- Per splice: 0.30 dB bi-directional average

Losses exceeding the above limits are only allowed with written approval from the Engineer.

Measurement

00987.80 Measurement - No measurement of quantities will be made for Work performed under this Section.

Payment

00987.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Telecommunications, Material	Lump Sum
(b) Telecommunications, Installation	Lump Sum
(c) Telecommunications, Splicing and Testing	Lump Sum

Item (a) includes furnishing outside plant fiber optic cable, fiber optic jumpers, fiber optic patch cable, splice closures, splice trays, and all other Incidental items necessary to complete the Work.
Item (b) includes installation of all materials as shown or specified.
Item (c) includes fiber optic cable splicing and fiber optic testing as shown or specified.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for required submittals and documentation.

No separate or additional payment will be made for replacement of disturbed earthwork, base, and surfacing.

SECTION 00990 - TRAFFIC SIGNALS

Comply with Section 00990 of the Standard Specifications modified as follows:

Add the following subsection:

00990.10 Materials - Furnish Materials meeting the following requirements:

Crosswalk Closure Support..... 00902.10

Add the following subsection:

(a) **0990.11(a) Thermal Detection System** - This section describes the minimum requirements for providing a complete Thermal Detection System. Initially, the system shall be capable of providing presence vehicle detection and bicycle presence detection at selected intersections. The system shall be expandable without removing or replacing existing units.

(1) The entire thermal detection system shall consist of the following:

a. Thermal Detection Module(s).

b. Interface Module(s) and Cable(s).

c. Luminaire Arm or Signal Mast Arm Bracket(s).

d. Surge Suppressor.

e. Programming Devices and /or Software with training.

f. Power Cable and Communications Cable.

g. All other necessary equipment.

h. Training for installation, operation, and maintenance.

(2) The following equipment package has been preapproved for use on this Project (quantities for each item are shown on the Drawings):

a. FLIR TrafiSense2 Series Thermal Sensors (see Drawings for actual quantity).

b. FLIR TI BPL2 EDGE interface card with network connectivity (NEMA / 2070 cabinet – 4 outputs) (see Drawings for actual quantity).

c. FLIR 4 I/O USB Expansion card(s) (if needed per Drawings).

d. CT PIM Module (SDLC interface to NEMA Cabinet – 64 outputs) (if needed per Drawings).

e. Pelco Mast Arm Sensor Brackets (see Drawings for actual quantity).

f. Traficon Luminaire Arm Sensor Brackets (see Drawings for actual quantity).

g. 18 Gauge 3 wire power cable – BPL Interface from cabinet to sensor.

h. Clackamas County currently has programming devices for this equipment package and no additional devices are necessary.

(3) Hardware—The following are the minimum standards for the Thermal Detection System. All equipment shall be completely compatible with existing Traficon video detection and ViewCom video transmission equipment and software currently used by Clackamas County.

a. The TrafiSense 2 sensor shall have 24 vehicle presence detection zones, 8 bicycle presence detection zones, 8 pedestrian presence detection zones, 8 traffic data detection zones, and 8 wrong way driver detection

zones per sensor. Data zones shall collect and store vehicle counts, volume, speed, gap time, headway, occupancy, and classification. Data shall be time-stamped and stored onboard (non-volatile memory) in a user selectable interval, from 1-60 minutes.

b. Data alarms are generated for: queue, inverse direction, speed drop, no video, and other errors.

c. The EDGE interface card shall be modular by design and housed in either a self-contained stand-alone unit or fit directly into NEMA TS1 & TS2 type racks as well as Type 170/2070 input files. The edge card shall be interchangeable between a shelf or rack mount installation without replacing or modifying existing units.

d. A single EDGE card shall communicate with 1 to 8 sensors and include interface to the agencies existing IP network. Only a single IP address should be necessary for all sensors and allow for independent streaming of the thermal video streams by using ports.

e. The system shall be designed to operate reliably in the adverse environment of roadside cabinets and shall meet or exceed all NEMA TS1 and TS2, as well as Type 170/2070 environmental specifications.

f. Ambient operating temperature shall be from -34 to +74 degrees Centigrade (-29.2 to +165.2 degrees Fahrenheit) at 0 to 95% relative humidity non-condensing.

g. The system shall be powered by 12-60 VDC or 12-42 VAC.

h. Surge ratings shall be set forth in the NEMA TS-1 and TS-2 specifications.

i. The EDGE interface board shall have 4 opto-isolated open collector outputs. Twenty-four (24) additional outputs shall be available via the USB expansion port and up to five (5) 4 I/O USB expansion modules.

j. Must pe able to provide loop emulation for presence, bike presence, counting, and data collection.

k. Presence hold time must have parameters that range from 10-600 seconds.

l. Each TI BPL2 EDGE card shall allow for up to 24 digital inputs into the traffic controller via the 4 I/O USB Expansion boards or up to 64 digital inputs into the traffic controller via the PIM Module using an SDLC interface.

m. Each TI BPL2 EDGE card shall have error detection. Outputs will be turned “ON” if the video signal is bad or the card is not functioning properly. A user defined quality level will automatically put selected outputs to recall in cases of severe degraded visibility (i.e., fog, blizzard, etc.). Normal

detection resumes when visibility improves above the user defined thermal quality level.

n. Using an agencies network, the TI BPL2 Edge card shall be capable of streaming all connected sensors video streams simultaneously via MPEG-4/H.264/MJPEG. These streams are available with or without detection overlay.

o. The TI BPL2 Edge board shall have a reset button on the front panel to reset the thermal sensors to “learn” the roadway image. During “learn”, selectable recall can be enabled or disabled for immediate operation. Learning time of video detectors shall be less than 6 minutes.

p. The BPL2 EDGE board shall have separate light emitting diodes (LED) that indicate the following:

1.	POWER	LED to verify power and reboot TI board
2.	POWER	LED to verify sensor power and reboot sensors
3.	PIM	Dual color status LED for PIM Connection
4.	OUTPUT Status	LED if the corresponding detection group is active.
5.	INPUT Status	LED if the corresponding detection group is active
6.	8 BPL Sensors	Dual color LED Status
7.	RJ5	The TI BPL2 EDGE card has 2 RJ45 connectors (10/100Mbit/s auto switching)
8.	USB	2 USB ports for connection to 4 I/O USB expansion boards

q. The 4 I/O Expansion board shall also have separate LEDs that indicate:

1.	POWER	Power LED
2.	OUTPUT	LED to indicate Output Status
3.	INPUT	LED to indicate Input Status
4.	Rotary	Rotary Switch that defines output numbers

(4) Functional Capabilities

a. Real Time Detection of vehicles and bicycles using the roadway. Bicycles using the roadway can be detected regardless of which lane they are using even if vehicle traffic is preset. Bicycles detected can have a separate output to allow bikes a pre-call or a longer minimum green.

b. The TI BPL2 EDGE system shall be expandable up to 8 FLIR sensors that may be programmed independently. Up to four (4) TI BPL2 EDGE cards may be used if more than 8 sensors are necessary – up to 32 FLIR sensors.

c. The system shall be capable of displaying detection zones on the thermal image with associated outputs. Outputs/Inputs status will be indicated on the screen. Parameters will also include the ability to view raw video without any verbiage and/or detectors for surveillance purposed. Signal phasing can also be displayed in a NEMA TS2-1 cabinet with an accompanied PIM Module and SDLC interface (optional).

d. Each TrafiSense2 will detect within its view the presence of vehicles or bicycles in user defined zones. Detectors available shall be presence, count, delay, extension, or pulse mode for either arrival or departure of vehicles. Delay and extension shall be defined between 0.1 – 99.9 seconds and pulse mode between 0 – 200ms in 33ms increments if NTSC is used. Each TrafiSense2 sensor shall also detect and collect traffic data of passing vehicles in user-defined zones. Collected traffic data by direction shall include: volume (absolute numbers) per length class and per lane, average speed (km/h or mph) per length class and per lane, average gap time (1/10 sec) per length class and per lane, average headway (m or feet) per lane, occupancy (%) per lane, confidence (0-10) depending on Thermal Quality of Image, Density (Vehicles / KM) Number of Vehicles over distance.

e. Once an IP address is set up the TraffiSense2 shall be programmed with the use of a computer or network connection. A standard computer running a web browser is necessary.

f. Detector configurations shall be able to be stored. These “offline” networks can be saved and easily reinstalled if needed.

g. Detectors may be linked to 24 outputs and 20 inputs using Boolean Logic features: AND, OR, NOT. It will be possible to generate conditional outputs based upon inputs from a controller.

h. It shall be possible to make a detector directional sensitive. Options will include an omni-directional detector or a detector that only senses movement: from right to left, left to right, up to down or down to up as you look at the screen.

i. 8 data detection zones per sensor may be used for collection of vehicle count, speed, classification, occupancy, density, headway, and gap time. These detectors will detect and store traffic data in a no-volatile memory at user-defined intervals of 1, 2, 3, 5, 6, 10, 15, 30, and 60 minutes.

j. Traficon Data Tool (TDT) software may be used with a PC to download data and export to a spreadsheet. A standard web browser will be used to upload and download detector configurations, technical events, send software version upgrades, and do remote setup of detectors.

k. The TrafiSense2 shall be able to detect vulnerable roadway users such as bicyclists and is capable of outputting a separate call allowing an agency to give early or extended time to their users.

l. The TrafiSense2 shall be able to delay or extend a detector zone output in combination with an input from the controller.

m. The TrafiSense2 shall be capable of detection wrong-way drivers and shall provide and alarm/event via communication and/or output.

n. The TrafiSense2 shall provide an alarm and/or output when the user selected queue detection threshold of occupancy is exceeded for more than a user selected time threshold.

o. The TraffiSense2 shall distinguish up to five classes of detected vehicles based upon user selectable vehicle length thresholds. Using optional premium traffic data, the sensor can classify up to 3 classes of vehicles using vehicle width and up to 5 classes combining both length and width.

p. The TraffiSense2 shall be able to emulate loop emulation with user selectable loop dimensions.

q. The TraffiSense2 shall be able to detect pedestrians and set up directional detection zones for crossing or waiting pedestrians. Optical occlusion must be considered if using this feature.

r. The TI BPL2 EDGE shall control from 1 to 8 FLIR Traffic sensors.

s. The TI BPL2 EDGE has 2 RJ45 connections for Ethernet interface and communication to provide traffic data and allow remote configuration from the Traffic Operations Center.

t. The LAN port shall meet IEEE 802.3 with a RJ-45 connector and meet the following specification:

   Data rates for Ethernet via LAN port: 10/100Mbps TCP/IP based protocol

u. The communication shall support all functions of the detection system

v. All data transmissions shall be protected by CRS (cyclic redundancy checking) or an equivalent error detection method.

w. The communication shall support MPEG-4/H.264/MJPEG streaming video over Ethernet with the following programmable parameters:

   (a) Streaming video frame rate over Ethernet of up to 30 frames/second.
   (b) Programmable bit/data rate of up to 4 Mbps.
   (c) 2 video streams are available with or without detection overlay.

x. Cyber Security – the thermal detection product will be capable of disabling non-essential services, disabling non-essential physical access ports, have

user authentication, configuring encryption certificates, and providing separate logs for user and physical access.

y. A web browser connection with a standard internet browser shall be possible to communicate with each TraffiSense2 sensor for remote monitoring and real-time data using the systems assigned IP addresses.

(5) Image Sensor – Mounting Brackets

a. Mast arm installations shall be mounted at a sufficient height to prevent occlusion from cross traffic between the stop bar and the mast arm on which the camera is installed. The supplied bracket allows horizontal and vertical mounting and is made of fiber reinforced polyamide (with an aluminum tube). To attach the bracket on existing or new infrastructure, 2 bolts or stainless steel bands will be sufficient. When necessary an optional Pelco 6' riser and Pelco mounting base will be required to get enough height on the mounting position to prevent occlusion from cross traffic.

b. Luminaire arm installations shall be installed on the luminaire arm, with the sensor manufacturers included brackets. Camera luminaire brackets shall provide adjustments for both vertical and horizontal positioning of the camera. Camera attachments shall be designed to securely fastened the camera to the luminaire arm. Miscellaneous hardware shall be stainless steel or galvanized.

(6) Image Sensor – Cable (BPL Power)

a. Power cable shall be installed in conduits or overhead as indicated in the plans. Power cable shall be suitable for exterior use and in direct sunlight. Power cable will have a minimum of 3 conductors.

b. Description of cable: 18 AWG three conductor PVC/Nylon 600V Tray Cable. Electrical Power and Control tray cable, direct burial.

(7) FLIR TraffisSense2 Series Thermal Sensor – The Thermal Traffic Sensor shall not depend on any visible or invisible (infrared) illumination or image intensifier to "see" i.e. produce images. The Thermal Traffic Sensor shall be totally passive and not produce any energy or emit light in any bandwidth. The Thermal Traffic Sensor shall allow the user to clearly identify images in the total absence of light.

a. The Thermal Traffic Sensor shall utilize a Vanadium Oxide (Vox) uncooled microbolometer sensor responding in the LWIR (Long Wave Infrared) spectral range of 7 – 14 µm, which is beyond what is visible to the human eye.

b. The Thermal Traffic Sensor shall be based on Vanadium Oxide (Vox) microbolometer detector technology and shall not be susceptible to permanent damage after imaging the sun. This is in contrast to some

systems based on a amorphous silicon detector technology, which can be permanently damaged when viewing the sun or even reflections of the sun.

c. The Thermal Traffic Sensor shall not utilize shutters to prevent damage from the sun, but rather the Thermal Traffic Sensor shall provide uninterrupted video which shall be required for traffic and ITS installations.

d. The Thermal Traffic Sensor shall not utilize dynamic apertures to protect the image sensor because these mechanisms reduce sensitivity for an extended period of time, thus reducing the Thermal Traffic Sensors performance, which shall not be acceptable for traffic installations.

e. The Thermal Traffic Sensor shall provide a thermal optics that automatically adjust to background thermal changes, and therefore do not require re-adjustment and/or thermal refocusing.

f. The Thermal Traffic Sensor shall not be susceptible to “image blooming” caused by bright lights as are image intensifiers and visible spectrum cameras.

g. The Sensor shall be factory configured with the following fixed anti-reflection coated Germanium lenses with the Field of View (FOV) and resolutions as indicated:

TraffiSense2 690: 640 x 480 pixels, 90 degrees Horizontal x 69 degrees Vertical
TraffiSense2 645: 640 x 480 pixels, 45 degrees Horizontal x 35 degrees Vertical
TraffiSense2 632: 640 x 480 pixels, 32 degrees Horizontal x 26 degrees Vertical

h. The Noise Equivalent Temperature Difference (NETD) is the measure of the smallest object temperature that can be detected by the thermal image sensor relative to the system noise. The measurement is usually quantified as an mK value. This is the most common Figure of Merit of a thermal imaging system and a true measurement of the thermal camera’s sensitivity. The Thermal Traffic Camera image sensor shall provide a NETD of <50mK f/1.0 or lower.

i. The Thermal Traffic Sensor shall include Auto Digital Detail Enhancement (Auto DDE) which is an advanced non-linear image processing algorithm. The Auto DDE function is fully automatic and requires no input or adjustment from the user. The Auto DDE shall enhance the image detail to match the total dynamic range of the original image allowing details to be visible to the user even in scenes with low or high thermal contrast. Auto DDE will increase the probability of detection of low contrast images. These settings shall be optimized for performance with Traffic Video Detection.

j. The Thermal Traffic Sensor shall utilize Non-Uniformity Correction (NUC) which is a set of compensation factors for each pixel. NUC shall enable the following features and benefits:

(a) Eliminate the need for FPA (Focal Plane Array) temperature stabilization.
(b) Allow for near instantaneous camera turn-on.
(c) Reduces system complexity and power consumption.
(d) Allow for a wider operating temperature range.

k. The Thermal Traffic Sensor shall include Automatic Gain Control (AGC) circuitry to compensate for scene variations, improve image quality by avoiding saturation and distortion, and to balance signal levels prior to display to maximize image quality.

l. The Thermal Traffic Camera shall feature both White-Hot and Black-Hot operating modes. In the White-Hot (default) mode warmer objects will be displayed in white or lighter shades than cooler or background areas. In the Black-Hot mode warmer images will be displayed as black or dark gray as compared to cooler background objects.

m. The Thermal Traffic Sensor shall be furnished in an IP-67 rated outdoor enclosure with mounting bracket. The mounting bracket shall be provided with holes for mounting to a pole, pedestal, or wall mount. All cable connections shall be quick connect. No tools are required to connect the sensor once the original adapter has been installed on the wire.

n. The Sensor has an Earth ground conductor which is run as part of the power cable bundle. This Earth ground is terminated in the cabinet.

o. The Thermal Traffic Sensor shall operate on 12-60 VDC.

p. The Thermal Traffic Sensor shall include a 10-year warranty on the thermal Sensor.

q. The Thermal Traffic Camera shall be a FLIR TraffiSense2 Series Traffic Sensor. Acceptable Models: TraffiSense2 BPL 690, TraffiSense2 BPL 645, TraffiSense2 BPL 632

(8) Installation and Training

j. The product supplier of the detection system shall supervise the installation and testing of the equipment. A factory certified representative from the manufacturer shall be on-site during installation. The factory representative shall install, make fully operational, and test the system as indicated on the intersection drawings and this specification.

k. One day of training shall be provided to personnel of the contracting agency in the operation, setup, and maintenance of the detection system. Instruction and materials shall be provided for a maximum of 10 persons and shall be conducted at a location selected by the contracting agency. The contracting agency shall be responsible for travel, room and board expenses for its own personnel.

(9) Warranty—FLIR products shall be warranted against manufacturing defects in materials and workmanship for a period of three years (10 years on FLIR uncooled microbolometer sensor inside camera) from date of purchase. Extended warranty, maximum for 2 more years, can be purchased. The detection module supplier shall provide all documentation necessary to maintain and operate the system. No other warranties or claims are acknowledged.

Add the following subsections:

00990.13 Power Service Cabinet - Service cabinets shall be the following or an approved equal:

Fouch Drwg #0600-0074-00 (NEMA 3-R Metered Base Mount Service Cabinet Clackamas County).

00990.14 Fire Preemption Equipment – Fire Preemption systems for installation at traffic signals shall be as follows:

Fire Preemption system shall be GTT Opticom. See plan set for additional details. The following components make up the fire preemption system.

(a) Fire Preemption Phase Selector (P/N: Opticom 762) - Interface device for installation in the cabinet.

(b) Fire Preemption Detector Unit (P/N: Opticom 721) - Field detector for fire preemption system.

(b) Fire Preemption Detector Feeder Cable (P/N: Opticom 138) – For installation between the cabinet and the field detector at the location shown in the plan set.

00990.15 Pedestrian Push Buttons and Mount - Pedestrian pushbuttons for installation at traffic signals shall be as follows:

Pedestrian push button system shall be a Polara iNavigator 2-Wire (iNS2) Push Button Station (P/N: iNS2-3-T-N-0-B) or approved equal. See the Contract Plans for additional details. The following components make up the push button system:

(a) Push Button Station (P/N: iNS2 PBS) - The main body with pushbutton for installation on the signal or pedestrian pole using 2-Wire push button wired as a 3-Wire system.

(b) Ped Head Control Unit (P/N: iPHCU3W) - Interface device for installation in pedestrian signal head. One per Push Button Station.

(c) Pedestrian Push Button Decal - The pedestrian push button sign shall be a Polara option T (Hi-Intensity Retroreflective MUTCD R10-3e) 9”x15” sign.

(d) Interconnect Cables (iN3-CABLE-X) - Pre-cut lengths (12’, 25’, or 50’) of interconnect cable from Push Button Station to Ped Head Control Unit.

(e) iNav Bluetooth Dongle (iN-DGL) - Bluetooth dongle to communicate from personal computer with Polar iN3 Push Button Station.

00990.16 Rectangular Rapid Flashing Beacons – The installation of rectangular rapid flashing beacons (RRFB) shall be as follows:

(a) RRFB Assembly Unit – The RRFB shall be a Carmanah (P/N: SC315-G) with AC Power Kit and uni- or bi-directional light bar configurations as shown on the Contract Plans or approved equal.

(b) Push Button System – RRFB push button system shall be a Polara Crosswalk Button Station (P/N: iNX9WN0-Y) or approved equal.

00990.17 Traffic Signal Circuits

All high-voltage wiring smaller than #10 AWG shall be IMSA 19-1 cable.

The #14 AWG, multi-conductor cables ran for traffic signal circuits will conform to IMSA Specification 19-1. Color coding of the conductors will be as follows:

Traffic Signal Color Code
Clackamas County, Oregon
#14 AWG IMSA 19-1 Traffic Signal Cable
Mast Arms Only

	Function (Phase)	20 Conductor [Feed]	10 Conductor [Branch]	7 Conductor [Branch]	5 Conductor [Branch]	4 Conductor [Branch]
Main Street	Phase Red	Red	Red	Red	Red	Red
	Phase Yellow	Orange	Orange	Orange	Orange	Orange
	Phase Green	Green	Green	Green	Green	Green
Side Street	Phase Red	Red/Black	Red/Black	Red	Red	Red
	Phase Yellow	Orange/Black	Orange	Orange	Orange	Black
	Phase Green	Green/Black	Green/Black	Green	Green	Green
Left Turn	Phase Red	Red/Black	White/Black	White/Black	Red	Red
	Phase Yellow	White/Red	Black	Black	Orange	Black
	Phase Green	Black/White	Blue	Green	Green	Green
Overlap	Phase Red	Red/Green	White/Black	White/Black	Red	Red
	Yellow/Flashing Yellow Arrow	Orange/Red	Black	Black	Orange	Black
	Phase Green	Blue/Red	Blue	Blue	Green	Green
Main Street	Phase Don't Walk	Red/White	Red	Red	Red	-
	Phase Walk	Green/White	Green	Green	Green	
Side Street	Phase Don't Walk	Black	Red/Black	Red	Red	-
	Phase Walk	Blue/White	Green/Black	Green	Green	-
Push-Button	Common	White/Black	White/Black	White/Black	Orange	-
	Main Street Phase	Blue	Blue	Blue	Black	-
	Side Street Phase	Blue/Black	Black	Black	Black	-
Spare		White	-	-	-	-
AC Common (Branch Only)		-	Spare	White		

00990.90 Payment - Delete Pay Item (c) from the pay item list.

Delete the paragraph that begins “Item (c) includes furnishing and installing…”

Replace the paragraph that begins “In Items (a), (b), (c), (d), (f) …” with the following paragraph:

In Items (a), (b), (d), (f) and (g), the intersection location will be inserted in the blank.

Replace the paragraph that begins “Item (b) includes furnishing and replacing…” with the following paragraph:

Item (b) includes furnishing and replacing or installing items for an existing traffic signal installation and the detection system.

Crosswalk closure supports will be paid for according to 00902.90.

SECTION 01015 - STORMWATER CONTROL, WATER QUALITY PLANTER

Section 01015, which is not a Standard Specification, is included for this Project by Special Provision.

Description

01015.00 Scope - This work consists of furnishing and installing water quality planters as shown. The work includes the installation and maintenance of the entire facility, as necessary, for a complete installation.

Materials

01015.10 Materials - Furnish material meeting the following requirements:

Storm Sewer Pipe	00445.11
Subsurface Drain Pipe	00430.10
Structural Steel	02530
Anchor Bolts	02560

01015.11 Water Quality Mixture – Furnish water quality mixture meeting the requirements of Section 01040.

01015.12 Concrete Check Dams – Construct concrete check dams with commercial grade concrete meeting the requirements of 00440.

Construction

01015.40 General - Construct water quality facility as shown. Perform planter excavation and fine grading work only when the biofiltration planter area is dry and only from the top of the planter area. Do not stockpile excavated material in the biofiltration planter area.

(a) Scarify - Scarify the subsoil area a minimum 12 inches deep.

(b) Laying Pipe - Lay the pipe according to Sections 00430 and 00445. Place pipe with perforations down.

(c) Joining Pipe - Fasten pipes together with coupling fittings or bands as specified for the type of pipe used. Cap the upstream end of the pipe.

(d) Inspection and Repair - Place drain rock, open graded aggregate base, and water quality mix only after all the pipe is laid, joined, and inspected. Remove and reinstall or replace all pipe that is out of alignment, has settled, or is damaged at no additional cost to the Agency.

(e) Black Plastic Liner – Place the Black Plastic liner as shown in the plans after curb & check dam installations are complete and prior to backfilling the planter with drain rock and water quality mixture.

(f) Concrete Check Dams - Install wood check dams as show per the plans after the planter curbs are installed.

(g) Placement of Water Quality Mixture - Place the water quality mixture in maximum 12 inch Lifts. Compact each Lift with a water filled landscape roller.

Maintenance

01015.70 Cleaning - If a stormwater control facility is used for erosion and sediment control, remove all accumulated sediment and debris before completing the facility.

Measurement

01015.80 Measurement – The quantities of Work performed under this section will be measured according to the following:

(a) Washed Drain Rock- Washed Drain Rock will be measured on the weight basis, measured in the hauling vehicle, after mixing.

(b) Open Graded Aggregate Base - Open graded aggregate base will be measured on the weight basis, measured in the hauling vehicle, after mixing.

(c) Concrete Check Dams – Concrete Check Dams will be measured on the "Each" basis as shown or directed.

Water Quality Mixture for planters is measured under Section 01040.

6" perforated pipe for planters is measured under Section 00430.

6" solid pipe for planters is measured under 00445.

Black Plastic Liner will not be measured. Black Plastic Liner is considered incidental to "Concrete Curbs, Modified Thickened Curb and Gutter for Stormwater Planters" or "Concrete Curbs, Perimeter Curb Wall for Stormwater Planters", as appropriate (Section 00759).

Payment

01015.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per the unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Washed Drain Rock for Planters	Ton
(b) Open Graded Aggregate Base for Planters	Ton
(c) Concrete Check Dams	Each

Item (c) includes reinforcement, dowels into planter curbs, and 2”-4” ballast placed on the downstream side of check dams, all as shown in the project drawings.

Excavation will be paid according to 00330.90.

Solid and perforated pipe for planters is paid under 00445.

Water Quality Mixture for planters is paid under Section 01040.

Black Plastic Liner is not paid under this section. It is incidental to “Concrete Curbs, Modified Thickened Curb and Gutter for Stormwater Planters” or “Concrete Curbs, Perimeter Curb Wall for Stormwater Planters”, as appropriate (Section 00759).

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

SECTION 01030 - SEEDING

Comply with Section 01030 of the Standard Specifications modified as follows:

01030.13(c) Pure Live Seed - Replace this subsection, except subsection number and title, with the following subsection:

Use the PLS specified rate listed in 01030.13(f) for determining PLS application rates. Ensure the PLS application rate meets the PLS specified rate. Apply pre blended seed mixes, with multiple species, at a PLS application rate ensuring all species meet or exceed the PLS specified rate for each species in the seed mix.

PLS application rate for an individual seed species is determined as follows:

- PLS specified rate is listed in 01030.13(f)
- PLS factor is obtained by multiplying the seed label germination percentage times the seed label purity percentage. Use the purity and germination percentages from the label on actual bags of seed to be used on the Project.
- PLS application rate is obtained by dividing the PLS specified rate by the PLS factor.

For a seed mix, make this calculation for each seed species in the mix and then adjust as follows:

- Using the seed tag, determine the weight of each seed species in the bag and use this information to find the percentage, by weight, of each seed species is in 1 pound for the pre-blended mix.
- Divide the percentage by weight of each seed species, per pound, for the pre-blended mix, by the PLS application rate for that specific seed species.

Determine the highest application rate in the seed mix and apply the seed mix at that application rate.

01030.13(f) Types of Seed Mixes - Add the following to the end of this subsection:

Provide the following seed mix formulas:

Permanent Seeding:

Botanical Name (Common Name)	**PLS Specified Rate (lb/acre)**
Festuca rubra 'Gibraltar' (Gilbralter Creeping red fescue)	39.2 ____
Festuca rubra 'Silhouette' (Silhouette Chewing Fescue)	39.2 ____
Lolium perenee 'Delaware Dwarf' (Dwarf Perennial Rye)	156.8 ____
Lolium perenee 'Amazing' (Amazing Perennial Rye)	156.8 ____

* Oregon Certified Seed

01030.13(g) Availability - Add the following sentence to the end of this subsection:

Submit the seed and seed mixes to be used on the project according to 00150.37.

01030.40 General - Add the following sentence after the sentence beginning “Notify the Agency…”:

Notify the Agency of the acreage to be seeded at least 7 Days before seeding begins.

Add the following subsection:

01030.43(c) Seed Application Rates - Determine the seeding application rate according to 01030.13(c). Apply seed mixes at the highest application rate calculated to provide not less than the specified application rate for each individual seed species in the mix.

SECTION 01040 - PLANTING

Comply with Section 01040 of the Standard Specifications modified as follows:

001040.02 Definitions - Add the following definition:

Weed Free - See 01030.02 for weed free definition

01040.14 Topsoil – Replace subsections (a), (b), and (c) with the following:

(a) Topsoil – Furnish medium compost meeting the requirements of Section 03020. Furnish soil meeting the following gradation requirements:

Sieve Size	Percent Passing (by Weight)
No. 4	100
No 10	95 - 100
No. 40	40 - 60
No. 100	10 - 25
No. 200	5 - 10

Sample soil according to AASHTO T 2. Determine sieve analysis according to AASHTO T 27 and AASHTO T 11.

Blend the medium compost and soil so that the mixture:

Is composed of between 20 percent and 25 percent medium compost material and between 75 percent and 80 percent soil material.

Has a pH between 5.5 and 8.0.

Does not have clumps greater than 3 inches in any direction.

(b) Water Quality Mixture – Furnish medium compost meeting the requirements of Section 03020. Furnish soil meeting the following gradation requirements:

Sieve Size	Percent Passing (by Weight)
No. 4	75-100
No 10	40 - 100
No. 40	15 - 50
No. 100	5 - 25
No. 200	5 - 15

Sample soil according to AASHTO T 2. Determine sieve analysis according to AASHTO T 27 and AASHTO T 11.

Blend the medium compost and soil so that the mixture:

Is composed of between 20 percent and 25 percent medium compost material and between 75 percent and 80 percent soil material.

Has a pH between 5.5 and 8.0.

Does not have clumps greater than 3 inches in any direction.

Refer to Section Appendix A, Section A.3 of the Clackamas County Sewer District #1 Stormwater Standards for further mixture requirements.

01040.15 Soil Conditioners - Remove subsection (b) and replace with the following:

(b) Commercially Manufactured Compost - Commercially manufactured fine compost material meeting the requirements of Section 03020.

01040.19(f) Plant Substitution – Add the following to the end of this paragraph:

The Engineer reserves the right to modify tree or plant materials. The cost of changing materials will be limited to the price difference (credit or deduction) of the plant.

01040.22 Water – Add the following:

(c) Tree Bags – Trees planted in non-irrigated areas, require placement of a tree watering bag, "TreeGator" or approved equal. Tree watering bags to be filled at least once a week, or as directed by product specifications.

Contractor will hand-water all plantings which are not served by underground irrigation systems. Trees in non-irrigated areas require placement of a "TreeGator" or approved equal tree watering bag. Tree watering bags to be re-filled at least once a week, or as directed by product specifications. All other vegetation to be hand-watered as required in 01040.49.

Provide moisture retention chemicals in all planter soils that are not irrigated for this Project.

01040.48(a) Method "A" (Cultivated Planting Areas, Non-lawn) – Modify as follows:

Delete the sentence beginning "Thoroughly mix 2 inches…" and replace with "Deliver Topsoil and Water Quality Mixture to the project, pre-blended to meet the specifications in 01040.14.

01040.49 General Planting - Add the following to the end of this subsection:

The following watering frequencies are required:

Plantings and seeded areas to be watered at a rate of one (1) inch per week.

01040.80 Measurement – Modify as follows:

Delete subsection (a). Soil Testing will be incidental to the bid items "Topsoil" and "Water Quality Mixture".

Replace subsection (b) with the following:

(b) Topsoil and Water Quality Mixture – Topsoil and Water Quality Mixture will be measured on the volume basis, using neat line field measurements after material has settled. Place sufficient material as required to account for settlement.

Replace subsection (c) with the following:

(c) Soil Conditioners – There will be no measurement for soil conditioners.

Replace subsection (f) with the following:

(f) Mulch – Bark Mulch, 3 Inch Depth will be measured on the area basis at time of placement, using neat line field measurements.

1040.90 Payment – Modify as follows:

Delete subsection (a). Soil Testing will be incidental to the items “Topsoil” and “Water Quality Mixture”.

(b) Topsoil and Water Quality Mixture – “Topsoil” and “Water Quality Mixture” will be paid at the Contract unit price per cubic yard.

(**c) Soil Conditioners** - Soil conditioner will be incidental to the payment for items paid under 1040.90 (b) Topsoil and Water Quality Mixture.

(d) Plant Materials – Modify as follows:

Delete the partial payment schedule. Payment for plants will be made in full after the time of original planting and after the County has accepted the plant material as healthy and properly planted.

The park district reserves the right to remove plants located within Mill Park from the bid depending upon their capacity and desire to complete this work with their own crews. This includes plant bid items including the description "(Mitigation Plantings)”

(f) Mulch – Modify the following pay items:

Pay Item	Unit of Measurement
Bark Mulch, 3 Inch Depth	Square Yard

For the paragraph beginning “No separate or additional payment…”, add the following bullet:

- tree watering bags
- moisture retention chemicals

SECTION 01044 – SECOND AND THIRD YEAR PLANT ESTABLISHMENT

Section 01044, which is not a Standard Specification, is included in the Project by Special Provision.

Description

01044.00 Scope - This work consists of furnishing labor, materials and equipment necessary to maintain all new plants and irrigation system elements <u>within the public rights-of-way</u>, beginning at the conclusion (final acceptance) of the original plant establishment period and continuing for two additional years. In case of conflict, the provisions of this Section shall govern over those of Section 01040.

Materials

01044.00 General - The minimum bid for 2nd and 3rd year plant establishment period may not be less than **$30,000.** The minimum bid for 2nd and 3rd year plant establishment period at Mill Park not be less than **$3,000.**

Engineer may reject part or all the landscape construction and establishment bids as nonconforming if the bid for landscape establishment does not meet or exceed this minimum requirement.

01044.11 Corrective Work - The Engineer may act to correct inadequate establishment work by any appropriate means. If corrective work is performed by Clackamas County, a proportional amount of monies otherwise due to the contractor for establishment services shall be deducted from the contract. The amount shall be determined as stated in Section 00150.80 of the Standard Specifications.

Maintenance

01044.20 General - The 2nd and 3rd year plant establishment periods will begin once all planting areas have been planted as specified in Section 01040, the first one-year maintenance period is completed, and written acceptance from the Engineer is received. The length of the additional establishment period will be two calendar years. The "anticipated" schedule is as follows:

- Project Completion by **November 15, 2023**
- First, one-year establishment period (included as part of landscaping bid items) from **November 16, 2023** through **November 15, 2024**.
- Second- and Third-Year plant establishment periods from **November 16, 2024** through **November 15, 2026**

01044.21 Watering - Water all newly installed plant materials at necessary intervals using the installed automatic irrigation system, unless otherwise directed by the Engineer. Water costs during the establishment period will be at the Contractor's expense. Repair or replace any damaged irrigation system components within 24-hours of observing problem with the system. Irrigation replacement and/or repair costs will be per 01044.22(e).

Contractor will hand-water all plantings which are not served by underground irrigation systems. Trees in non-irrigated areas require placement of a "TreeGator", or approved equal, tree watering bag. Tree watering bags to be re-filled at least once a week, or as directed by product specifications. All other vegetation to be hand-watered at a rate of one (1) inch per week, or on an as-needed basis to ensure healthy plant conditions.

01044.22 Plant Establishment -

(a) General - Maintain all original plantings and seeding as specified in Sections 01040.70 and 01040.71.

(b) Periodic Inspections - During the two-year establishment period, make inspections jointly with the Engineer at the following times:

Spring: Early-May, each year,
Summer: Mid-July, each year,
Fall: Late-September, each year.

(c) Corrective work - Perform corrective work per Sections 01040.74, 01040.75, 01040.77, and 01040.78.

(d) Success Criteria - Determination of success of establishment shall be made at each of the inspections listed in Section 01044.22(b). Successful establishment shall be defined as follows:

- 90% survival and vigorous growth of all trees, shrubs, vines and groundcovers.

(e) Irrigation Maintenance - Irrigation maintenance will include proper system start-up sufficiently ahead of the growing season to accommodate repairs without causing plant stress. Activate all lines with cleaning and adjustments as necessary. Program all clocks with the consultation and assistance of the Clackamas County supervisors. Regularly review clock operation to account for damage fluctuations and seasonal/environmental fluctuations.

Repair and replace system parts due to normal usage and product defect at contractor's expense. Other repair and replacement due to vandalism, acts of natural disaster or other causes such as traffic accidents shall be at Clackamas County's expense. Contractor must submit for repairs to Engineer for pre-approval prior to repair work. Rates for labor and equipment use required to repair shall be pre-negotiated with Engineer after award for contract but prior to repair work. Contractor will be responsible for system winterization, typically no later than October 31st.

(f) Plant Care - Plant care maintenance will include regular feeding of trees, shrubs and groundcover to promote vigorous and healthy growth. Use low phosphorus fertilizer within 50 feet of bio-swales and detention ponds. Do not use fertilizer within 50 feet of streams and natural drainage ways. Plant pruning shall be done to enhance the natural growth of plants. Pruning shall be done to eliminate dead growth and crossing branches, maintain growth within available space and not overgrow walks and walls, and to reduce tree canopy damage from winds. Tree pruning shall generally occur in the dormant winter season, a minimum of once per year for the street trees. To maintain overall appearance of the landscape, Contractor shall remove and dispose of all dead and/or critically damaged plant material. The cost of plant replacement will be borne by Contractor for plants damaged by poor establishment practices. The cost of plant replacement will be borne by Clackamas County for plants damaged by vehicle traffic, vandalism, theft and unusual insect infestation.

(g) Weed Control - Weed maintenance control will include non-selective contact spraying of identifiable weeds during the growing season with hand weeding as required. Do not use herbicides within 50 feet of streams and natural drainage ways. Weeding of persistent weed growth will be performed on an on-going basis to minimize unsightly weed build-up. Dead growth shall be removed and beds raked to a uniform finish grade.

(h) Litter Control - Litter control work will include regular pickup removal and disposal of litter and debris from all landscape areas. Litter work must be performed consistently throughout the year.

(i) Bark Mulch - Bark mulch maintenance will include application of bark to areas where existing bark has degraded or eroded. Generally, maintenance of the bark mulch at a depth of 2" will be sufficient. Rake smooth to an even finish grade.

(j) Safety Practices - All workmen must wear bright orange (or red) safety vests and must be instructed in safe working practices around the roadway system prior to any work. No work may proceed in any area of the roadway without proper notification by person, telephone or radio, a minimum of 24 hours before beginning work.

Measurement

01044.80 Measurement – The two-year establishment work will be measured by the Engineer during the periodic inspections described in Section 01044.22 (b). The contractor must submit establishment services reports to the Engineer no later than two weeks after each inspection date. The establishment services reports must include invoices for all establishment labor and materials expended toward the specific project, within the billed time period.

Payment

01044.90 Payment – Work performed under this section will be paid for at the Contract unit price, per unit of measurement for the following items:

Pay Item	Unit of Measurement
(a) 2nd and 3rd Year Plant Establishment	LS
(b) 2nd and 3rd Year Plant Establishment at Mill Park	LS

Item (a) includes all plant establishment along the project corridor, exclusive of that within Mill Park. This item has a minimum bid price of $30,000.

Item (b) includes all plant establishment at Mill Park. This includes all plants in the Bid Scheduled identified as “Mitigation Plantings”. The park district reserves the right to remove the “Plant Establishment at Mill Park” from the bid depending upon their capacity and desire to complete this work with their own crews. This item has a minimum bid price of $3,000.

Payment for the additional two-year establishment work will be paid on a quarterly basis after plant establishment work is verified by the engineer.

No separate or additional payment will be made for:

- Corrective work required during the plant establishment period
- Replacement of mulch as required to maintain minimum 2” depth
- Water (irrigation and hand-watered areas)
- Replacement of watering bags

SECTION 01050 - FENCES

Comply with Section 01050 of the Standard Specifications modified as follows:

01050.00 Scope – Add the following bullet:

- Where required, installation of new fence includes providing a connection to existing fences.

Add the following at the end of this subsection:

Most of the fences on this project will not be paid under this section. Any fences required as part of private property improvements will be paid as part of the “Private Property Improvements” bid items (Section 01075). The 4’ black vinyl coated fence required on top of the cast-in-place concrete wall at the north end of the Johnson Creek Bridge is included under the LS bid item

"Johnson Creek Crossing Structure" (Section 00500). The Split rail wood fence located at Mill Park will be paid under this section. Regardless of what sections the fences are paid under, all fences are required to meet the requirements of 01050, unless specified otherwise.

01050.10 Materials – Add the following at the end of the section:

The Split Rail Wood Fence at Mill Park must match existing split rail fence, including any finish treatments (paint, sealant, stain, etc.). Contractor is to provide submittal of all proposed materials for approval prior to construction.

Where specified in the bid schedule to provide Vinyl Coated Chain Link Fence or Gates, all items must be matching color Vinyl Coated including the fencing, posts, bars, cross braces, hardware and other elements of the fence.

All chain link style fences shall have a top bar.

01050.80 Measurement – Add the following to the end of this sub subsection:

(k) Split Rail Wood Fence at Mill Park will be measured on the length basis. Measurement will be from center to center of posts, measured along the line and grade of each separate continuous run of fence as constructed, exclusive of gates.

01050.90 Payment – Delete the pay schedule and replace with the following:

Payment for "Split Rail Wood Fence at Mill Park" will be paid on the length basis, per lineal foot.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and incidentals necessary to complete the Work as Specified.

SECTION 01065 – MONUMENT BOXES

Section 01065, which is not in the Standard Specifications, is included for this project by Special Provision.

01065.00 Scope – This work shall consist of installing new monument frames and covers at the locations designated by the Engineer.

Adjustment of existing monument boxes to finish grade shall be considered incidental work.

01065.10 Materials - The monument frames and covers shall be in compliance with the Clackamas County Surveyor's Office requirements as follows:

8" inch frames and covers - are typically acceptable for most local streets (subdivisions) with speeds of 35 miles per hour or less.

East Jordan Iron Works, Inc.
13127 State Avenue

Marysville, WA 98271
(360) 651-6144
Fax (360) 651-6150

Anders Jorgenson
Oregon Sales Representative
(503) 774-4144
Fax (503) 775-3263
Cell (503) 367-7925
ajorgenson@ejiw.com

- Product number 00368004 (fka 1036) for 8" Monument Frame and Cover
- Paving riser rings available

Additional vendor for 8” frames and covers:

Olympic Foundry Inc.
6530 NE 42nd Avenue
Portland, OR 97218
503-281-3381
503-284-5880 Fax

- Pattern No. M1010 for 8” Monument Frame and Cover
- Paving riser rings available

12 " inch frames and covers - are required for streets or County Roads of a higher speed classification (speeds over 35 miles per hour).

East Jordan Iron Works, Inc.
13127 State Avenue
Marysville, WA 98271
(360) 651-6144
Fax (360) 651-6150

Anders Jorgenson
Oregon Sales Representative
(503) 774-4144
Fax (503) 775-3263
Cell (503) 367-7925
ajorgenson@ejiw.com

- Product No. 00367311 12" x 7-7/8" Monument Frame
- Product No. 00367323 Monument Cover with drop handle
- Paving riser rings available

01065.40 Construction - Set monument case just below the pavement finished surface (0.00 inch to ¼ inch) at the slope of the street surface.

For asphalt streets, contractor shall complete top lift paving before installing monument boxes. Upon completion of paving, contractor shall diamond cut and install monument box as shown on the project drawings, backfilling with compacted ¾”-0 crushed rock and finishing with 6” of Class 4000 concrete. Contractor shall repair sawcut extensions with asphalt joint sealer. For concrete streets, monument boxes must be set and secured in place prior to concrete pour.

The location of the required monument boxes have not been indicated on the plans. The location of the required monument boxes will be determined during construction. A minimum of 5 days prior to placing the final lift of pavement, the contractor shall notify the engineer that they are ready for the monument boxes to be placed. The County or designated representative will mark the locations of the required monument boxes. At a minimum, the P.C.’s, P.T.’s, P.R.C.’s, P.C.C.’s, and tangents at a minimum of 1000 foot increments along the centerline will be marked.

01065.80 Measurement - The quantities to be paid for will be the actual number of monument boxes installed.

01065.90 Payment - Payment will be made at the contract unit price per each for the item "Monument Boxes". Payment will constitute full compensation to provide the monument boxes and furnish all materials, equipment, and labor required to set the monument boxes as specified.

SECTION 01070 - MAILBOX SUPPORTS

Comply with Section 01070 of the Standard Specifications.

SECTION 01075 – MISCELLANEOUS PRIVATE PROPERTY ADJUSTMENTS

Section 01075, which is not a Standard Specification, is included for this project by Special Provision. This section is intended to provide direction for specific private property improvements that are not covered under other Sections of the Standard Specifications or Special Provisions.

01075.00 Scope - The following work items shall be completed under this section and defined as follows:

Private Property Improvements – Property 4

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 4’ in height. Estimated length is 48’.

Private Property Improvements – Property 17

- Install new fence at property line. New fence material to be cedar, 4’ in height. Estimated length is 56’.

- Decommission existing septic sewer system. Contractor responsible for all permits and documentation. Provide a copy of documentation to the owner following decommission.
- Connect new service lateral to existing private service.

Private Property Improvements – Property 20

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood fence, 4' in height. Estimated length is 10'.

Private Property Improvements – Property 24

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be white wood fence, 5' in height. Estimated length is 56'.

Private Property Improvements – Property 28

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood fence, 6' in height. Estimated length is 42'.

Private Property Improvements – Property 29

- Remove existing private light pole located within the right-of-way. Qualified electrician to disconnect power at source. Notify and coordinate with property owner prior to beginning work.

Private Property Improvements – Property 30

- Remove existing private light pole located within the right-of-way. Qualified electrician to disconnect power at source. Notify and coordinate with property owner prior to beginning work.

Private Property Improvements – Property 37

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence with green privacy slats, 5' in height. Estimated length is 77'.
- Install new gates with similar configuration to existing gates. See plan for location of new gates.

Private Property Improvements – Property 45

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence with green privacy slats, 6' in height. Estimated length is 100'.
- Install new gates with similar configuration to existing gates. See plan for location of new gates.

Private Property Improvements – Property 47

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence with green privacy slats, 6' in height. Estimated length is 89'.
- Install new gates with similar configuration to existing gates. See plan for location of new gates.

Private Property Improvements – Property 48

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence with green privacy slats, 6’ in height. Estimated length is 100’.

Private Property Improvements – Property 49

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 4’ in height. Estimated length is 60’.

Private Property Improvements – Property 50

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be white plastic fence, 3’ in height, and wood fence, 6’ in height. Estimated length of white plastic fence is 39’. Estimated length of wood fence is 65’.

Private Property Improvements – Property 51

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood picket fence, 3’ in height. Estimated length is 47’.

Private Property Improvements – Property 54

- Install new fence between existing wall and back of shared-use path. New fence material to be black vinyl coated chain link fence, 4’ in height. Estimated length is 45’.
- Replace approximately 80 square feet of existing pavers, as shown on the plans
- Note the obligation agreement includes replacement of an existing retaining wall, but the design has since been modified to protect the existing retaining wall.

Private Property Improvements – Property 56

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence with green privacy slats, 6’ in height. Estimated length is 66’.

Private Property Improvements – Property 58

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood fence, 4’ in height. Estimated length is 71’.

Private Property Improvements – Property 59

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 4’ in height. Estimated length is 10’.

Private Property Improvements – Property 61

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood picket fence, 6’ in height. Estimated length is 41’.

Private Property Improvements – Property 64

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 3' in height. Estimated length is 58'.

Private Property Improvements – Property 65

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 3' in height. Estimated length is 96'.

Private Property Improvements – Property 66

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be wood fence, 6' in height. Estimated length is 107'.

Private Property Improvements – Property 72

- Install new fence at property line in replacement of existing fence being removed within existing right-of-way. Match existing fence material type and height. New fence material to be chain link fence, 4' in height. Estimated total length is 186'.
- Install new gates with similar configuration to existing gates. See plan for location of new gates.

All fence installations must meet the requirements of 01050. Where specified to provide Vinyl Coated Chain Link Fence or Gates, all items must be matching color Vinyl Coated including the fencing, posts, bars, cross braces, hardware and other elements of the fence. All fences shall have a top bar.

Additionally, all material submittals for work performed on Properties 41 and 43 will need to be approved by City of Portland Parks and Recreation.

01075.80 Measurement – No measurement of quantities will be made for work performed under this Section. Fence material, height, and lengths are provided here for contractor convenience. Regardless, where shown, fence types and heights are to match existing, including finish treatments (paint, stain, etc.). Fence materials, heights and lengths shown are approximate. No changes to measurement/payment will be made based on discrepancies of information presented here vs. actual. The contractor should inspect each property to determine their bid price for private property improvements work.

01075.90 Payment - Payment for each item listed in the bid schedule under this Section will be made on the Lump Sum basis. Payment will be payment in full for furnishing and placing all materials (including new materials), and for furnishing all equipment, labor, and incidentals necessary to complete the work, including permits, if necessary.

SECTION 01120 - IRRIGATION SYSTEMS

Comply with Section 01120 of the Standard Specifications modified as follows.

01120.10 Scope – Replace with:

This work consists of a design-build irrigation system and associated equipment at Mill Park, at locations shown or specified and as directed. The park district reserves the right to remove the private irrigation system from the bid depending upon their capacity and desire to complete this work with their own crews.

Work also includes repair to existing private irrigation systems damaged by construction improvements along the project corridor.

01120.18 Valve Boxes and Protective Sleeves – Replace the second sentence with the following:

Furnish boxes constructed of thermoplastic, with locking lids and of the type shown or specified.

01120.40 General – Replace with the following:

The irrigation drawings are schematic and show types of irrigation to be installed, and locations of water meters, points of connection, crossing points of mainline and sleeves, and approximate mainline locations.

Using products and direction shown on drawings, provide detailed irrigation system design showing irrigation head and lateral line layout (with 100%, head-to-head coverage), quick coupler locations averaging 200 feet on center (both sides of roadway and at medians), and the locations and sizes of all sleeves, valves, controllers, water meters and backflow prevention devices. Take into account all grade changes when designing system.

Submit shop drawings to the Engineer that clearly show layout of all required components for review and approval, prior to staking system. These drawings shall be completed by an experienced irrigation designer and shall be of a professional quality. Provide:

- A drafted, legible plan (at the same scale as original irrigation drawings) that shows the designed layout, location, and sizes of every system element as required for proper operation and as indicated on the contract drawings. Include on the shop drawings all system elements, relevant site features (existing trees, fences, retaining walls, etc.) and plan elements (detention ponds, swales, paving, new trees, proposed grades, etc.). A shop drawing made by marking up the original irrigation drawings will not be accepted.

- Provide the following minimum hydraulic calculations with the irrigation shop drawings: At a minimum, show a complete calculation for one average sprinkler zone (section) and a complete calculation for the “worst case” sprinkler zone (i.e., the section that is farthest from the point of connection (P.O.C.), is the largest, or otherwise presents the most challenging hydraulics). Starting from the P.O.C., show the calculation with a step-down method with flow and loss at each piece of equipment and length of pipe run between equipment. Show the total water required for each zone and the total for all zones to ensure that maximums for meter size, pipe sizes, and watering times will not be exceeded.

- Submit controller run-times to show that all zones can run within a reasonable time period.

The irrigation drawings and Contractor’s shop drawings may require adjustment during construction. Do not install the irrigation system as shown if it is evident that obstructions, grade

changes, or differences in area dimensions create conditions different from those anticipated in the design. Bring all such discrepancies to the attention of the Engineer. In the event this notification is not performed before construction begins on a part of the system where discrepancies exist, any revisions necessary to make the system operate as designed will be the Contractor's responsibility.

01120.90 Payment – Replace with the following:

01120.90 Payment – The accepted quantities of Work performed under this Section will be paid for at the Contract lump sum amount, for the following items:

Pay Item	Unit of Measurement
(a) Repair Private Irrigation Systems	Lump Sum
(b) Irrigation System at Mill Park	Lump Sum

Add the following to the end of this section:

Payment of item (a) includes repair/replacement of all private irrigation systems impacted by construction. Contractor will be required to coordinate with property owners and ensure that irrigation systems damaged or impacted by construction are restored to working condition, and that all zones function as intended. This work may include incidental repairs of damaged irrigation systems such as capping lines, moving/adjusting sprinkler heads or other similar modifications. Contractor will be responsible for replacing plants and landscaped areas damaged as a result of not restoring damaged irrigation systems in a timely manner.

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

No separate or additional payment will be made for excavation, backfill, electrical service, and system orientation.

SECTION 01150 - POTABLE WATER VALVES

Comply with Section 01150 of the Standard Specifications modified as follows:

Except for Measurement & Payment, Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

01150.90 Payment – Add the pay item as follows:

Pay Item	Unit of Measurement
(h) Valve Box Replacement	Each

Add the following:

Item (h) includes all work as shown in the Valve Box Replacement Detail (104B) on Sheet 3.10

SECTION 01160 - HYDRANTS AND APPURTENANCES

Comply with Section 01160 of the Standard Specifications modified as follows:

Except for Measurement & Payment, Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 01170 - POTABLE WATER SERVICE CONNECTIONS, 2 INCH AND SMALLER

Except for Measurement & Payment, Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

01170.90 Payment – Add the pay item as follows:

Pay Item	Unit of Measurement
(g) Pressure Reducing Valve Assembly	Each

Add the following:

Item (f) includes all work as shown in the Typical CRW Service Assembly detail on Sheet 3.10. Depending on side of the street compared to the water main, “Long Side” or “Short Side” will be inserted in the blank.

Item (g) includes installation of the Pressure Reducing Valve Assembly as shown in the Typical CRW Service Assembly detail on Sheet 3.10, as required.

Items (f) and (g) include excavation, pipe connections, laying and jointing the pipe and fittings and appurtenances, backfilling, testing, flushing and disinfection of the service connection. They also include obtaining any necessary plumbing permits to make connections to the existing service lines.

SECTION 02001 - CONCRETE

Comply with Section 02001 of the Standard Specifications modified as follows:

02001.02 Abbreviations and Definitions: Replace the sentence that begins “**Pozzolans** - Fly ash, silica fume…” with the following sentence:

Pozzolans - Fly ash, natural Pozzolans, silica fume, and high-reactivity Pozzolans.

Replace the sentence that begins "**Supplementary Cementitious Materials** - Fly ash, silica fume…" with the following sentence:

Supplementary Cementitious Materials - Pozzolans and ground granulated blast furnace slag.

02001.20(a) Strength - Replace Table 2001-1 with the following Table 2001-1:

Table 02001-1

Concrete Strength and Water/Cementitious Material (w/cm) Ratio		
Type of Concrete	**Strength f'_c (psi)**	**Maximum w/cm Ratio**
Structural	3300	0.50
	3300 (Seal)	0.45
	4000	0.48
	4000 (Drilled Shaft)	
	HPC4500	0.40
	HPC(IC)4500	
	5000 +	
Paving	4000	0.44
PPCM's (with cast-in-place decks and no entrained air)	5000	0.48
	5500	0.44
	6000 +	0.42

SECTION 02030 – SUPPLEMENTARY CEMENTITIOUS MATERIALS

Comply with Section 02030, of the Standard Specifications modified as follows:

02030.00 Scope - Replace this subsection, except for the subsection number and title, with the following:

This Section includes the requirements for fly ash, natural pozzolans, silica fume, ground granulated blast furnace slag and high reactivity pozzolans used in portland cement concrete.

02030.10 Fly Ash - Replace this subsection, except for the subsection number and title, with the following:

Furnish Class C and Class F fly ash from the QPL and conforming to AASHTO M 295 (ASTM C618).

Add the following subsection:

02030.15 Natural Pozzolans - Furnish Class N natural pozzolans from the QPL and conforming to AASHTO M 295 (ASTM C618).

02030.50 Metakaolin - Replace this subsection with the following:

02030.50 High Reactivity Pozzolans - Furnish high-reactivity pozzolans from the QPL and conforming to AASHTO M 321.

SECTION 02050 - CURING MATERIALS

Comply with Section 02050 of the Standard Specifications modified as follows:

02050.10 Liquid Compounds - Replace the paragraph that begins "Furnish liquid membrane-forming curing…" with the following paragraph:

Furnish liquid membrane-forming curing compounds from the QPL and meeting the requirements of ASTM C309. Before use, submit a one quart sample from each lot for testing. Samples will be tested according to ODOT TM 721. Samples are not required for curing compounds used on Commercial Grade Concrete.

SECTION 02470 – POTABLE WATER PIPE MATERIALS

For water-related work, contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 02475 – POTABLE WATER FITTING MATERIALS

For water-related work, contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 02480 – POTABLE WATER VALVE MATERIALS

Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 02485 – HYDRANT AND APPURTENANCE MATERIALS

Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 02490 – POTABLE WATER SERVICE CONNECTION MATERIALS, 2-INCH AND SMALLER

Contractor is to comply with the materials, installation, and testing requirements as provided in the latest version of the Clackamas River Water Technical Specifications.

SECTION 02510 - REINFORCEMENT

Comply with Section 02510 of the Standard Specifications modified as follows:

02510.11(c) Coated Reinforcement Ties and Supports - Replace this subsection, except for the subsection number and title, with the following:

Ties and supports for coated reinforcement, including ties for coated to uncoated reinforcement connections, shall be nonmetallic coated.

SECTION 02530 - STRUCTURAL STEEL

Comply with Section 02530 of the Standard Specifications modified as follows:

002530.10 Structural Steel for Bridges - Replace this subsection, except for the subsection number and title, with the following:

Structural steel for Bridges shall conform to the following, as shown or specified:

- AASHTO M 270, Grade 36 (ASTM A709, Grade 36)
- AASHTO M 270, Grade 50 (ASTM A709, Grade 50)
- AASHTO M 270, Grade 50W (ASTM A709, Grade 50W)
- AASHTO M 270, Grade HPS 70 (ASTM A709 Grade HPS 70)
- AASHTO M 270, Grade HPS 70W (ASTM A709 Grade HPS 70W)

Impact test requirements, for both non-fracture-critical tension components (T), and fracture-critical tension components (F), are to be according to Zone 2 requirements of AASHTO M 270 Tables 11 and 12, respectively.

SECTION 02560 - FASTENERS

Comply with Section 02560 of the Standard Specifications modified as follows:

02560.30(b) High Strength Tie Rods, Anchor Bolts and Anchor Rods - Add the following paragraph to the end of this subsection:

End stamp all ASTM F1554, Grade 105 according to ASTM F1554 Supplementary Requirements S2 and S3. If the end of the bolt is to be embedded in concrete, the projecting end from the concrete shall be the marked end.

SECTION 02690 - PCC AGGREGATES

Comply with Section 02690 of the Standard Specifications modified as follows:

02690.20(e) Grading and Separation by Sizes for Prestressed Concrete - Replace this subsection with the following subsection:

02690.20(e) Grading and Separation by Sizes - Sampling shall be according to AASHTO R 90. Sieve analysis shall be according to AASHTO T 27 and AASHTO T 11. Provide aggregates meeting the gradation requirements of Table 02690-1 for structural concrete. Provide a CAgT to perform sampling and testing when required.

Table 02690-1
Gradation of Coarse Aggregates
Percent passing (by Weight)

		Sieve Size											
Size Number	Nominal Size Square Openings	(2½ in.)	(2 in.)	(1½ in.)	(1 in.)	(¾ in.)	(½ in.)	(⅜ in.)	(No. 4)	(No. 8)	(No. 16)	(No. 50)	(No. 200)
3	(2 to 1 in.)	100	90 to 100	35 to 70	0 to 15	—	0 to 5	—	—	—	—	—	**
357*	(2 in. to No. 4)	100	95 to 100	—	35 to 70	—	10 to 30	—	0 to 5	—	—	—	**
4	(1½ to ¾ in.)	—	100	90 to 100	20 to 55	0 to 15	—	0 to 5	—	—	—	—	**
467*	(1½ to No. 4)	—	100	95 to 100	—	35 to 70	—	10 to 30	0 to 5	—	—	—	**
5	(1 to ½ in.)	—	—	100	90 to 100	20 to 55	0 to 10	0 to 5	—	—	—	—	**
56	(1 to ⅜ in.)	—	—	100	90 to 100	40 to 85	10 to 40	0 to 15	0 to 5	—	—	—	**
57	(1 to No. 4)	—	—	100	95 to 100	—	25 to 60	—	0 to 10	0 to 5	—	—	**
6	(¾ to ⅜ in.)	—	—	—	100	90 to 100	20 to 55	0 to 15	0 to 5	—	—	—	**
67	(¾ to No. 4)	—	—	—	100	90 to 100	—	20 to 55	0 to 10	0 to 5	—	—	**
68	(¾ to No. 8)	—	—	—	100	90 to 100	—	30 to 65	5 to 25	0 to 10	0 to 5	—	**
7	(½ to No. 4)	—	—	—	—	100	90 to 100	40 to 70	0 to 15	0 to 5	—	—	**
78	(½ to No. 8)	—	—	—	—	100	90 to 100	40 to 75	5 to 25	0 to 10	0 to 5	—	**
8	(⅜ to No. 8)	—	—	—	—	—	100	85 to 100	10 to 30	0 to 10	0 to 5	—	**
89	(⅜ to No. 16)	—	—	—	—	—	100	90 to 100	20 to 55	5 to 30	0 to 10	0 to 5	**

* Use two or more seperated sizes which when combined meet these gradation limits.

** See 02690.20(a). Do Not evaluate material passing the No. 200 sieve according to 00165.40.

02690.20(f) Grading and Separation by Sizes for Other Concrete - Delete this subsection.

02690.30(g) Grading - In the paragraph that begins “Sampling shall be according to…”, replace the words “AASHTO T 2” with the words “AASHTO R 90”.

SECTION 02910 - SIGN MATERIALS

Comply with Section 02910 of the Standard Specifications modified as follows:

02910.33(a) General - Replace this subsection, except for the subsection number and title, with the following:

Permanent legends consist of white retroreflective screened, red retroreflective screened, black screened or cut-out white retroreflective sheeting. The letters and numerals of all permanent legends shall conform to the design of the FHWA Standard Rounded Capital Letter Alphabets.

Add following subsection:

02910.50 Digitally Printed Signs, Temporary - Temporary traffic control signs may use digitally printed signs from an integrated engineered match component system on the QPL and applied to furnished substrate according to 00222.10(b).

SECTION 03010 – FENCE MATERIALS

Comply with Section 03010 of the Standard Specifications modified as follows.

03010.30 Chain Link Fabric, Ties, and Tension Wires – Add the following bullet:

- Vinyl coated fabric shall be coated with a minimum of 7 mils of poly-vinyl chloride.

03010.50 Metal Fence Posts, Braces and Appurtenances for Chain Link Fence – Modify this subsection as follows:

03010.50(c)(1) Tubular Steel Posts – Add the following bullet after the last paragraph:

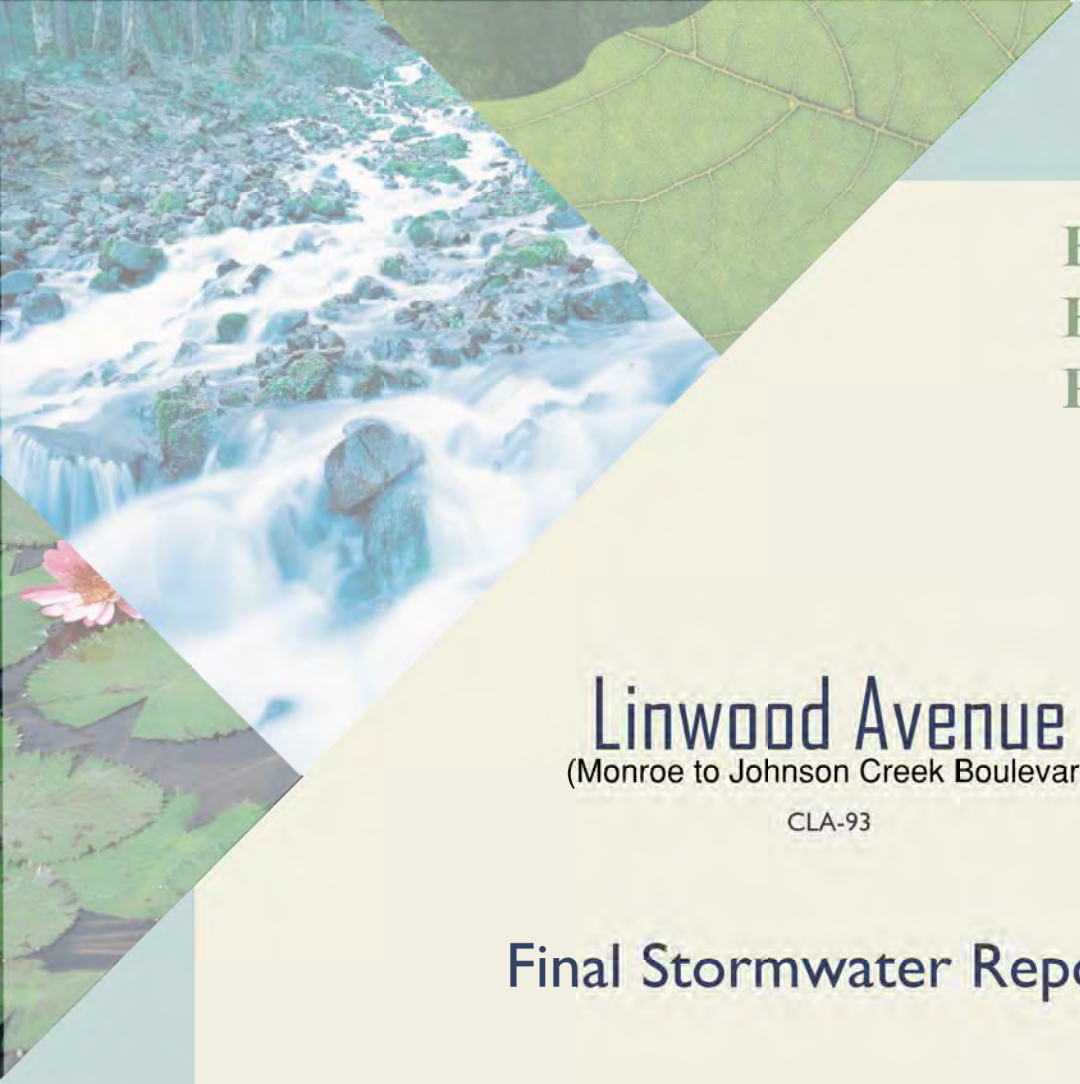
- All vinyl coated posts shall be coated with 10 to 15 mils of poly-vinyl chloride.

03010.50(c)(3) Fence Stays, Brace Guys and Wire Loops – Add the following bullet after the last paragraph:

- All vinyl coated fence stays, brace guys, and wire loops, and other miscellaneous wire shall be coated with 7 mils of poly-vinyl chloride.

SECTION 03020 - EROSION MATERIALS

Comply with Section 03020 of the Standard Specifications.



Harper
Houf Peterson
Righellis Inc.

Linwood Avenue

(Monroe to Johnson Creek Boulevard)

CLA-93

Final Stormwater Report

Revised November 2022

Prepared For:

Clackamas County's Department of Transportation and Development (DTD) and Water Environmental Services (WES)

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Project Description

The proposed project is located on SE Linwood Avenue between SE Monroe Street and Johnson Creek Boulevard. Linwood Avenue is classified as an arterial and is a significant route for pedestrians and cyclists. This segment of Linwood Avenue is within Clackamas County Service District #1 (CCSD#1) jurisdiction. All managed runoff will be conveyed through Linwood Ave and ultimately discharge north into Johnson Creek. Refer to Appendix A for Vicinity and basin maps.

The Capital Improvement Program (CIP) indicates the need for updated improvements to the stormwater control and widening the Johnson Creek crossing to accommodate pedestrian travel. This project includes asphalt pavement, curbs, sidewalks (pervious and impervious), stormwater facilities, and bike lanes. A 10.5' wide pedestrian bridge is proposed to be constructed over Johnson Creek just upstream of the existing Linwood Ave vehicular bridge. The existing storm system will be utilized to the maximum extent possible. Proposed low impact development infiltration (LID) planters will be used to meet project requirements.

Purpose and Objectives

This report presents the best management practices (BMP) for conveyance, infiltration, detention and water quality treatment to be installed as part of this roadway development project. Clackamas County Water Environment Services (WES) and Clackamas County Department of Transportation and Development (DTD) standards have been used as design requirements and guidelines.

Existing Basin Characteristics

The existing conditions of SE Linwood Avenue between SE Monroe Street and Johnson Creek Boulevard consists of a two-lane arterial street with limited, intermittent sidewalks and gravel shoulders along the corridor.

Pre-developed conditions, as stated in the WES development standards, are the existing conditions prior to new development or redevelopment. Existing ground cover along Linwood Avenue generally consists of impervious streets, compacted gravel, landscape and sidewalks within the public right-of-way. Adjacent properties include private residences, commercial district (SE King Road intersection), and undeveloped land. Existing conditions within the project limits were found to be approximately 84% impervious pavement and 16% landscape in poor condition. For the purposes of hydrologic evaluation, the pre-developed condition for modified impervious area shall be modeled as grassy pasture for flow control calculations. The project corridor consists of several soil classifications and corresponding curve numbers. Project basin breakdown and hydrologic soil group breakdown can be found in Appendix B.

Stormwater runoff from the existing Linwood Ave corridor is unmanaged with no treatment or flow control measures along the project corridor between Monroe Street and Johnson Creek Boulevard. Storm runoff is collected in a series of catch basins and pipes that discharge north to Johnson Creek within the Johnson Creek Watershed. Johnson Creek continues flowing west and south until its confluence with the Willamette River.

This project is identified as being located within an area of limited downstream conveyance capacity per Appendix G of the CCDS#1 2013 Stormwater Standards. Appendix G.5 identifies the project site as contributing to Johnson Creek basin to the north, where Johnson Creek is known to flood during large storm events. Due to this criteria, additional flow control measures are required for the project per the CCSD#1 Stormwater Standards section 5.4.4.3.

The proposed conveyance basins were delineated using a combination of topographic survey, WES GIS pipe network data, Clackamas County drywell GIS network and the City of Milwaukie GIS pipe network and drywell basins. Basin land use and cover were determined by soil characteristics, site observation and geotechnical boring logs. Assumed impervious area for all offsite basins were based on current local zoning for residential housing and approximate lot sizes for urban areas. Zone mapping provided in Appendix B.

There are eight public basins delineated along the corridor associated with the project (Basins A – Basin H). SE Monroe Street forms the southern border of these basins, routing the captured stormwater north towards Johnson Creek. Proposed Basins C, D, E, F and G are all ultimately conveyed north and outfall via an existing 56-inch concrete pipe along the south embankment of Johnson Creek, just west of Linwood Avenue.

Basins A and B are within the 100-year flood plain boundary of Johnson Creek. Basin A collects runoff and discharges northeast into an undocumented vegetated public swale that ultimately outfalls to Johnson Creek just upstream of the project site. Currently, the majority of existing Basin A runoff drains to this swale for management with a small portion of the basin draining directly into Johnson Creek via small weep holes at the existing Johnson Creek crossing. Basin B drains east to an existing catch basin in SE Overland Street before discharges into a water quality swale in Mill Park. The water quality swale at Mill Park outfalls to Johnson Creek upstream of the project as well. Additionally, the existing basin B has some direct discharge to Johnson Creek via weep holes at Johnson Creek Linwood bridge.

Basin H flows northwest along a vegetated drainage ditch along the Springwater Corridor Trail before being collected and discharged into Johnson Creek further downstream from the main project outfall location.

All existing Johnson Creek outfalls identified will be maintained and protected with this project. The proposed design will maintain existing drainage paths to the maximum extent practical. See Appendix A for all basin delineations, proposed managed and unmanaged areas along Linwood Avenue, and proposed stormwater management facility locations.

Soil Characteristics
The Natural Resources Conservation Service (NRCS) with the United States Department of Agriculture (USDA) has classified the soils within Clackamas County in the Soil Survey. Soils are categorized into Hydrologic Soil Groups based on estimated runoff from precipitation. These groupings assume the soils are saturated and receive precipitation from long-duration storms. The soils consists of majority Quatama and Salem silt loam. The hydrological grouping classifications are soil group C and soil group B, respectively. Refer to Appendix B for assumed soil group classification.

Existing (E) and Proposed (P) Soil Assumptions:
Curve Numbers = (E & P) 98 for Impervious Area
(P) 79 for Proposed Pervious Pavement (Soil Type B)
(P) 86 for Proposed Pervious Pavement (Soil Type C)
(E&P) 85 for Gravel (Soil Type B)
(E&P) 89 for Gravel (Soil Type C)
(E) 79 for Poor Condition Open Space (Soil Type B)
(E) 86 for Poor Condition Open Space (Soil Type C)
(P) 58 for Good Condition Woods (Soil Type B)
(P) 72 for Good Condition Woods (Soil Type C)

Sheet Flow Mannings “n” = 0.011 for pavement
0.240 for dense grass
Shallow Concentrated Flow “Cp” = 16.13 for unpaved surfaces
Per FHWA, English units 20.32 for paved surfaces
Conduit Flow Mannings n = 0.013 for pipe flow

Proposed Improvements and Impervious Surfaces
Proposed impervious surface area will consist of concrete driveways, asphalt surfaces and compacted gravel. The proposed project has an 0.70-acre net decrease in impervious area along the corridor. Basin maps are located in Appendix A of this report.

Pollutants of concern related to road work include metals (zinc, copper, lead, etc.), sediment, nutrients, pesticides, polycyclic aromatic hydrocarbons (PAHs), oil, grease and other petroleum per the Department of Environmental Quality (DEQ).

Stormwater Management

The current (July 1, 2013) WES stormwater standards were used for all design as it relates to conveyance, water quality, infiltration and water quantity management. Table 1 on the following page shows the specific WES requirements.

Table 1 – 2013 WES Stormwater Management Requirements

Design Requirement	WES Criteria
Conveyance Design Storm	10-Year Rational Method Storm (<10 acres) 25-Year 24-hour SBUH Method for Pipe (> 10 acres) 100-Year 24-hour Storm (Creek Crossing (>640 acres) 1 foot minimum freeboard between HGL and top of structure
Treatment Area	All area within the limits of improvement
Treatment Storm	1 inch in 24-hour rainfall
Infiltration	½" in 24-hour rainfall to infiltrate in 96-hours 3.0' minimum vertical separation from max seasonal groundwater elevation
Detention Storm	Reduce 2-year, 24-hr post-developed runoff to ½ 2-year, 24-hr pre-developed runoff Reduce 25-year events post-developed runoff to 2-year pre-developed runoff
Downstream Analysis	Net new flow < 15% of total contributing flow or 1500 feet downstream, whichever is greater

Table 2 - Precipitation-Frequency Estimates

Frequency	Precipitation
2-yr; 24-hr	2.6 inches
25-yr; 24-hr	4.0 inches
100-yr; 24-hr	4.8 inches

Infiltration

Per section 5.3 of the Clackamas County Service District No. 1 Stormwater standards, infiltration systems require all new or redevelopment projects to infiltrate the runoff volume of a ½-inch 24-hour storm. Most of the project site and surrounding offsite basins have high infiltration rates, making infiltration a commonly used disposal method. NV5 Inc and GeoDesign conducted infiltration testing in nine locations along the Linwood Corridor at approximately 5 feet deep. Some infiltration tests are used for multiple infiltration planters; however, all test location are within less than 100 feet from any proposed facility. Field infiltration results reveal differing infiltration rates throughout the site, ranging from negligible to over 100 inches per hour. A factor of safety of 2 was applied to all field infiltration test rates and all design infiltration was capped at 10 inches per hour for stormwater disposal to account for variability in soil consistency, location and depth. Refer to Appendix D for infiltration rates used in design.

WES requires all infiltration subsurface facilities to have a minimum of 3.0' vertical separation from the maximum seasonal groundwater. The geotechnical report by GeoDesign dated September 23, 2020 indicated ground water is approximately 15' deep near the creek and 31.5' deep near SE King road intersection. The geotechnical report indicates that groundwater is likely associated with the water level of the nearby Johnson Creek. All proposed infiltration planters are designed well over 3.0' above measured seasonal ground water.

The proposed infiltration facilities will infiltrate the entire ½-inch; 24-hour storm for the project. The proposed perforated pipe will be at least 6 inches above the bottom of the proposed planter rock section to encourage infiltration. The planters were designed such that all stormwater resulting from the ½ inch storm will fully infiltrate, not reaching the proposed perforated pipe and remain fully in the drain rock section of the planter.

Due to the disperse nature of the project site, proposed planters will manage equivalent impervious area, both new and existing. All area draining to each proposed planter will fully infiltrate the ½ inch storm contributing to the facility. Refer to Appendix C for hydrographs. Complete infiltration hydrographs are available upon request.

Water Quality

The WES treatment criteria will be met by treating runoff from an equivalent impervious area within the Linwood Avenue corridor. Due to the disperse nature of new or modified impervious area, portions of redeveloped impervious area are unable to be treated directly. To account for these unmanaged areas, this project proposes managing exiting areas where stormwater management is not required, and existing management does not exist. Per section 5.2 of the CCSD#1 Stormwater standards, the water quality facilities shall be designed to capture and treat the first 1-inch of precipitation falling in a 24-hour storm from surfaces within the project limits requiring SWM.

The existing utility infrastructure was used to the maximum extent practical due to the linear nature of the improvements and large upstream contributing basins being conveyed through the project site. Portions of the project corridor are within the 100-year flood plain or drain offsite to undocumented stormwater facilities. For the purposes of this report, all impervious area within the 100-year flood plain or contributing to an undocumented facility will be considered as unmanaged. Any treatment that occurs from these downstream facilities is incidental. Refer to downstream analysis portion of this report for project impact analysis to these existing undocumented facilities.

The project is required to treat 82,334 square feet of new and modified impervious surface. Due to the dispersed nature of the site, 50,059 sf of new or modified impervious area will not be directly treated with the proposed LIDA planters. The proposed water quality infiltration planters are proposed to treat 86,684 square feet of contributing impervious area (32,275 sf modified and 54,409 sf existing), which is more than the total required treatment area. Table 3 on following page shows total basin managed areas, treating public contributing impervious area for project impervious areas unable to be managed. See Basin Characteristics Table in Appendix B for total project basin areas and required treatment basin areas.

The proposed stormwater partial infiltration planters will deviate from the WES 2013 stormwater standards. See proposed details in attached Appendix A. HHPR proposes a design variance to allow or the following planter section:

- 1” Freeboard
- 9” Minimum Ponding
- 18” Blended Soil Media
- 3” Separation Chocker Rock Layer
- 12” Drain Rock Minimum
- 6” Perforated Pipe
- Overflow Beehive with Orifice Control Plate
- 1% Maximum Slope within facility
- Concrete Check Dams (where required)

HHPR proposes setting the overflow such that there is 9 inches of ponding with a 1% max slope within the facility and no freeboard requirement. As designed, these facilities will be adjacent to a cycle track, so reducing the vertical drop is important for safety and riding comfort. The majority of the project corridor is relatively flat; however, a couple concrete check dams are required at some planters to limit the overall vertical drop adjacent to the planters to 20 inches from the top of the

planter wall to the finished grade of the facility. Planter locations were strategically chosen to prevent offsite runoff entering the facilities and limit existing underground utility conflicts. The overflow drain will be set 1 inch below the roadway gutter elevation. Underdrain systems will be necessary for collecting and routing stormwater that will filter through the proposed topsoil material but will not infiltrate into the underlining native soils during larger storm events. The facility will provide a minimum of 12 inches of washed drain rock to encourage infiltration. The planters will have a flat bottom; therefore, the drain rock layer may vary across the planter. This additional rock storage is incidental to planters and not modeled. See rock depth table on sheet 3.9 of the drawing set and Appendix A of this report.

The design was modeled using SBUH method and ensures that all water quality runoff will filter through the 18 inches of topsoil media without reaching the overflow atrium. The vegetated partial infiltration planters will filter all stormwater developed during a 1 inch; 24-hour storm event with a designed maximum filtration rate of 6 in/hr through the 18-inch growing media layer. All water quality planter hydrographs refrain from extracting this filtration volume, showing all stormwater generated from the water quality event will filter through the proposed facility. These planters are designed to infiltrate stormwater. The water quality planter model is simply showing water quality compliance within the ponding area of the planter.

Hydrograph summaries, calculations and spreadsheets of the proposed treatment can be found in Appendix C. Refer to Table 3 below for sizing and design parameters. See Appendix A for planter locations and standard details.

Table 3 – Water Quality Planter Basin Characteristics

BASIN #	PLANTER #PER PLANS	TOTAL CONTRIBUTING AREA (SF)	NEW/MODIFIED IMPERVIOUS AREA (SF)	ONSITE PUBLIC CIA (SF)	GRAVEL (SF)	PERVIOUS SIDEWALK (SF)	LANDSCAPE AREA (SF)	BMP PLANTER (SF)	ORIFICE SIZE (IN)	DESIGN INFILRATION RATE (IN/HR)
C1	Planter 16	17,466	4,740	6,768	70	3,998	1,540	350	0.8	10.0
D1	Planter 15	9,862	2,066	3,693	192	2,794	917	200	1.0	5.7
D2	Planter 14	8,630	1,866	3,282	0	2,493	829	160	1.1	5.7
D3	Planter 12	9,520	2,040	3,670	0	2,821	837	152	1.0	10.0
D4	Planter 13	11,175	3,048	3,948	0	2,907	1,100	172	1.1	10.0
E1	Planter 9	6,591	1,853	2,382	0	1,606	568	182	0.5	6.3
E2	Planter 10	9,021	2,110	3,276	25	2,360	1,016	234	0.6	6.3
E3	Planter 7	5,890	1,435	2,312	0	1,567	448	128	1.0	1.55
E4	Planter 8	6,509	1,274	2,670	0	1,864	399	302	0.5	1.55
E5	Planter 6	11,032	3,156	4,050	280	2,120	1,228	198	1.4	1.55
E6	Planter 5	3,968	741	1,719	0	1,186	182	140	0.6	1.55
E7	Planter 11	6,808	2,344	2,535	104	1,405	240	180	0.6	6.3
F1	Planter 4	7,414	966	2,922	0	1,621	1,629	276	0.5	2.25
F2	Planter 2	7,936	933	3,072	0	2,677	986	268	0.9	0
F3	Planter 3	10,096	1,885	3,918	0	2,942	1,055	296	1.1	0
F4	Planter 1	8,050	1,147	4,192	0	1,982	457	272	1.0	0.55
Total Managed Basins		139,968	**31,604**	**54,409**	**671**	36,343	13,431	3,510		

Flow Control

The project site drains to a basin with limited capacity per Appendix G of the CCDS#1, which cannot be upgraded with this project. WES requires the 2-year, 24-hr post-developed runoff be ½ the 2-year, 24-hr pre-developed runoff and the 25-year, 24-hr post-developed runoff be reduced to meet the 2-year, 24-hr pre-developed runoff. This project will utilize partial infiltration planters with orifice control to meet WES detention requirements. Facilities were modeled using Hydraflow SBUH method and can be found in Appendix C.

Due to the disperse nature of improvements, limited green space, existing underground utilities and portions of the corridor being within the 100-year flood plain, several project basins remain undetained. Project basins A, B, G and H all flow offsite and will not be detained as part of this project. Additionally, some proposed improvements within project basins C, D, E and F are unable to be managed due to existing grade constraints.

See Table 4 below. A more complete project basin allowable flow breakdown is available in Appendix B with provided basin hydrograph summaries in Appendix C. Complete hydrographs are available upon request.

Table 4 – Project Flow Control Summary

Storm Event	Pre-Developed Peak Flow (cfs)	Allowable Post-Developed Peak Flow (cfs)	Proposed Post-Developed Peak Flow (cfs)
2 Year Storm	2.55*	2.03**	1.99
25 Year Storm	4.54***	3.40****	3.15

**1.043 cfs from the project limits + 1.507 cfs from CIA*
*** Allowable 2-Yr Peak Flow = 1.043*(1/2) + 1.507 cfs from CIA*
**** 2.187 cfs from project limits + 2.357 cfs from CIA*
**** Allowable 25-Yr Peak Flow = 1.043 cfs + 2.357 cfs from CIA*

The proposed partial infiltration planters will overdetain proposed and contributing impervious area within basins C, D, E and F to account for the undetained project flows. Contributing impervious area, not currently or required to be managed, will be treated in lieu of dispersed project disturbance areas. A proposed orifice and overflow drain will ensure the total project peak flows meet WES flow control requirements. The proposed planters are capable of conveying the 100-year storm event through the overflow atrium. In the event of an atrium drain clogging, any stormwater unable to infiltrate will flow into the roadway gutter pan and continue downstream to be collect by existing catch basins and additional planter facilities. Linwood Avenue has been documented to be under submerged conditions during 100-year flood events. HHPR does not anticipate any additional impact to downstream properties since the project peak flows will be reduced during all storm events with a reduction in impervious area. The proposed design will meet all WES flow control requirements. For full breakdown of allowable peak flows and calculations, see Appendix B.

Conveyance/ Downstream Analysis

Storm pipes were analyzed to convey the undetained, full build-out 25-year, 24-hour storm at critical locations depending on size, slope and upstream basin size. Pipe calculations were done using Manning's Equation with a "n" value of 0.013 and the SBUH method was used to calculate the peak undetained runoff rates. A 25-year HGL analysis of the existing conveyance system is provided in Appendix D of this report.

As previous stated, the proposed site improvements are within an area identified as having downstream deficiencies. The proposed design will reduce the overall peak flows leaving the site due to impervious area reductions. Therefore, the project will not create any net new peak flows. The project discharges into three (3) separate existing outfalls to Johnson Creek. The majority of the project will discharge via an existing 56" pipe into Johnson Creek approximately 60' downstream of the existing Linwood bridge crossing. This project will not impact any existing outfalls.

The stormwater runoff management plan consists of utilizing the existing pipe system in Linwood Avenue to the maximum amount practical. It is not feasible to adjust the existing conveyance system at the outfall in Linwood Avenue due to the historic classification of the existing rock channel embankments of Johnson Creek. The existing 56-inch Johnson Creek pipe outfall on the southwest bank of the creek discharges below the measured ordinary high-water elevation. As a result, the outfall pipe is expected to be partially submerged during most storm events. Due to the

partially submerged outfall, backwater conditions from Johnson Creek exist within the existing pipe conveyance system for approximately 100 feet upstream and is undocumented.

The existing 56-inch outfall to Johnson Creek has an undetained 25-year peak flow of 92 cfs, which contributes less than 15 percent of the upstream drainage basin (approximately 3.5%). A "No-Rise" analysis and certification will be submitted, separate from this report. The proposed project will not impact the 100-year floodway elevations with the addition of the pedestrian bridge, as well as floodway elevations at all existing cross-sections of Johnson Creek upstream and downstream of the project crossing.

The proposed design maintains over 1 foot of freeboard in SE Linwood Avenue at all locations, typically more. Additionally, only a small portion of the existing conveyance will be in slight surcharged conditions due to offsite basin JCB3 large undetained flow contribution and existing partially submerged outfall condition.

The 25-year HGL analysis assumes all basins are undetained for the purposes of conveyance. Clackamas County and DEQ provided maps of upstream infiltration drywell locations that can be found in Appendix E. Areas where topographic survey and county maps indicate injection wells do not connect or contribute to the Linwood Avenue conveyance system were excluded from offsite basin boundaries. Infiltration facilities with limited information were not modeled or reflected in the conveyance calculations. For conveyance purposes, all offsite basins assume no detention and full build-out conditions to be conservative. Refer to Appendix D for as-builts and Johnson Creek capacity flow calculations.

Proposed basin A will remain to be routed through an undocumented vegetated public (County) swale facility that discharges into Johnson Creek, approximately 145 feet upstream of the new pedestrian bridge at Outfall 2. The existing facility condition was added to the time of concentration calculations of basin A existing and proposed conditions. The open channel dimensions were approximated based on existing asbuilt and topographic survey. The proposed design will reduce the project impervious area draining to this existing public vegetated SWM swale by 0.15 acres. Since the existing facility and project basin A are both within the 100-year flood plain, water quality calculations do not take credit of potential treatment from the existing vegetated swale. This downstream facility will not be impacted as a result of this project.

The existing bridge, Basin A2, has weep holes within the asphalt to discharge directly into Johnson Creek below. The proposed design will maintain these rudimentary drainage holes, discharging a small area directly into the creek. The design is unable to collect and treat Basin A2. The project treats and detains other contributing impervious area in lieu of this unmanaged basin.

Proposed basin B sheet flows to an existing catch basin in Overland Street and discharged into an existing water quality swale in Mill Park. The Mill Park swale discharges into Johnson Creek from an existing 12" storm pipe, Outfall 3. This water quality swale dimensions were determined by as-builts, topographic survey and visual inspection. Refer to Appendix D for asbuilt data. A thorough analysis of the existing conveyance system was conducted at Outfall 3. The proposed project changes will not create any adverse effects downstream. Project water quality calculations do not take credit of potential treatment from this existing vegetated public (County) swale or residence time. The existing swale facility and project basin B are both within the 100-year flood plain.

Proposed basin H will continue to sheet flow into a grassy drainage ditch along Johnson Creek blvd and continue within the drainage ditch for 1500 feet. The proposed basin H has a 457 sf increase in impervious area that will not impact the downstream system and is incidental to the project. The existing drainage ditch was analyzed and can convey the entire flow without issue. This basin is treated as unmanaged for purposes of design.

Refer to Appendix D for supporting data.

Operations and Maintenance

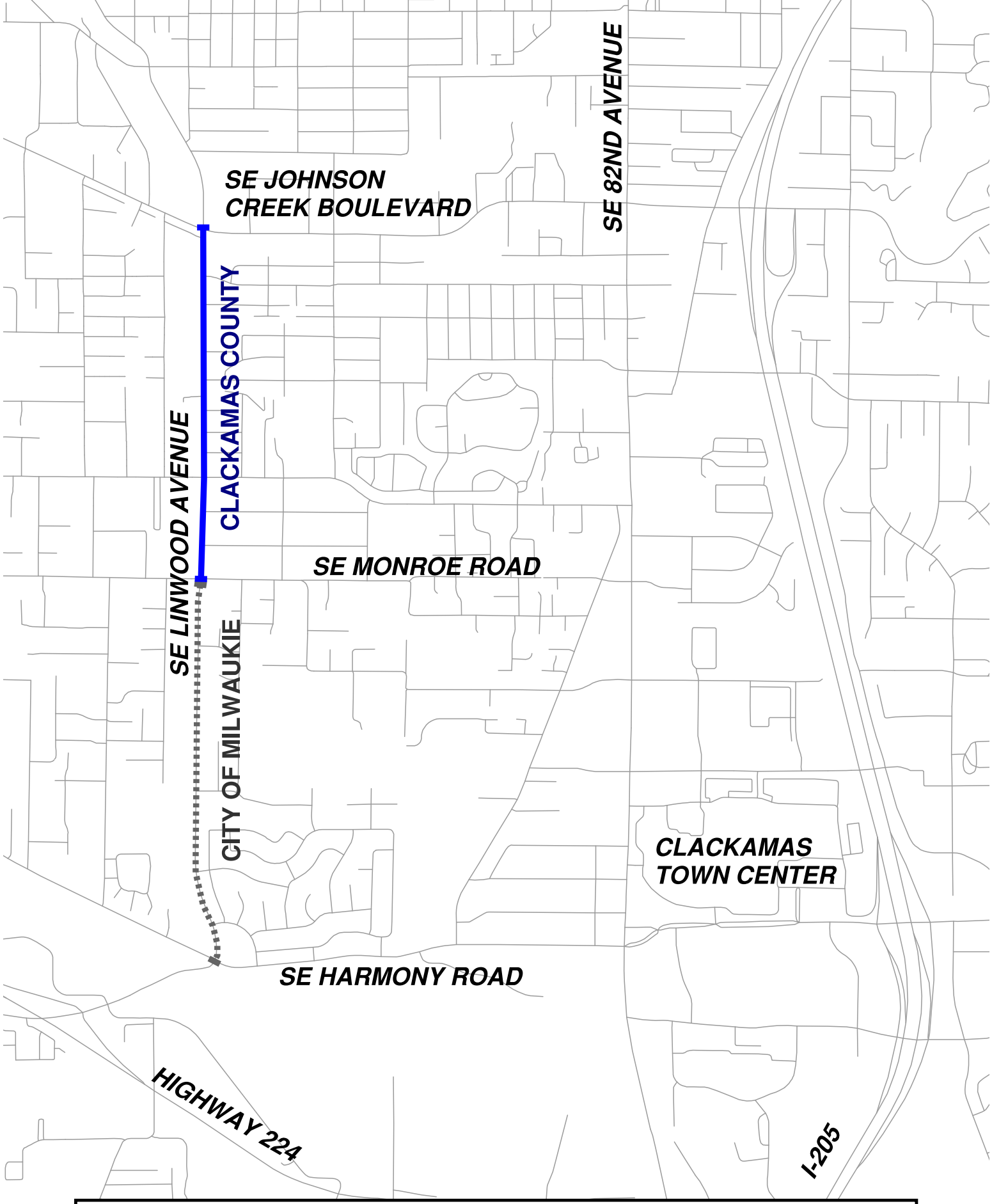
Proposed LID planters will be constructed intermittently along the site frontage of Linwood Avenue, which provide adequate treatment and detention to satisfy all WES requirements. Clackamas County is responsible for maintenance of all proposed public facilities along Linwood Avenue. Planters shall be accessed from the sidewalk or roadway. All facilities shall be maintained per the O&M plan included in Appendix F.

Conclusion

The proposed stormwater management plan will achieve pollutant removal to the maximum extent practicable via biofiltration that target pollutants expected within Linwood Avenue.

Stormwater from the Linwood corridor project will connect to the existing stormwater collection system, ultimately discharging to Johnson Creek. As designed, this project shall not create any adverse impacts to the downstream water bodies. The proposed partial infiltration planters will satisfy WES water quality, infiltration and detention requirements. The project will significantly improve the overall storm conveyance as the improvements will reduce the total impervious area within the right-of-way as well as provide detention and infiltration disposal per WES standards. The stormwater runoff will be reduced during all storm events with no adverse effects to the downstream system as a result of this project.

Appendix A – Exhibits



LINWOOD AVENUE IMPROVEMENTS PROJECT

CLACKAMAS COUNTY PORTION - SE MONROE RD TO SE JOHNSON CREEK BLVD

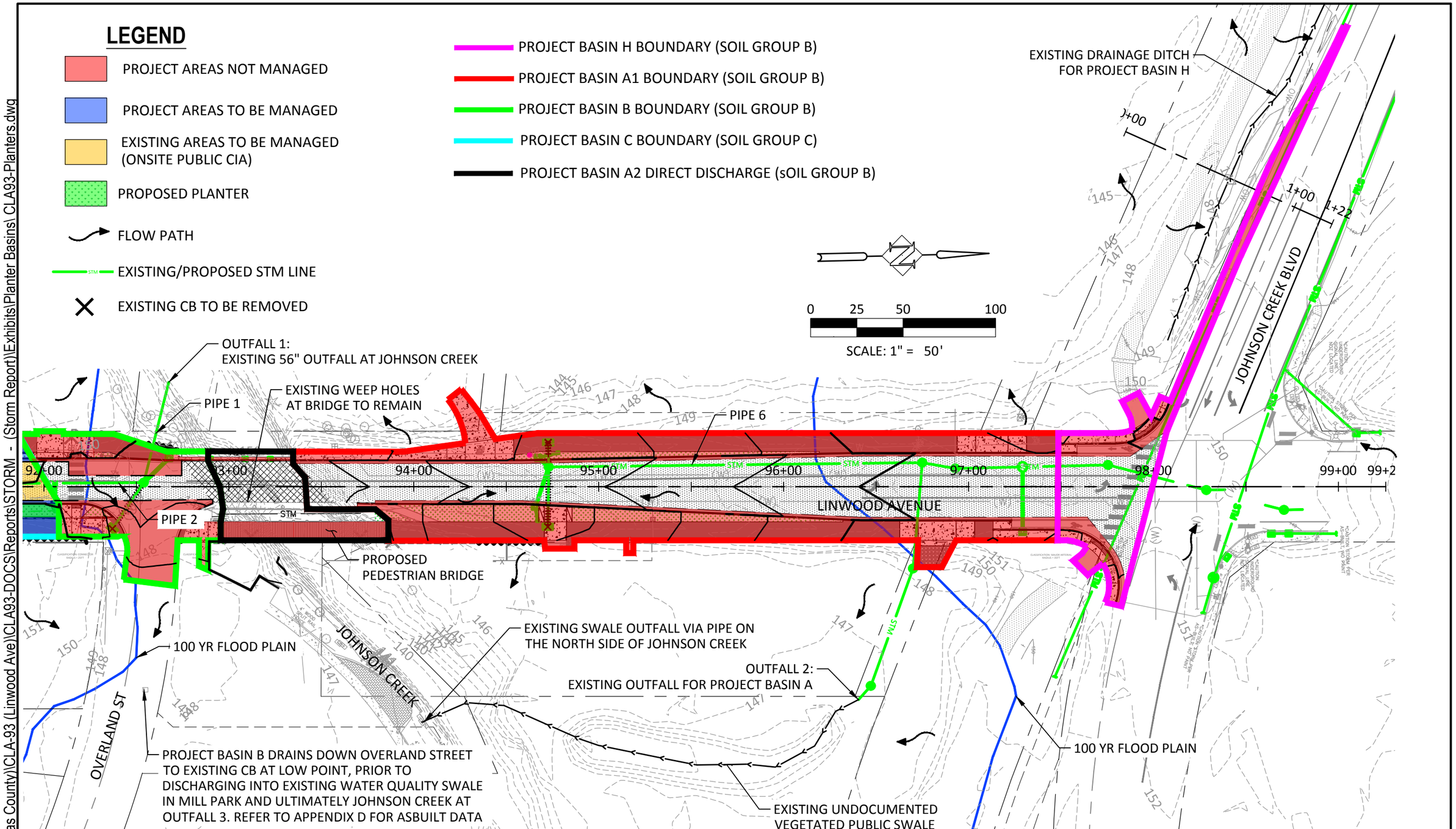
CLACKAMAS COUNTY PROJECT LIMITS

CITY OF MILWAUKIE

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DOCS\Reports\STORM - (Storm Report)\Exhibits\Planter Basins\ CLA93-Planters.dwg

LEGEND

- PROJECT AREAS NOT MANAGED
- PROJECT AREAS TO BE MANAGED
- EXISTING AREAS TO BE MANAGED (ONSITE PUBLIC CIA)
- PROPOSED PLANTER
- FLOW PATH
- EXISTING/PROPOSED STM LINE
- EXISTING CB TO BE REMOVED
- PROJECT BASIN H BOUNDARY (SOIL GROUP B)
- PROJECT BASIN A1 BOUNDARY (SOIL GROUP B)
- PROJECT BASIN B BOUNDARY (SOIL GROUP B)
- PROJECT BASIN C BOUNDARY (SOIL GROUP C)
- PROJECT BASIN A2 DIRECT DISCHARGE (sOIL GROUP B)



SE LINWOOD AVE
CLACKAMAS COUNTY, OREGON
NOV 2022

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: SSS
DRAWN: SSS
CHECKED: ---
DATE: NOV 2022

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

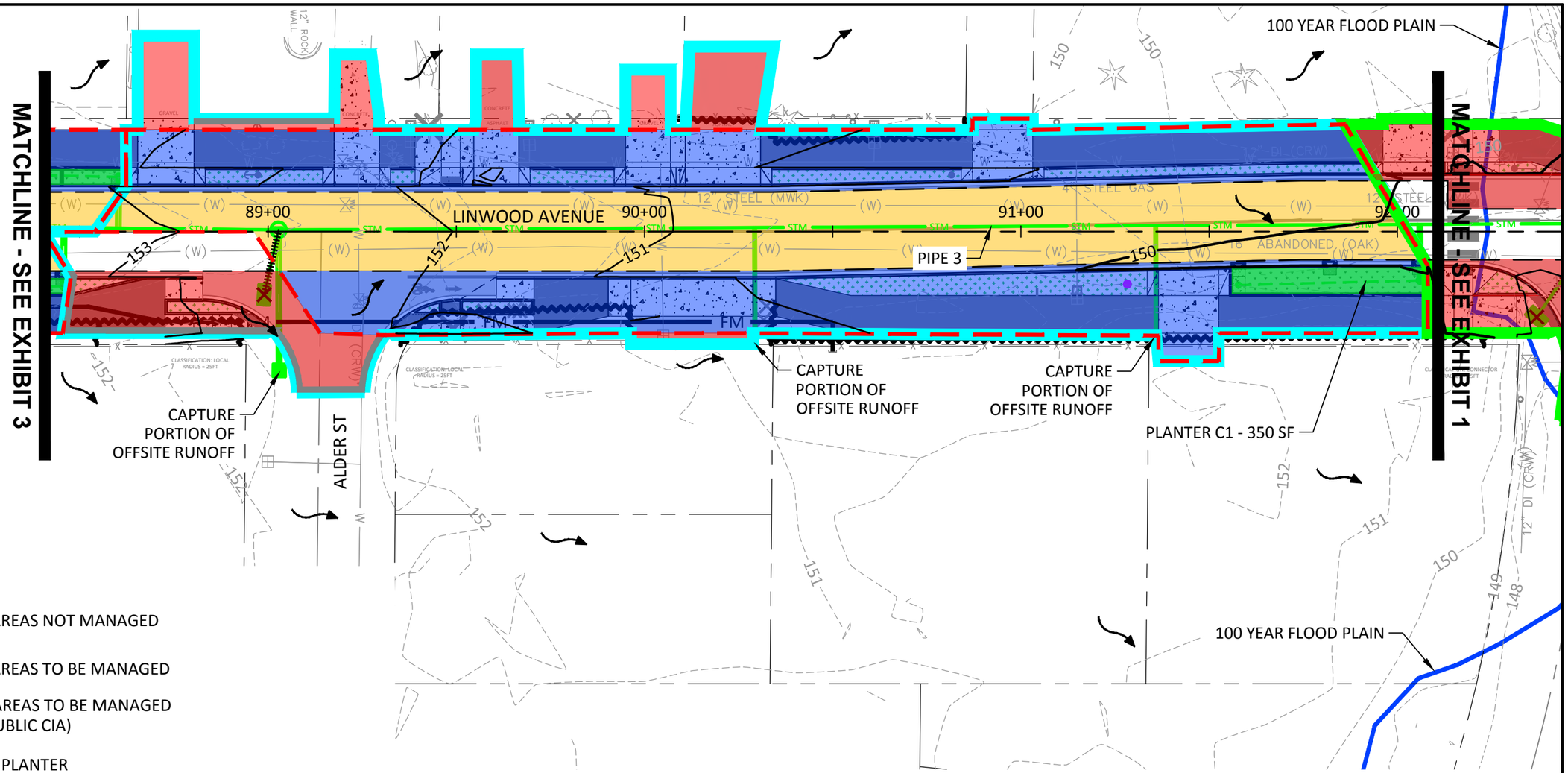
PROPOSED BASIN MAP

Linwood Avenue

CLACKAMAS COUNTY, OREGON

SHEET NO. 1

JOB NO. CLA-93



LEGEND

- PROJECT AREAS NOT MANAGED
- PROJECT AREAS TO BE MANAGED
- EXISTING AREAS TO BE MANAGED (ONSITE PUBLIC CIA)
- PROPOSED PLANTER
- FLOW PATH
- EXISTING/PROPOSED STM LINE
- EXISTING CB TO BE REMOVED
- PROJECT BASIN B BOUNDARY (SOIL GROUP B)
- PROJECT BASIN C BOUNDARY (SOIL GROUP C)

0 15 30 60

SCALE: 1" = 30'

SE LINWOOD AVE
CLACKAMAS COUNTY, OREGON
NOV 2022

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PROPOSED BASIN C PLANTER EXHIBIT

Linwood Avenue

CLACKAMAS COUNTY, OREGON

SHEET NO. 2

JOB NO. CLA-93

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LEGEND

- PROJECT AREAS NOT MANAGED
- PROJECT AREAS TO BE MANAGED
- EXISTING AREAS TO BE MANAGED (ONSITE PUBLIC CIA)
- PROPOSED PLANTER
- FLOW PATH
- EXISTING/PROPOSED STM LINE
- EXISTING CB TO BE REMOVED
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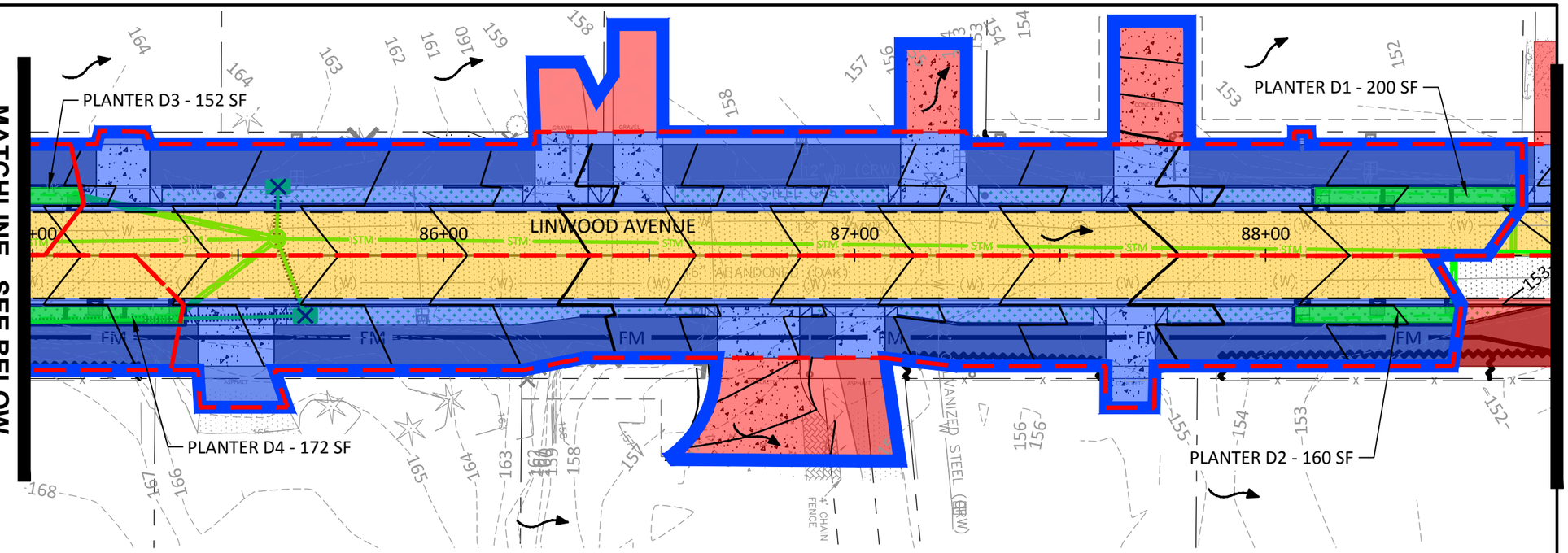
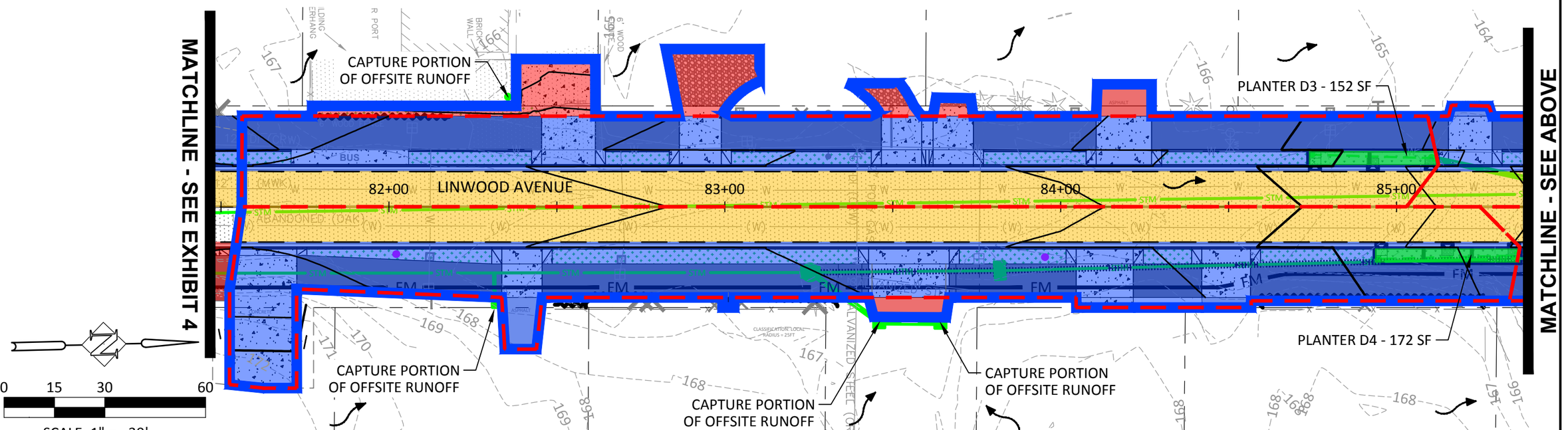
- PROPOSED STORM PLANTER SUBBASIN





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SCALE: 1" = 30'

SE LINWOOD AVE
CLACKAMAS COUNTY, OREGON
NOV 2022

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PROPOSED BASIN D PLANTER EXHIBIT

Linwood Avenue

CLACKAMAS COUNTY, OREGON

SHEET NO. 3

JOB NO. CLA-93

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LEGEND

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- PROJECT AREAS TO BE MANAGED
- EXISTING AREAS TO BE MANAGED (ONSITE PUBLIC CIA)
- PROPOSED PLANTER
- FLOW PATH
- EXISTING/PROPOSED STM LINE
- EXISTING CB TO BE REMOVED
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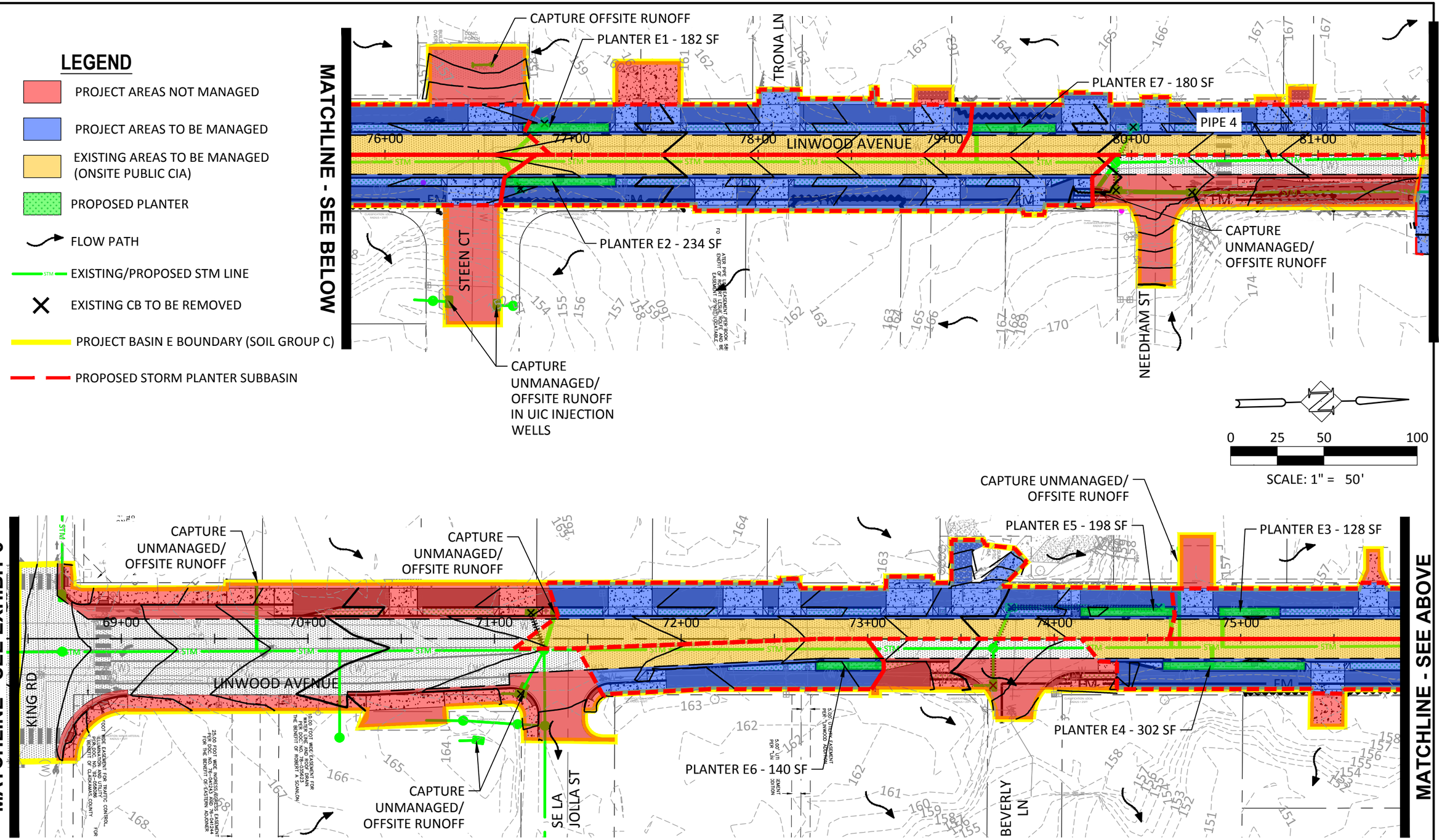

SE LINWOOD AVE
CLACKAMAS COUNTY, OREGON
NOV 2022

DATE	NO.	DESCRIPTION

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DESIGNED: SSS
DRAWN: SSS
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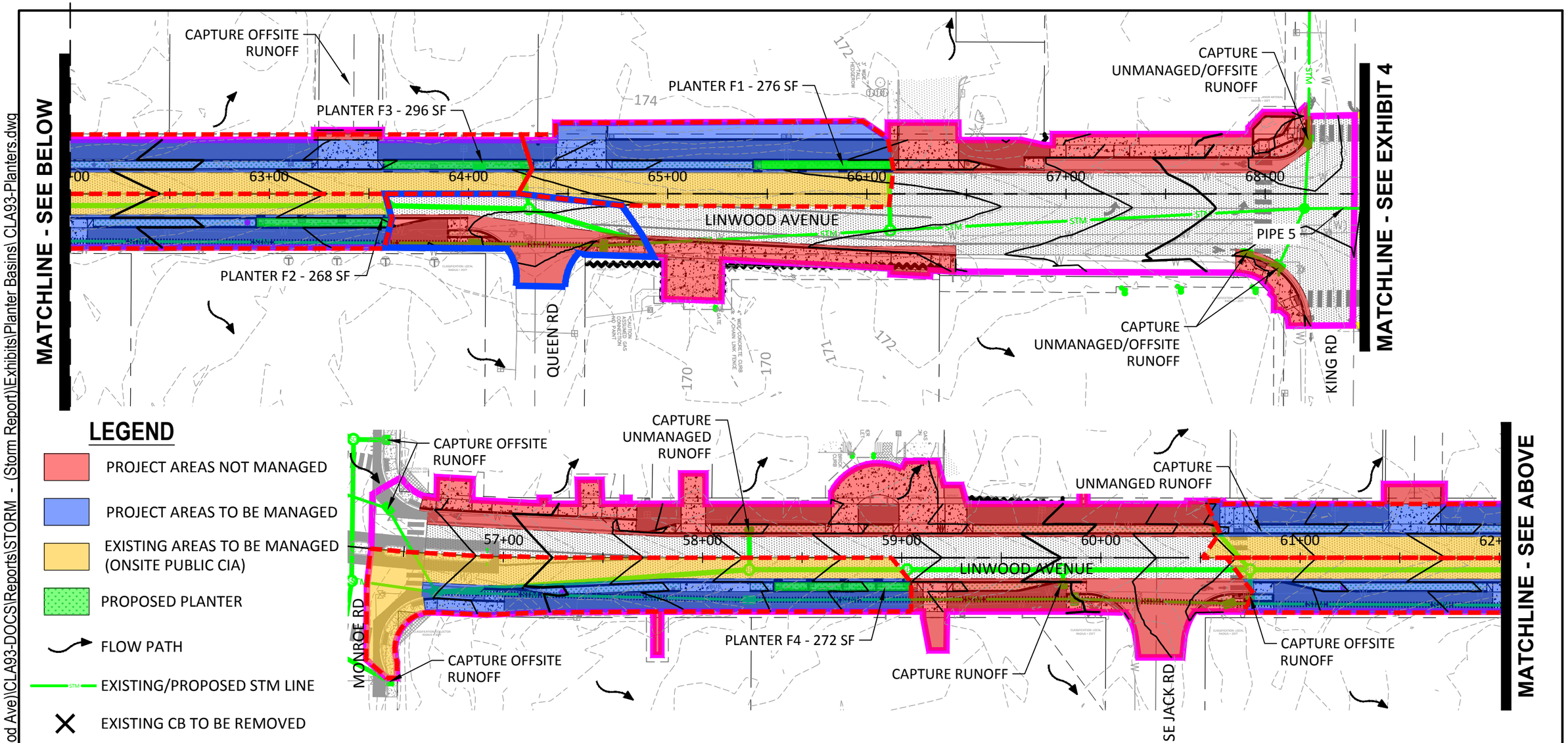
PROPOSED BASIN E PLANTER EXHIBIT

Linwood Avenue

CLACKAMAS COUNTY, OREGON

SHEET NO. 4

JOB NO. CLA-93



LEGEND

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- PROJECT AREAS TO BE MANAGED
- EXISTING AREAS TO BE MANAGED (ONSITE PUBLIC CIA)
- PROPOSED PLANTER
- FLOW PATH
- EXISTING/PROPOSED STM LINE
- EXISTING CB TO BE REMOVED

- PROJECT BASIN F BOUNDARY (SOIL GROUP C)
- PROJECT BASIN G BOUNDARY (SOIL GROUP C)
- PROPOSED STORM PLANTER SUBBASIN

0 25 50 100

SCALE: 1" = 50'

SE LINWOOD AVE
CLACKAMAS COUNTY, OREGON
NOV 2022

DATE	NO.	DESCRIPTION

R E V I S I O N S

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PROPOSED BASIN F PLANTER EXHIBIT

Linwood Avenue

CLACKAMAS COUNTY, OREGON

SHEET NO. 5

JOB NO. CLA-93

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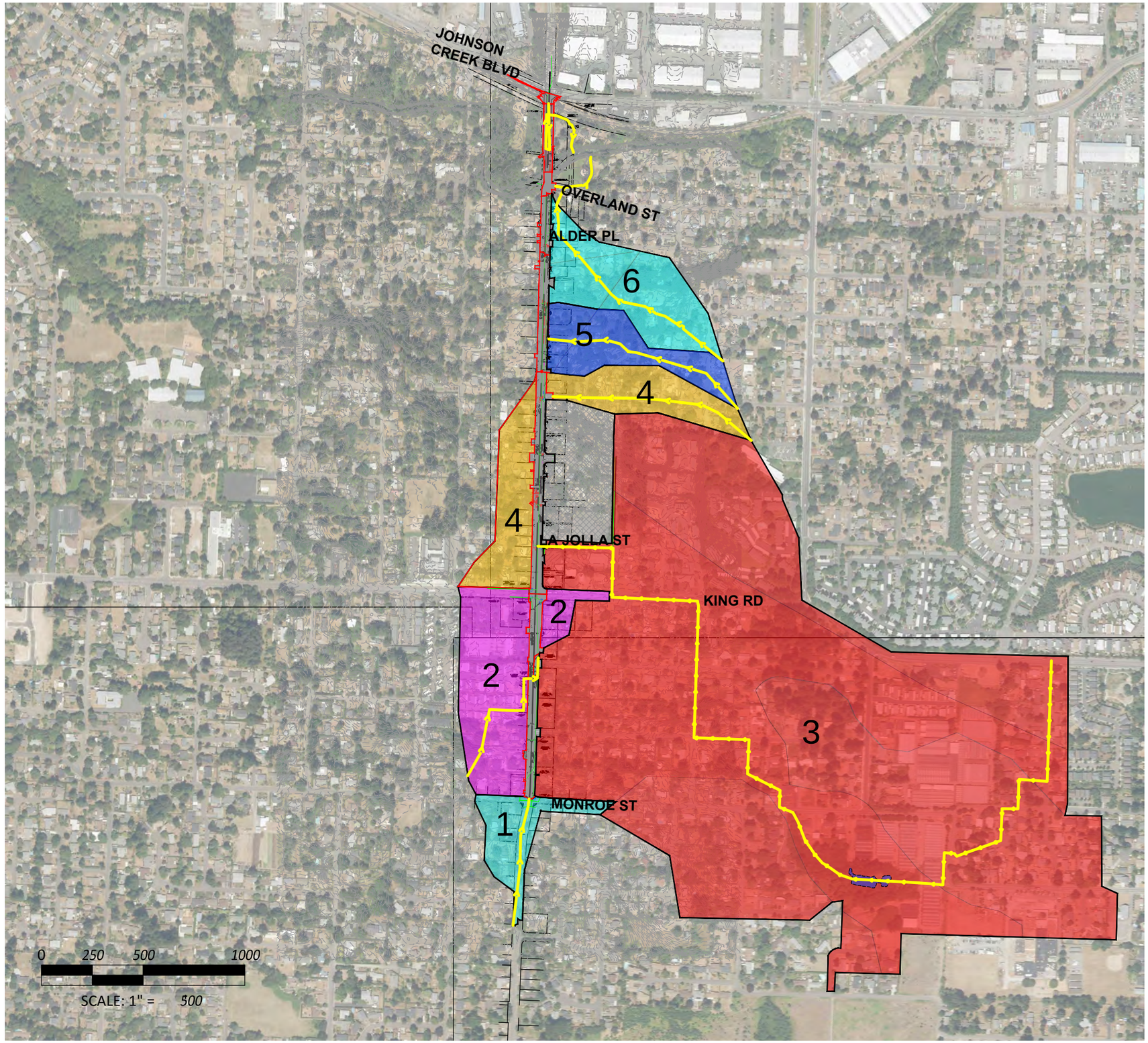

LEGEND

PROPOSED BASIN LINE

TIME OF CONCENTRATION PATH

SE LINWOOD AVE CONVEYANCE BASINS

CLACKAMAS COUNTY, OREGON

DECEMBER 2021

6

Harper Houf Peterson Righellis Inc.

ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

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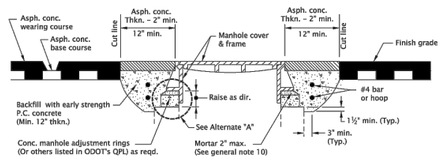
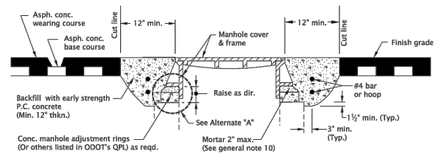
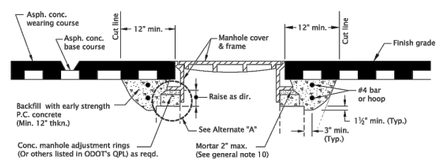


METHOD "A"



METHOD "B"



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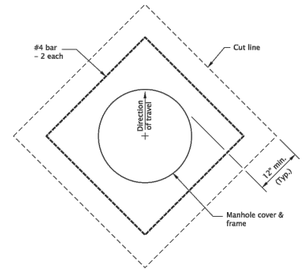

PLAN
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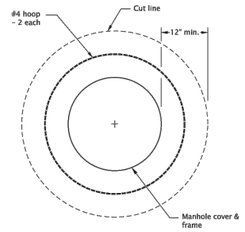

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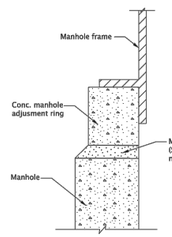
CIRCULAR CUT



ALTERNATE "A"

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Cover manhole with building paper and const. asph. conc. base course and wearing courses.
2. Saw cut square or circular excavation around manhole 12" min. from manhole frame.
3. Raise manhole cover and frame to finish grade by installing conc. manhole adjustment rings and leveling mortar, as shown.
4. Backfill with early strength Portland Cement Concrete. All concrete shall be commercial grade concrete.
5. Protect from traffic loading until conc. has cured to 3000 psi.
6. Apply tack coat to edges of existing pavement before installing patch.
7. Finish joint with asphalt seal and sand.
8. See Std. Dwg. RD336 for manhole steps details.
9. See appropriate manhole standard drawings for details not shown.
10. Use epoxy for synthetic grade rings.
11. See Std. Dwg. RD336 for tracer wire details.
12. See Std. Dwg. RD356 for manhole covers and frames.

CALC. BOOK NO. N/A | SDR DATE 21-JUL-2015

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

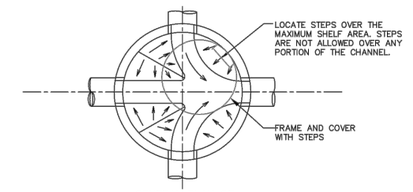
MANHOLE FRAME ADJUSTMENT

2021

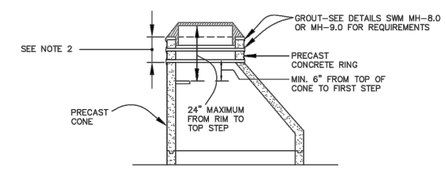
DATE	REVISION DESCRIPTION

Effective Date: June 1, 2022 – November 30, 2022

RD360



GENERAL PLAN OF CHANNEL INTERSECTION

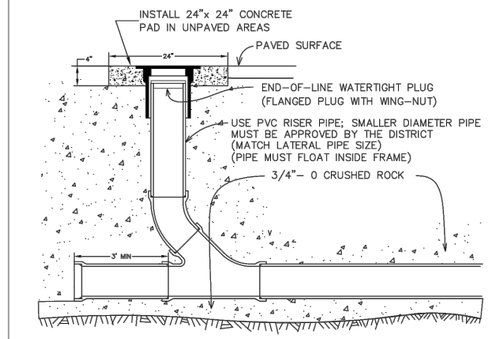


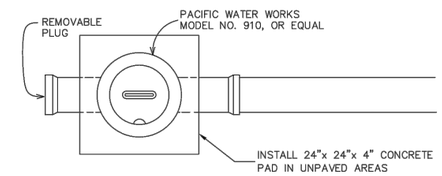
PRECAST RING EXTENSION

NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.
2. NUMBER OF RISER RINGS ALLOWED SHALL NOT EXCEED 12" MAXIMUM.

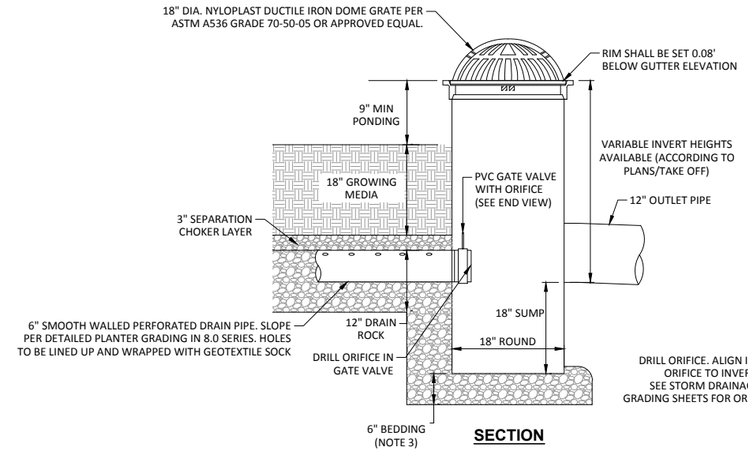
WATER ENVIRONMENT SERVICES | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | MANHOLE-CHANNEL AND RING EXTENSION | STANDARD DRAWING SWM MH-2.0





NOTE: CLEANOUTS WITHIN A PRIVATE OR PUBLIC RIGHT–OF–WAY SHALL MEET THE LATEST ROADWAY STANDARDS FOR SPECIFICATIONS AND LOAD RATE.

WATER ENVIRONMENT SERVICES | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | STORM - CLEAN OUT | STANDARD DRAWING SWM ST-4.0



BEEHIVE OVERFLOW INLET

NTS

NOTES:

1. CONTRACTOR TO WIDEN EXCAVATION AS REQUIRED TO OBTAIN COMPACTION WITH COMPACTION EQUIPMENT.
2. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 24").
3. BEDDING MATERIAL SHALL BE 6" OF COMPACTED ¾"-0 CRUSHED ROCK BASE MATERIAL OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS I OR CLASS II MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.
4. REFER TO 8.0 SERIES FOR DETAILED PLANTER GRADING AND BEEHIVE LOCATIONS

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REVISIONS

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CHECKED: DSH/JSH
DATE: 10-7-2022

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LANDSCAPE ARCHITECTS ♦ SURVEYORS
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

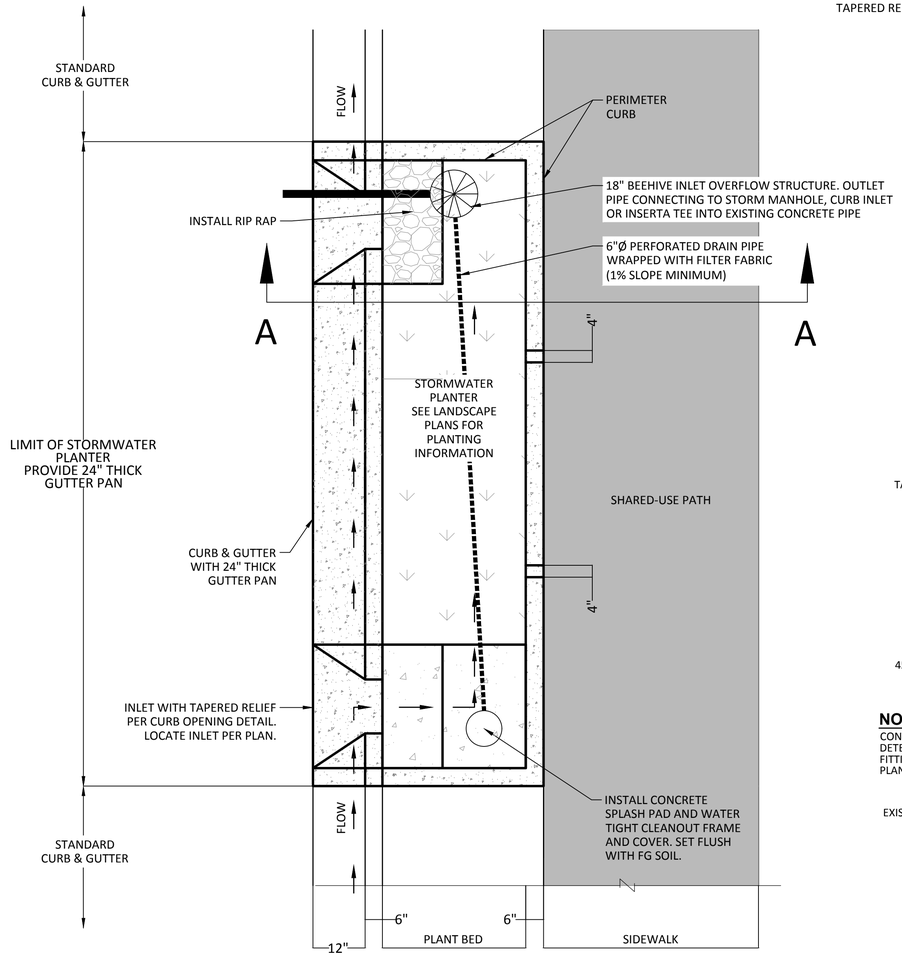
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

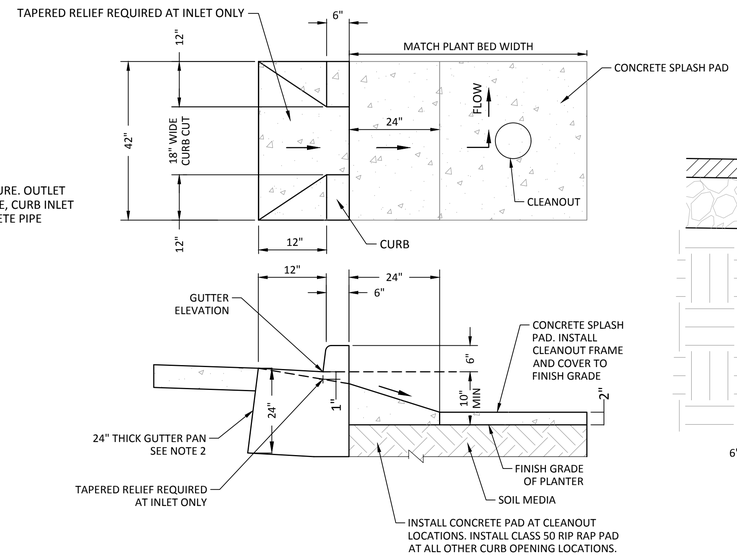
SHEET NO. 3.8

JOB NO. CLA-93

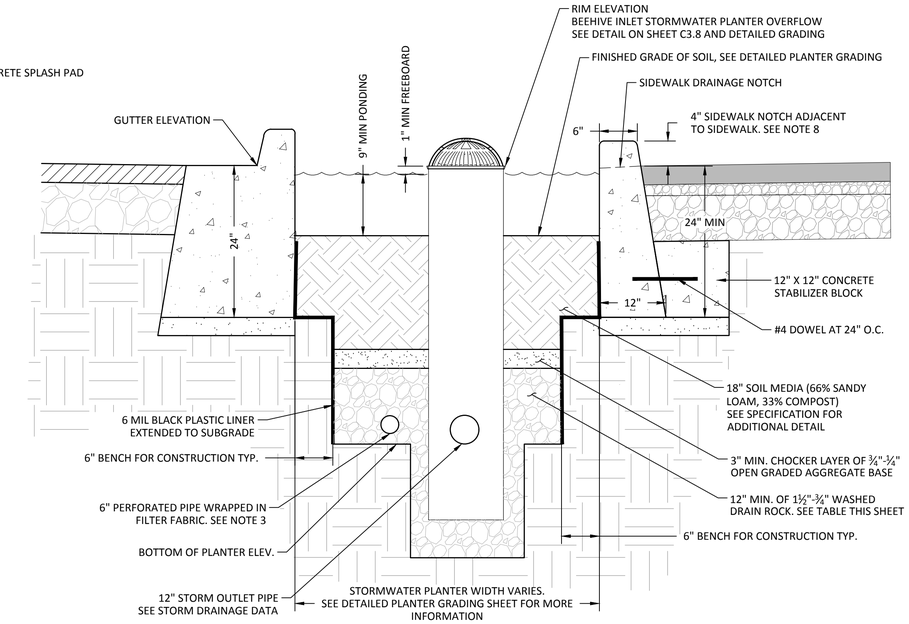
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg
rd360.dgn 20-JUL-2020
RD360



STORMWATER PLANTER PLAN



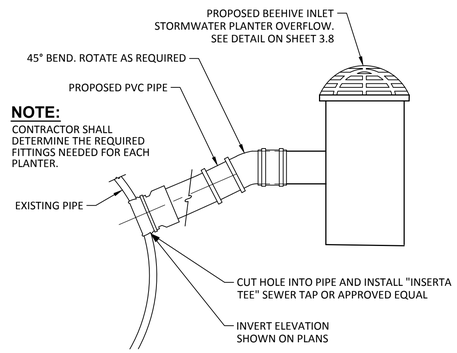
CURB OPENING DETAIL



STORMWATER PLANTER SECTION WITH BEEHIVE INLET STORMWATER PLANTER OVERFLOW

PLANTER NUMBER	WQ SOIL DEPTH	CHOCKER DEPTH	*WASHED DRAIN ROCK DEPTH
1	18"	3"	VARIES (12" - 26")
2	18"	3"	VARIES (12" - 20")
3	18"	3"	VARIES (12" - 19")
4	18"	3"	VARIES (12" - 16")
5	18"	3"	VARIES (12" - 19")
6	18"	3"	VARIES (12" - 17")
7	18"	3"	12"
8	18"	3"	12"
9	18"	3"	VARIES (12" - 16")
10	18"	3"	VARIES (12" - 18")
11	18"	3"	VARIES (12" - 20")
12	18"	3"	VARIES (12" - 21")
13	18"	3"	VARIES (12" - 25")
14	18"	3"	VARIES (12" - 17")
15	18"	3"	VARIES (12" - 21")
16	18"	3"	VARIES (12" - 17")

*FLAT BOTTOM



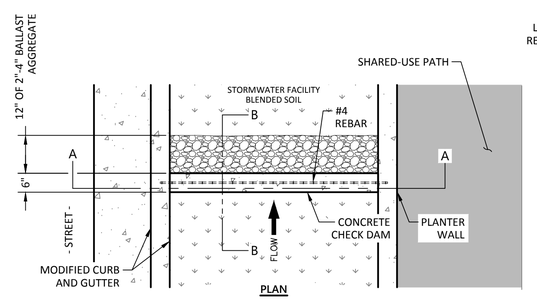
NOTE:
CONTRACTOR SHALL DETERMINE THE REQUIRED FITTINGS NEEDED FOR EACH PLANTER.

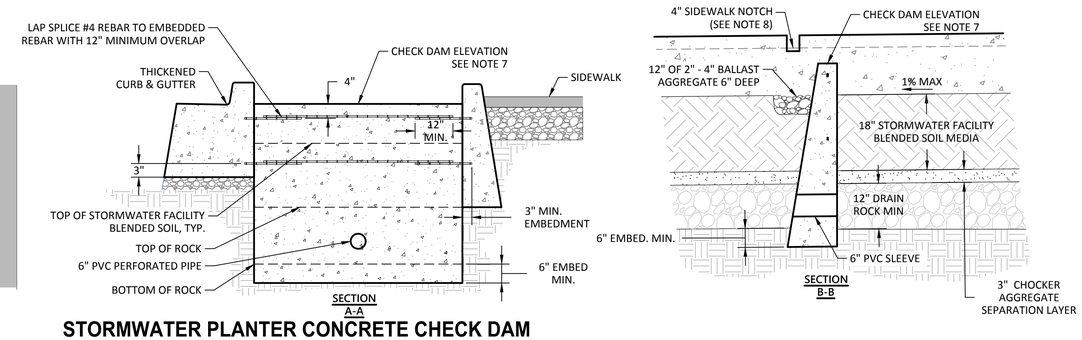
PLANTER INSERTA TEE PIPE CONNECTION

NTS

STORMWATER PLANTER NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING AND FOOT TRAFFIC PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. CONSTRUCT MODIFIED STANDARD CURB AND GUTTER PER STANDARD CURB AND GUTTER DETAIL S150 ON SHEET 3.0. MODIFY GUTTER PAN TO BE 24" THICK AS SHOWN.
3. PIPE SHALL BE PVC D3034 SDR 35, 6" PERFORATED PIPE WRAPPED IN FILTER FABRIC WITH 0.5% MINIMUM SLOPE. BOTTOM OF PIPE SHALL BE SET AT LEAST 6" ABOVE EXISTING SUBGRADE. CONNECT TO BEEHIVE INLET AND INSTALL PIPE WITHIN EACH STORMWATER PLANTER FOR DRAINAGE PURPOSES. SEE STORM DRAINAGE DATA ON ROADSIDE SHEETS FOR LENGTH, S=0.01 MIN.
4. SLOPE OF PLANTER TO NOT EXCEED 1.0%
5. CONTRACTOR TO POTHOLE AND PROTECT EXISTING UTILITIES DURING CONSTRUCTION. WATER LINE TO MAINTAIN 3.0' OF COVER WITH PROPOSED DESIGN. FILED COORDINATE ANY CONFLICTS WITH DESIGN ENGINEER.
6. FINISH ALL EXPOSED CONCRETE SURFACES.
7. CHECK DAM TOP ELEVATION TO BE WHICHEVER IS LOWEST: EQUAL TO THE FLOW LINE ELEVATION AT THE UPSTREAM INLET OF THE FACILITY; THE ELEVATION OF THE SIDEWALK ADJACENT TO THE CHECK DAM; OR 6" BELOW THE ELEVATION OF THE TOP-OF-CURB ADJACENT TO THE PLANTER. ENSURE THAT THE CHECK DAM ELEVATIONS DO NOT CAUSE STORMWATER TO OVERFLOW TO SIDEWALK, OR BACKWATER TO STREET.
8. CONSTRUCT 4" SIDEWALK NOTCH TOP OF WALL EVERY 10 LF ON CENTER. NOTCH TO BE SET 1" BELOW SIDEWALK LOW POINT, SLOPING DOWNWARD INTO PLANTER FACILITY, TYP.





STORMWATER PLANTER CONCRETE CHECK DAM

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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LANDSCAPE ARCHITECTS • SURVEYORS
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DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 3.9

JOB NO. CLA-93

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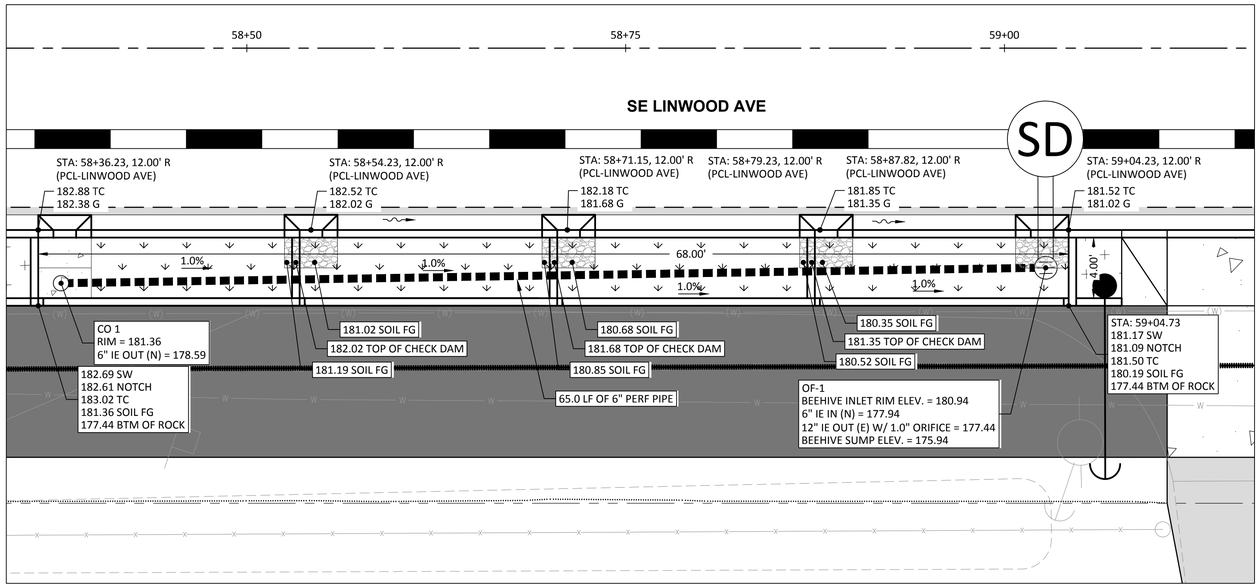

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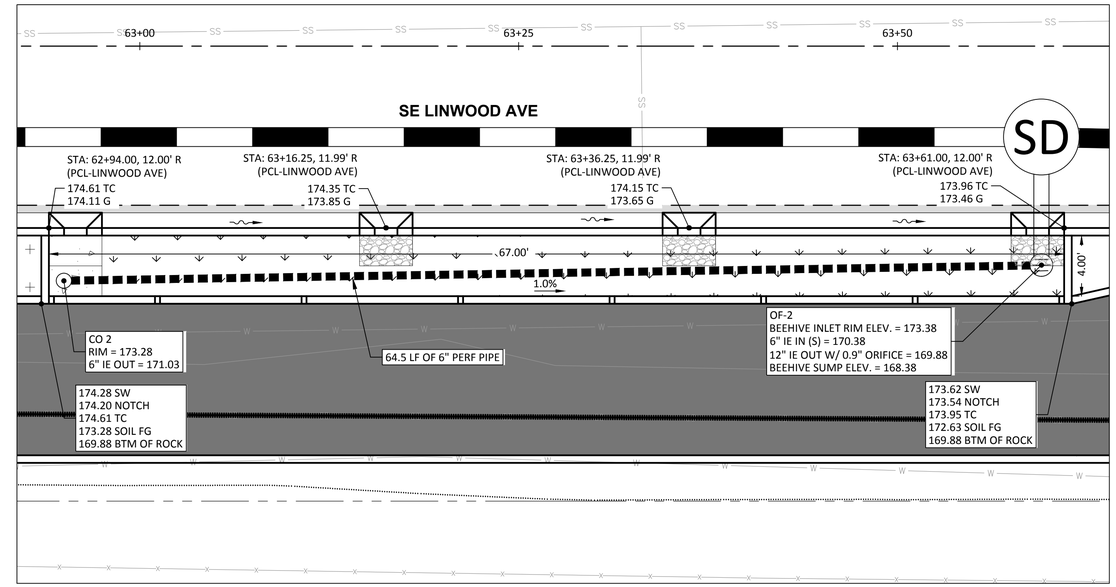

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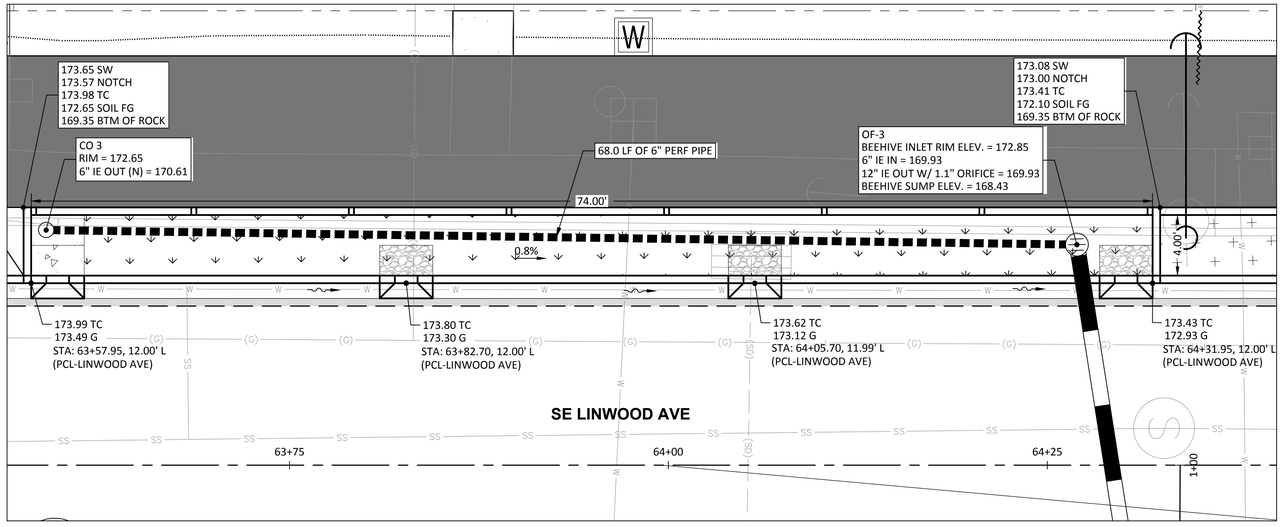

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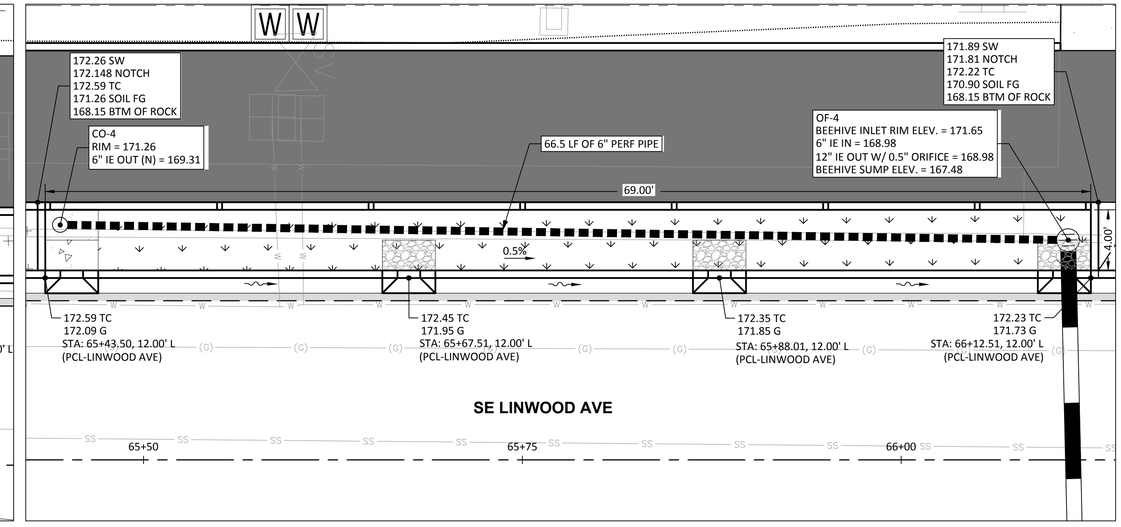

PLANTER 4

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SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg

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DEVELOPMENT SERVICES BLDG.
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DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.8

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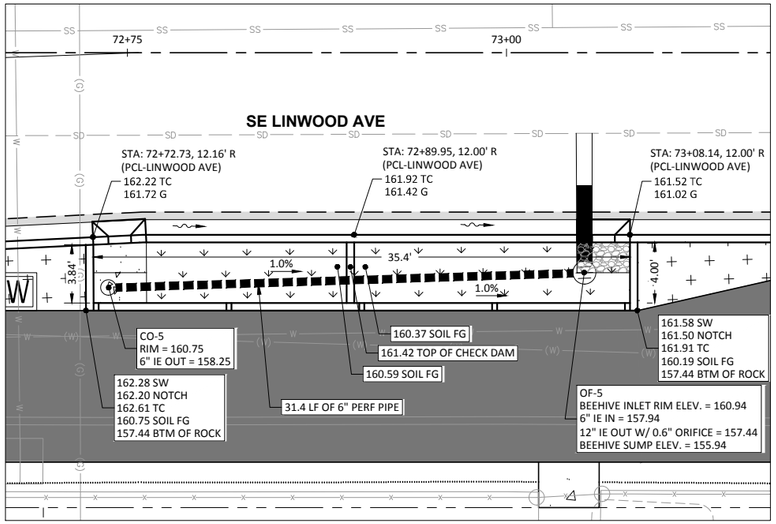

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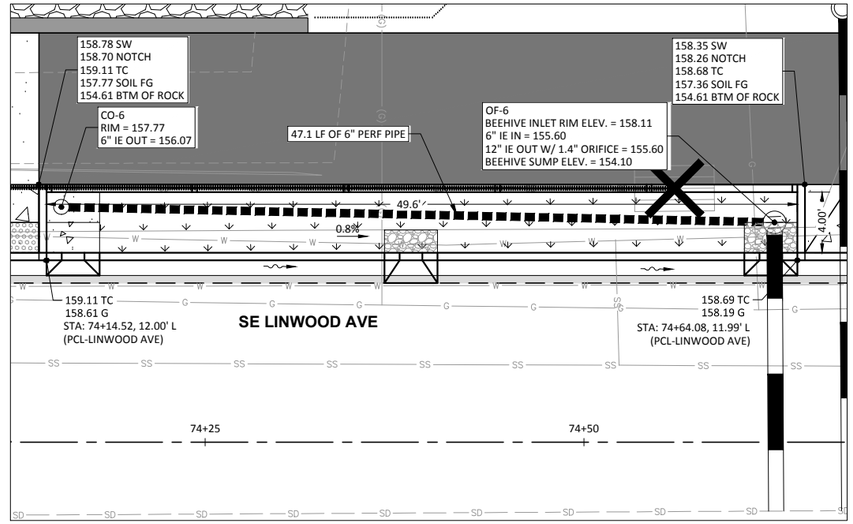

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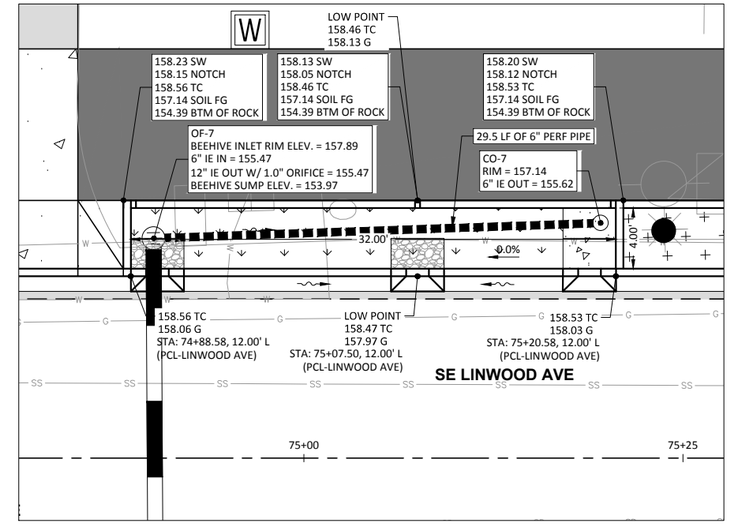

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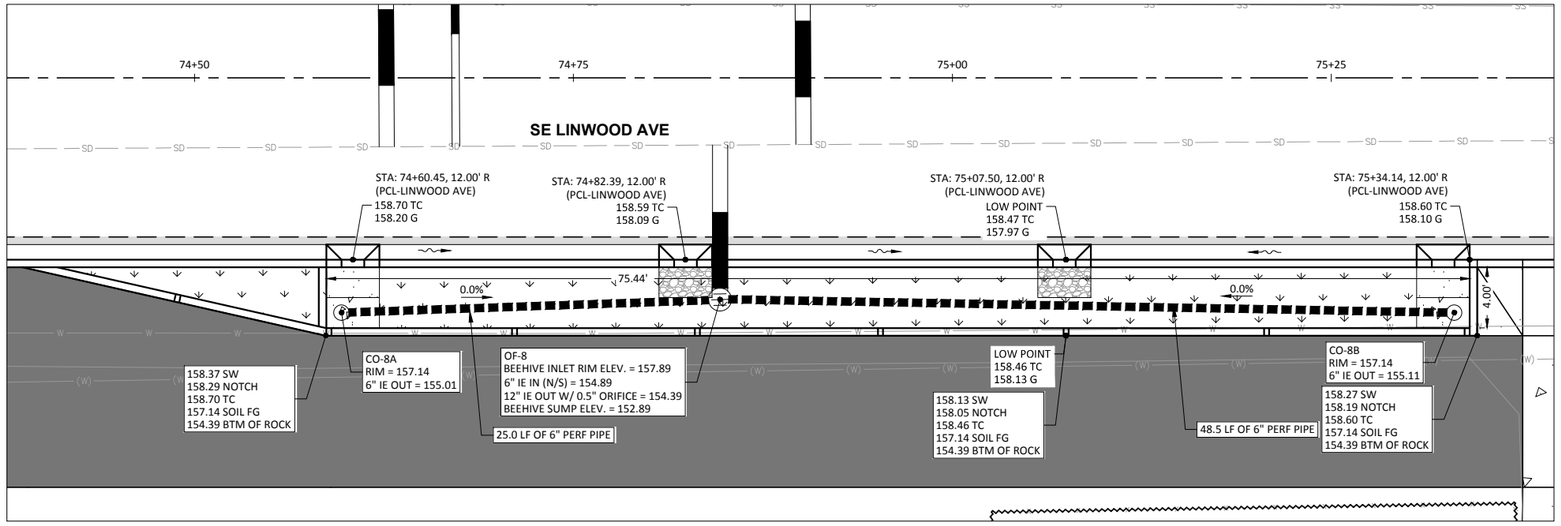

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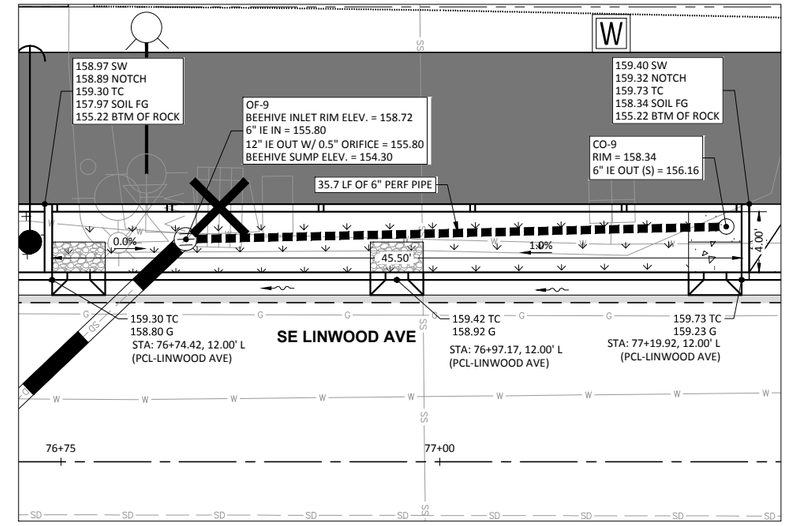

PLANTER 9

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SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg

PREPARED FOR

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EXPIRES: 6/30/23

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DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

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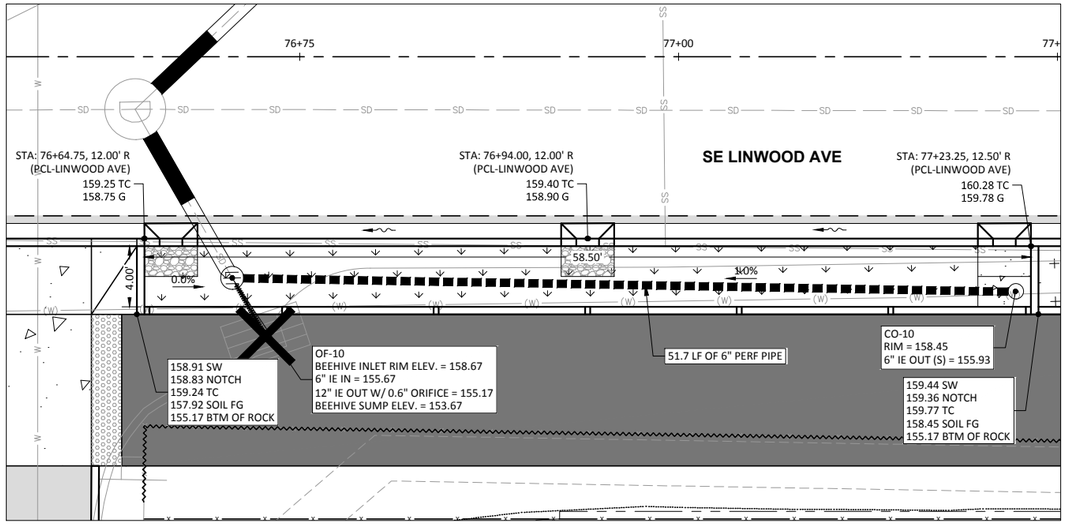

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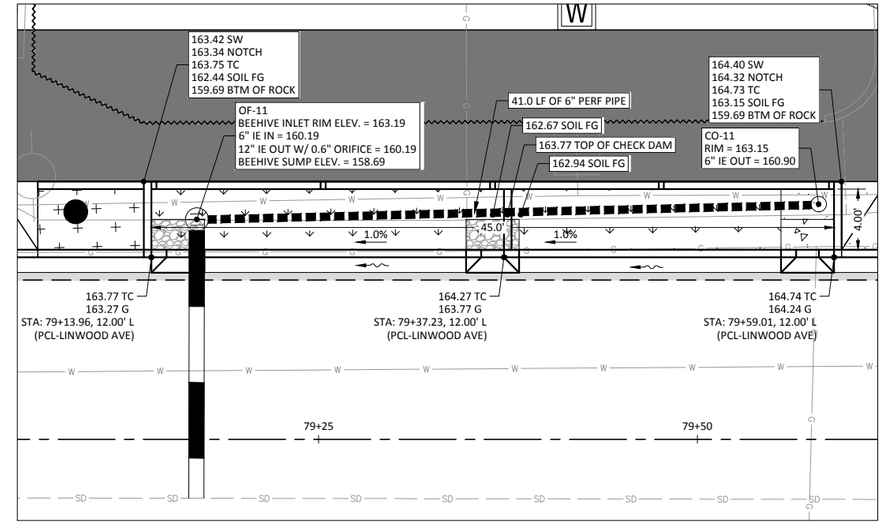

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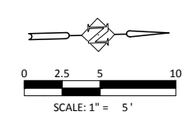

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DETAILED PLANTER GRADING

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CLACKAMAS COUNTY, OREGON

SHEET NO. **8.10**

JOB NO. CLA-93

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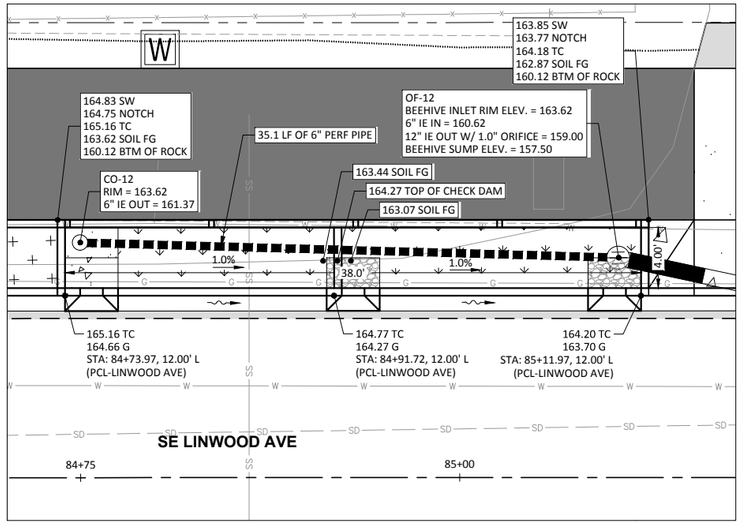

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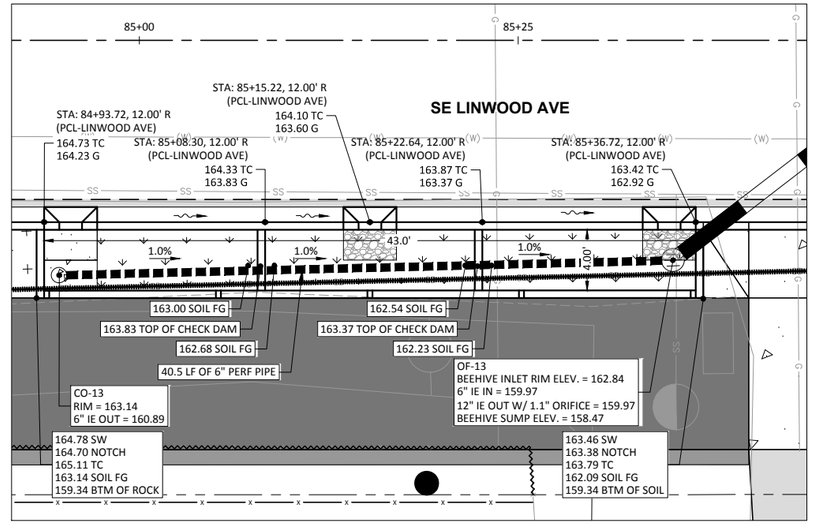

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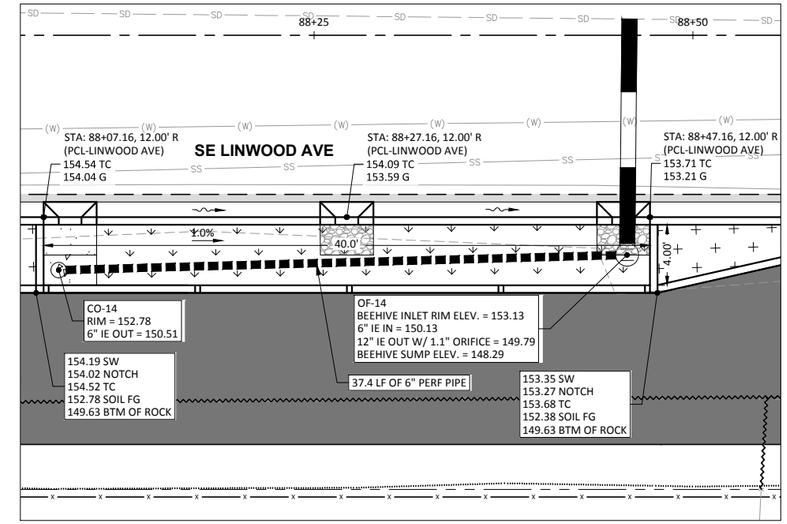

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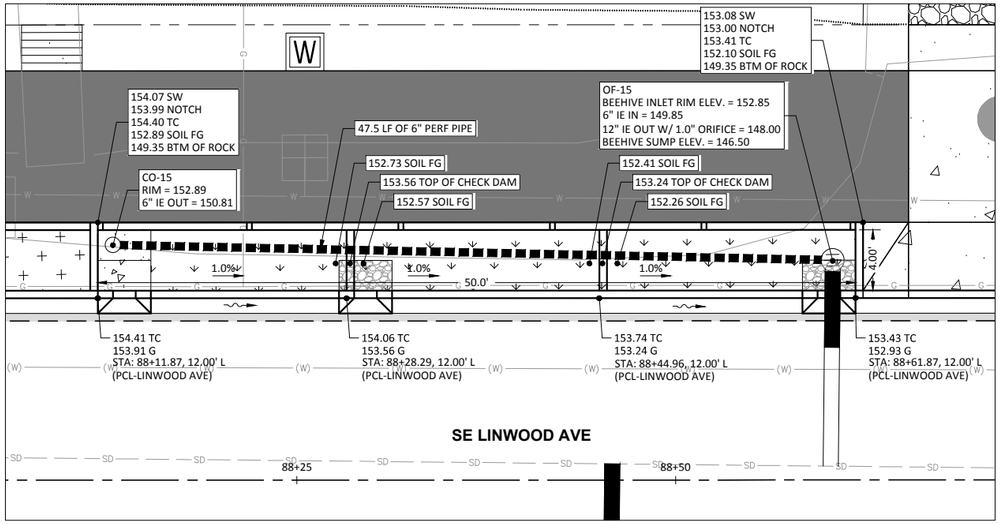
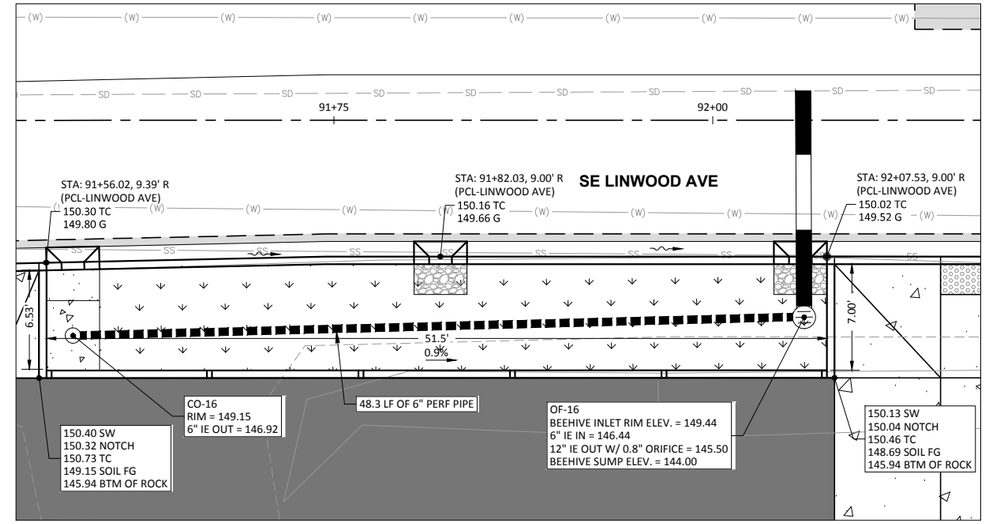


PLANTER 15



PLANTER 16

0 2.5 5 10

SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 10-7-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS ♦ PLANNERS
LANDSCAPE ARCHITECTS ♦ SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
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DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.11

JOB NO. CLA-93

Appendix B – Basin Characteristics

Soil Map—Clackamas County Area, Oregon
(Linwood Avenue)

Map Scale: 1:7,670 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2019—Jul 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
53B	Latourell loam, 3 to 8 percent slopes	1.0	1.4%
61A	Multnomah silt loam, 0 to 3 percent slopes	1.1	1.5%
71A	Quatama loam, 0 to 3 percent slopes	50.5	65.6%
76B	Salem silt loam, 0 to 7 percent slopes	13.3	17.3%
84	Wapato silty clay loam	5.7	7.3%
92F	Xerochrepts and Haploxerolls, very steep	5.3	6.9%
Totals for Area of Interest		**77.0**	**100.0%**

Clackamas County Area, Oregon

71A—Quatama loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 226p
Elevation: 100 to 1,400 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Quatama and similar soils: 85 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quatama

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 18 inches: loam
H2 - 18 to 38 inches: clay loam
H3 - 38 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Clackamas County Area, Oregon

76B—Salem silt loam, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 226y
Elevation: 200 to 650 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Salem and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Salem

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 24 inches: gravelly clay loam
H3 - 24 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)

Clackamas County Area, Oregon

84—Wapato silty clay loam

Map Unit Setting

National map unit symbol: 227j
Elevation: 100 to 1,500 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Wapato and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapato

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 18 inches: silty clay loam
H2 - 18 to 45 inches: silty clay loam
H3 - 45 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: Frequent
Available water capacity: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Cove

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Humaquepts

Percent of map unit: 4 percent
Landform: Flood plains
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 16, Jun 11, 2020

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)			Pervious Pavement Conditions/ Existing		
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:			Existing and Proposed Conditions		
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

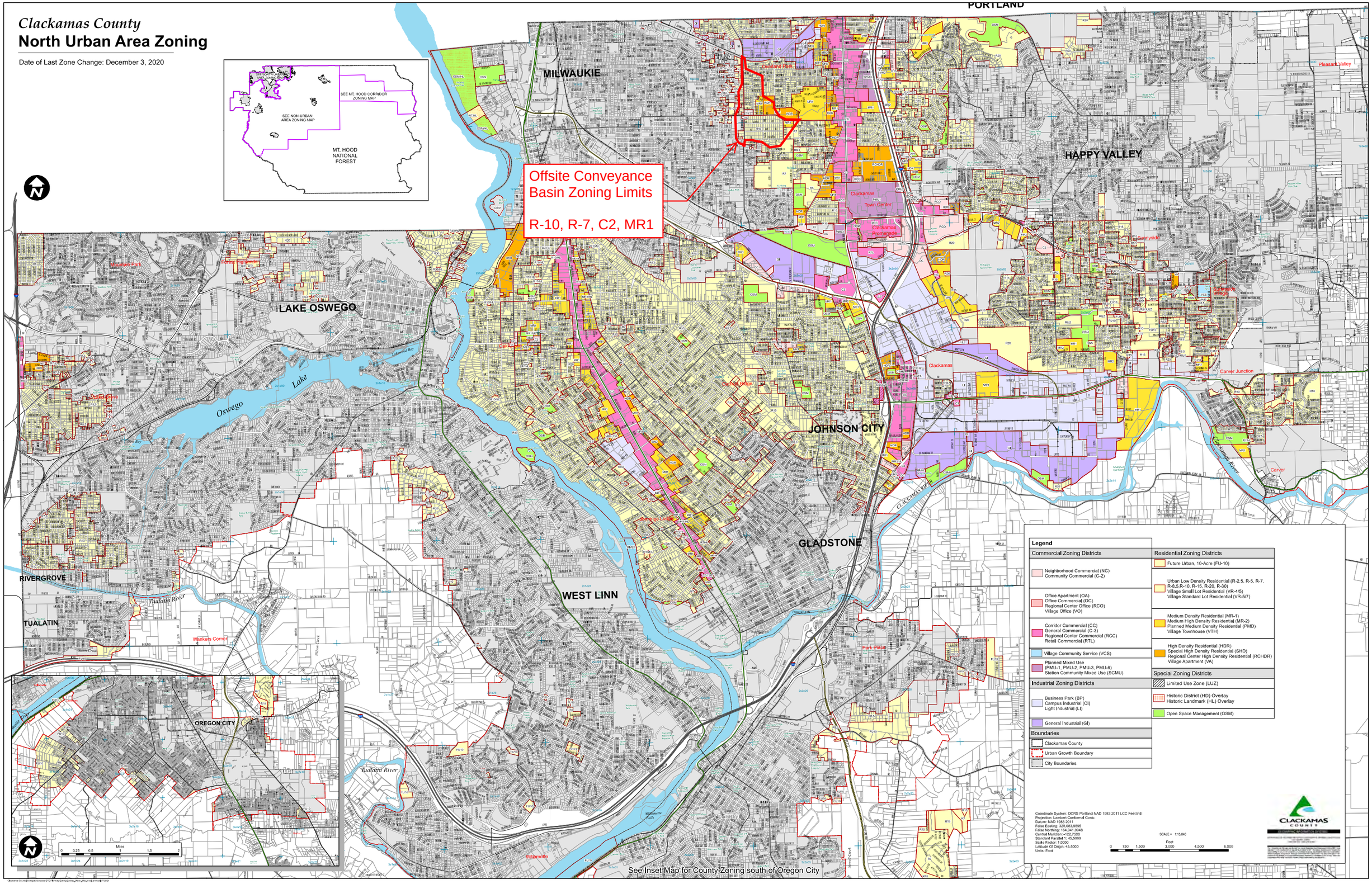
Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58 Proposed Conditions	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Clackamas County

North Urban Area Zoning

Date of Last Zone Change: December 3, 2020



SE Linwood Avenue

Time of Concentration Break Down

Prepared by Harper Houf Peterson Righellis Inc.
Job No. CLA-93
January 2021

Notes: Time of Concentration (tc) calculated to the treatment discharge location
2-Year, 24-Hour Rainfall = 2.6 inches

CONVEYANCE BASINS

JCB1			JCB2			JCB3			JCB4		
t_c sheet flow:			t_c sheet flow:			t_c sheet flow:			t_c sheet flow:		
L =	35	ft	L =	160	ft	L =	55	ft	L =	35	ft
S =	1.5	%	S =	6.5	%	S =	3.5	%	S =	1.4	%
n =	0.011	Paved	n =	0.150	short grass	n =	0.150	short grass	n =	0.011	Paved
t_{c1} =	**0.00**	**Min**	**t_{c1} =**	**0.03**	**Min**	**t_{c1} =**	**0.01**	**Min**	**t_{c1} =**	**0.00**	**Min**
t_c Shallow Concentrate flow:			t_c Shallow Concentrate flow:			t_c Shallow Concentrate flow:			t_c Shallow Concentrate flow:		
L =	265	ft	L =	256	ft	L =	1176	ft	L =	485	ft
S =	1.00	%	S =	3.10	%	S =	2.00	%	S =	1.40	%
C_p =	20.33	Paved	C_p =	16.13	Unpaved	C_p =	16.13	Unpaved	C_p =	16.13	Unpaved
V =	2.03	fps	V =	2.84	fps	V =	2.28	fps	V =	1.91	fps
t_{c2} =	**2.17**	**Min**	**t_{c2} =**	**1.50**	**Min**	**t_{c2} =**	**8.59**	**Min**	**t_{c2} =**	**4.23**	**Min**
t_c Pipe flow:			t_c Shallow Concentrate flow:			t_c Pipe flow:			t_c Pipe flow:		
L =	455	ft	L =	125	ft	L =	514	ft	L =	1048	ft
S =	1.5	%	S =	0.50	%	S =	0.5	%	S =	0.19	%
n =	0.013	Pipe	C_p =	20.33	Paved	n =	0.013	Pipe	n =	0.013	Pipe
D =	15	in	V =	1.44	fps	D =	48	in	D =	48	in
V =	6.42	fps	**t_{c3} =**	**1.45**	**Min**	V =	8.05	fps	V =	4.96	fps
t_{c3} =	**1.18**	**Min**				**t_{c3} =**	**1.06**	**Min**	**t_{c3} =**	**3.52**	**Min**
t_c Open Channel flow:			t_c Pipe flow:			t_c Pipe flow:			t_c Open Channel flow:		
L =	0	ft	L =	846	ft	L =	1950	ft	L =	0	ft
K =	1.64	ft/sec for gravel	S =	1.1	%	S =	0.5	%	K =	1.64	ft/sec for gravel
i =	0.005	ft/ft	n =	0.013	Pipe	n =	0.013	Pipe	i =	0.005	ft/ft
n =	0.33	average for gravel	D =	15	in	D =	12	in	n =	0.33	average for gravel
V_{pore} =	0.025	ft/sec	V =	5.50	fps	V =	3.19	fps	V_{pore} =	0.025	ft/sec
t_{c4} =	**0.00**	**Min**	**t_{c4} =**	**2.56**	**Min**	**t_{c3} =**	**10.17**	**Min**	**t_{c4} =**	**0.00**	**Min**
$t_c = t_{c1} + t_{c2} + t_{c3}$ =		**3.4 Min**	**$t_c = t_{c1} + t_{c2} + t_{c3}$ =**		**5.5 Min**	**$t_c = t_{c1} + t_{c2} + t_{c3}$ =**		**19.8 Min**	**$t_c = t_{c1} + t_{c2} + t_{c3}$ =**		**7.8 Min**

Note: A minimum time of concentration of 5 min was used for all basins 5 min or less.

SE Linwood Avenue

Time of Concentration Break Down

Prepared by Harper Houf Peterson Righellis Inc.
Job No. CLA-93
January 2021

Notes: Time of Concentration (tc) calculated to the treatment discharge location
2-Year, 24-Hour Rainfall = 2.6 inches

JCB5

t_c sheet flow:

L =	160	ft
S =	6.0	%
n =	0.011	Paved
t_{c1} =	**0.00**	**Min**

t_c Shallow Concentrate flow:

L =	1033	ft
S =	4.50	%
C_p =	16.13	Avg.
V =	3.42	fps
t_{c2} =	**5.03**	**Min**

t_c Shallow Concentrate flow:

L =	260	ft
S =	0.50	%
C_p =	16.13	Avg.
V =	1.14	fps
t_{c3} =	**3.80**	**Min**

t_c Open Channel flow:

L =	0	ft
K =	1.64	ft/sec for gravel
i =	0.005	ft/ft
n =	0.33	average for gravel
V_{pore} =	0.025	ft/sec
t_{c4} =	**0.00**	**Min**

$t_c = t_{c1} + t_{c2} + t_{c3}$ = 8.8 Min

JCB6

t_c sheet flow:

L =	20	ft
S =	0.8	%
n =	0.011	Paved
t_{c1} =	**0.00**	**Min**

t_c Shallow Concentrate flow:

L =	255	ft
S =	1.0	%
C_p =	16.13	Unpaved
V =	1.61	fps
t_{c2} =	**2.63**	**Min**

t_c Pipe flow:

L =	0	ft
S =	0.5	%
n =	0.013	Pipe
D =	18	in
V =	4.35	fps
t_{c3} =	**0.00**	**Min**

t_c Open Channel flow:

L =	0	ft
S =	1.2	%
n =	0.110	Grass, Fair stand
d =	0.25	ft
B =	6	ft
Cross Slope =	2	%
R =	0.15	
V =	0.42	fps
t_{c4} =	**0.00**	**Min**

$t_c = t_{c1} + t_{c2} + t_{c3}$ = 2.6 Min

Project Basin A (Existing/Proposed)

t_c sheet flow:

L =	30	ft
S =	1.1	%
n =	0.011	Paved
t_{c1} =	**0.00**	**Min**

t_c Shallow Concentrate flow:

L =	243	ft
S =	1.00	%
C_p =	20.33	Paved
V =	2.03	fps
t_{c2} =	**1.99**	**Min**

t_c Pipe flow:

L =	360	ft
S =	0.39	%
n =	0.013	Pipe
D =	12	in
V =	2.82	fps
t_{c3} =	**2.13**	**Min**

t_c Open Channel flow:

L =	200	ft
S =	1.5	%
n =	0.110	Grass, Fair stand
d =	0.25	ft
B =	10	ft
Cross Slope =	0.5	%
R =	0.14	
V =	0.44	fps
t_{c4} =	**7.58**	**Min**

$t_c = t_{c1} + t_{c2} + t_{c3+tc4}$ = 11.7 Min

UPSTREAM MILL PARK

t_c sheet flow:

L =	190	ft
S =	1.7	%
n =	0.011	Paved
t_{c1} =	**0.01**	**Min**

t_c Shallow Concentrate flow:

L =	1025	ft
S =	1.3	%
C_p =	20.33	Unpaved
V =	2.32	fps
t_{c2} =	**7.37**	**Min**

t_c Shallow Concentrate flow:

L =	110	ft
S =	38.00	%
C_p =	20.33	Unpaved
V =	12.53	fps
t_{c2} =	**0.15**	**Min**

t_c Open Channel flow:

L =	130	ft
S =	1.3	%
n =	0.150	Grass, Fair stand
d =	1.33	ft
B =	2	ft
Cross Slope =	0.1	%
R =	0.67	
V =	0.86	fps
t_{c4} =	**2.51**	**Min**

$t_c = t_{c1} + t_{c2} + t_{c3+tc4}$ = 10.0 Min

Note: A minimum time of concentration of 5 min was used for all basins 5 min or less.

SE Linwood Avenue

Basin Characteristics

Prepared by Harper Houf Peterson Righellis Inc.
Job No. CLA-93
November 2022

NRCS Curve Numbers (CN) used:

Ground Cover		Condition	Ground Cover		Condition
Impervious (Paved, C Soils)	98	Existing CIA & Proposed	Woods (Good, B Soils)	58	Proposed
Open Space (Poor Conditions, B Soils)	79	Existing	Woods (Good, C Soils)	72	Proposed
Open Space (Poor Conditions, C Soils)	86	Existing	Pervious Pavement (B Soil)	79	Proposed
Impervious (Gravel, B Soils)	85	Existing & Proposed	Pervious Pavement (C Soil)	86	Proposed
Impervious (Gravel, C Soils)	89	Existing & Proposed			

Linwood Avenue Existing Basins

BASIN	TOTAL CONTRIBUTING AREA (SF)	TOTAL CONTRIBUTING AREA (AC)	EXISTING MODIFIED IMPERVIOUS AREA (SF)	EXISTING MODIFIED IMPERVIOUS AREA (AC)	EXISTING CIA (SF)	EXISTING CIA (AC)	LANDSCAPE AREA (SF)	LANDSCAPE AREA (AC)	EXISTING GRAVEL AREA (SF)	EXISTING GRAVEL AREA (AC)	SOIL GROUP	Tc (min)
H (Offsite Johnson Creek Blvd)	5110	0.12	2085	0.048	2280	0.052	745	0.017	0	0.000	B	5.0
A1 (Johnson Creek Blvd-Johnson Creek Xing)	22717	0.52	10916	0.251	10867	0.249	704	0.016	230	0.005	B	11.7
A2 (Johnson Creek Direct Discharge)	2950	0.07	97	0.002	1352	0.031	1501	0.034	0	0.000	B	5.0
B (SE Overland St - Mill Park Existing Swale)	5723	0.13	2715	0.062	1538	0.035	1470	0.034	0	0.000	B	5.0
C (Johnson Creek Xing - Ander Pl)	21088	0.48	5691	0.131	7358	0.169	3962	0.091	4077	0.094	B	5.0
D (Alder Place - Needham Ct)	43275	0.99	11273	0.259	14593	0.335	10284	0.236	7125	0.164	C	5.0
E (Alder Place - King Rd)	86779	1.99	30237	0.694	34741	0.798	15170	0.348	6631	0.152	C	5.0
F (King Rd - Monroe St)	74457	1.71	29629	0.680	35729	0.820	9099	0.209	0	0.000	C	5.0
G (Queen St)	3888	0.09	1977	0.045	1556	0.036	355	0.008	0	0.000	C	5.0
	265987	6.11	94620	2.17	110014	2.53	43290	0.99	18063	0.41		

Note: 2-year Allowable peak flow = all surfaces within project limits reduce the post-developed 2-yr flow to 1/2 the pre-developed 2-yr peak flow + additional contributing impervous area (overlay) 2-yr peak flows. All flows computed in Hydraflow using SBUH Method.
Note: 25-year Allowable peak flow = all surfaces within project limits reduce the post-developed 25-yr flow to the pre-developed 2-yr peak flow + additional contributing impervous area (overlay) peak 25-yr peak flows. All flows computed in Hydraflow using SBUH Method.
*Refer to allowable project flow break down on following page.

Linwood Avenue Proposed Basins

BASIN/SUBBASIN	TOTAL CONTRIBUTING AREA (SF)	TOTAL CONTRIBUTING AREA (AC)	TOTAL PROJECT LIMITS (SF)	NEW/MODIFIED IMPERVIOUS AREA (SF)	NEW/MODIFIED IMPERVIOUS AREA (AC)	ONSITE PUBLIC CIA (SF)	ONSITE PUBLIC CIA (AC)	GRAVEL (SF)	GRAVEL (AC)	PERVIOUS SIDEWALK (SF)	PERVIOUS SIDEWALK (AC)	LANDSCAPE AREA (SF)	LANDSCAPE AREA (AC)	BMP PLANTER (SF)	SOIL GROUP	Tc (min)
H (Offsite Johnson Creek Blvd)*	5110	0.12	2830	**2830**	0.065	2280	0.052	**0**	0	0	0.000	0	0.000	0	B	5.0
A1 (Johnson Creek Blvd-Johnson Creek Xing)*	22717	0.52	11850	**4225**	0.097	10867	0.249	**205**	0.005	5391	0.124	2029	0.047	0	B	11.7
A2 (Johnson Creek Direct Discharge)	2950	0.07	1598	**997**	0.023	1352	0.031	**0**	0.000	0	0.000	601	0.014	0	B	5.0
B (SE Overland St - Mill Park Existing Swale)*	5723	0.13	4185	**3438**	0.079	1538	0.035	**0**	0	415	0.010	332	0.008	0	B	5.0
C1	17466	0.401	10698	**4740**	0.109	6768	0.155	**70**	0.002	3998	0.092	1540	0.035	350	B	5.0
C2*	3622	0.083	3032	**2100**	0.048	590	0.014	**600**	0.014	332	0.008	0	0.000	0	B	5.0
D1	9862	0.226	6169	**2066**	0.047	3693	0.085	**192**	0.004	2794	0.064	917	0.021	200	C	5.0
D2	8630	0.198	5348	**1866**	0.043	3282	0.075	**0**	0.000	2493	0.057	829	0.019	160	C	5.0
D3	9520	0.219	5850	**2040**	0.047	3670	0.084	**0**	0.000	2821	0.065	837	0.019	152	C	5.0
D4	11175	0.257	7227	**3048**	0.070	3948	0.091	**0**	0.000	2907	0.067	1100	0.025	172	C	5.0
D5*	4088	0.094	4088	**2543**	0.058	0	0.000	**1120**	0.026	0	0.000	425	0.010	0	C	5.0
E1	6591	0.151	4209	**1853**	0.043	2382	0.055	**0**	0.000	1606	0.037	568	0.013	182	C	5.0
E2	9021	0.207	5745	**2110**	0.048	3276	0.075	**25**	0.001	2360	0.054	1016	0.023	234	C	5.0
E3	5890	0.135	3578	**1435**	0.033	2312	0.053	**0**	0.000	1567	0.036	448	0.010	128	C	5.0
E4	6509	0.149	3839	**1274**	0.029	2670	0.061	**0**	0.000	1864	0.043	399	0.009	302	C	5.0
E5	11032	0.253	6982	**3156**	0.072	4050	0.093	**280**	0.006	2120	0.049	1228	0.028	198	C	5.0
E6	3968	0.091	2249	**741**	0.017	1719	0.039	**0**	0.000	1186	0.027	182	0.004	140	C	5.0
E7	6808	0.156	4273	**2344**	0.054	2535	0.058	**104**	0.002	1405	0.032	240	0.006	180	C	5.0
E8*	36960	0.848	21163	**16130**	0.370	15797	0.363	**0**	0.000	2334	0.054	2699	0.062	0	C	5.0
F1	7414	0.170	4492	**966**	0.022	2922	0.067	**0**	0.000	1621	0.037	1629	0.037	276	C	5.0
F2	7936	0.182	4864	**933**	0.021	3072	0.071	**0**	0.000	2677	0.061	986	0.023	268	C	5.0
F3	10096	0.232	6178	**1885**	0.043	3918	0.090	**0**	0.000	2942	0.068	1055	0.024	296	C	5.0
F4	8050	0.185	3858	**1147**	0.026	4192	0.096	**0**	0.000	1982	0.046	457	0.010	272	C	5.0
F5*	40961	0.940	19100	**14100**	0.324	21625	0.496	**0**	0.000	3545	0.081	1691	0.039	0	C	5.0
G (Offsite Queen) *	3888	0.09	2332	**1771**	0.041	1556	0.036	**0**	0.000	381	0.009	180	0.004	0	C	5.0
TOTAL AREA	265987	6.11	155737	**79738**	1.831	110014	2.526	**2596**	0.060	48741	1.119	21388	0.491	3510		

* Unmanaged basin. Subbasin combined all remaining areas unmanaged within basin not captured by planters. Refer to Appendix A for exhibits identifying areas managed vs unmanaged. Proposed detention will overdetain to meet project peak flow requirements for these undetained basins.
Note: Total project limits include all project areas within distrubed boundary limits (pervious&impevious area)
Note: Onsite Public CIA includes all impervious overlay limits without project disturbance boundaries

Note: Bold text shows required treated area for project (82,334 SF of impervious area)

SE Linwood Avenue

Post-Developed Project Limit Peak Allowable Flow

Prepared by Harper Houf Peterson Righellis Inc.
Job No. CLA-93
November 2022

BASIN	Pre-Developed Q_{2yr} Project Limits (cfs)	Pre-Developed Q_{2yr} Total Limits (cfs)	Post-Developed Q_{2yr} Total Allowable (cfs)	Post-Developed Q_{2yr} Allowable Breakdown (cfs)	Proposed Q_{2yr} (cfs)	Pre-Developed Q_{25yr} Project Limits (cfs)	Pre-Developed Q_{25yr} Total Limits (cfs)	Post-Developed Q_{25yr} Total Allowable (cfs)	Post-Developed Q_{25yr} Allowable Breakdown (cfs)	Proposed $Q25_{yr}$ (cfs)
H (Offsite Johnson Creek Blvd)	0.012	0.043	0.037	(0.009+0.003)/2 + 0.031	0.070	0.030	0.079	0.061	(0.009+0.003)+ 0.049	0.110
A1 (Johnson Creek Blvd-Johnson Creek Xing)	0.044	0.183	0.161	(0.040+0.003+0.001)/2+0.139	0.214	0.115	0.332	0.261	(0.040+0.003+0.001)+0.217	0.358
A2 (Johnson Creek Direct Discharge)	0.006	0.025	0.022	(0.000+0.06)/2+0.019	0.031	0.016	0.045	0.035	(0.000+0.006)+0.029	0.049
B (SE Overland St - Mill Park Outfall)	0.017	0.038	0.030	(0.011+0.006)/2+0.021	0.070	0.043	0.076	0.050	(0.011+0.006)+0.033	0.112
C (Johnson Creek Xing - Ander Pl)	0.066	0.168	0.135	(0.023+0.016+0.027)/2+0.102	0.065	0.158	0.317	0.225	(0.023+0.016+0.027)+0.159	0.099
D (Alder Place - Needham Ct)	0.217	0.418	0.310	(0.081+0.074+0.062)/2+0.201	0.210	0.435	0.750	0.532	(0.081+0.074+0.062)+0.315	0.322
E (Alder Place - King Rd)	0.382	0.861	0.670	(0.216+0.108+0.058)/2+0.479	0.637	0.775	1.525	1.132	(0.216+0.108+0.058)+0.750	0.989
F (King Rd - Monroe St)	0.283	0.776	0.635	(0.218+0.065)/2+0.493	0.648	0.581	1.352	1.054	(0.218+0.065)+0.771	1.032
G (Queen St)	0.016	0.038	0.030	(0.014+0.002)/2+0.022	0.049	0.034	0.068	0.050	(0.014+0.002)+0.034	0.079
	1.04	**2.55**	**2.03**		**1.99**	**2.19**	**4.54**	**3.40**		**3.15**

*Allowable flows breakdown include grind and overlay limits

2-year Total Allowable peak flow = all surfaces within project limits reduce the post-developed 2-yr flow to 1/2 the pre-developed 2-yr peak flow + additional contributing impervous area (overlay) 2-yr peak flows. All flows computed in Hydraflow using SBUH Method.

25-year Total Allowable peak flow = all surfaces within project limits reduce the post-developed 25-yr flow to the pre-developed 2-yr peak flow + additional contributing impervous area (overlay) peak 25-yr peak flows. All flows computed in Hydraflow using SBUH Method.

REFER TO HYDRAFLOW SUMMARY OUTPUTS
IN APPENDIX C FOR EACH FLOW COMPONENT

SE Linwood Avenue

Upstream Contributing Basin Characteristics

Prepared by Harper Houf Peterson Righellis Inc.
Job No. CLA-93
November 2022

NRCS Curve Numbers (CN) used:

Ground Cover		Condition
Impervious (Paved, B&C Soils)	98	Existing CIA & Proposed
Open Space (Fair Conditions, B Soils)	69	Existing
Open Space (Fair Conditions, C Soils)	79	Existing

Linwood Avenue Proposed Conveyance Basins

BASIN	TOTAL AREA (SF)	TOTAL AREA (AC)	OFFSITE IMPERVIOUS AREA (AC)	OFFSITE LANDSCAPE AREA (AC)	ASSUMED OFFSITE IMPERVIOUS %	Tc (min)	Q_{25yr} Existing (cfs)
JCB1 - B SOIL	191958	4.4	1.3	3.1	30%	5.0	1.92
JCB2 - C SOIL	542705	12.5	8.1	4.4	65%	6.0	9.50
JCB3 - B SOIL	3387540	77.8	35.0	42.8	45%	33.1	61.99
JCB3 - C SOIL	3111070	71.4	32.1	39.3	45%	33.1	
JCB4 - B SOIL	261645	6.0	2.3	3.7	38%	7.5	6.65
JCB4 - C SOIL	262534	6.0	2.3	3.7	38%	7.5	
JCB5 - B SOIL	217840	5.0	1.9	3.1	38%	7.1	3.42
JCB5 - C SOIL	67534	1.6	0.6	1.0	38%	7.1	
JCB6 - B SOIL	271153	6.2	2.4	3.9	38%	6.3	4.55
JCB6 - C SOIL	99413	2.3	0.9	1.4	38%	6.3	

*Assumed offsite impervious based on current zoning. See Appendix B for zoning map

DRAFT

REPORT OF PAVEMENT AND GEOTECHNICAL ENGINEERING SERVICES

SE Linwood Avenue Improvements Project
Clackamas County, Oregon

For
Harper Houf Peterson Righellis, Inc.
September 23, 2020

GeoDesign Project: ClackCo-106-01

Water head was recorded with an In-situ Level 500 Data Logger® or a Geotech ET Portable Water Level Meter® during testing. The infiltration tests were generally performed with 1.0 to 2.1 feet of water head. We evaluated the records of water head and time to approximate the unfactored infiltration rate of each test. Laboratory testing was performed on a select soil sample to determine the percent fines content at the infiltration test depth. Table 4 summarizes the unfactored infiltration test results and the fines content of the soil present at the infiltration test depths.

Table 4. Infiltration Test Results

Exploration	Depth (feet BGS)	Material	Observed Infiltration Rate[1] (inches per hour)	Water Head (feet)	Percent Fines[2]
B-1	5	Silty GRAVEL (GM) (FILL)	18.4	1.0	34
B-3	5	GRAVEL with silt and sand (GP-GM)	80.4	1.1	5
B-4	5	Sandy SILT (ML)	3.1	2.1	55
B-5	5	Sandy SILT (ML)	Negligible (<0.1)	1.9	55

1. Infiltration rates are measured rates with no factor of safety.
2. Fines content: material passing the U.S. Standard No. 200 sieve

We anticipate infiltration will be highly variable relative to within fill materials and relative to the silt content within granular (sand and gravel) materials. Infiltration in the sandy silt layers will also be variable and will have relatively low infiltration capacity compared to the gravel and silty sand units. Additional discussion is included in the "Stormwater Disposal Design" section.

4.4 FWD TESTING

GeoDesign performed deflection testing along the alignment on February 6, 2020. Details of our test program and the deflection data are presented in Appendix B.

5.0 STORMWATER DISPOSAL DESIGN

Based on the results of infiltration testing, it is our opinion that infiltration is possible in the soil underlying the project alignment; however, infiltration rates will be highly variable due to the varying amounts of silt. The infiltration rates shown in Table 4 are short-term field rates and factors of safety have not been applied. Correction factors should be applied to the measured infiltration rates to account for soil variations and the potential for long-term clogging due to siltation and buildup of organic material. Our recommendations are as follows:

- Given the variability as well as presence of silt directly below the gravel at B-1, we recommend a minimum factor of safety of at least 2 and a maximum infiltration rate of 10 inches per hour be applied to the field infiltration rates.

DRAFT

LEGEND:

- PAVEMENT CORE BORING
- BORING

N

0 200 400

(SCALE IN FEET)

SITE PLAN BASED ON AERIAL PHOTOGRAPH
OBTAINED FROM GOOGLE EARTH PRO®,
MARCH 3, 2020

SITE PLAN

SE LINWOOD AVENUE IMPROVEMENTS PROJECT
CLACKAMAS COUNTY, OR

FIGURE 2

CLACKCO-106-01

SEPTEMBER 2020

GEODESIGN AN NV5 COMPANY

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DRAFT

LEGEND:

- PAVEMENT CORE BORING
- BORING

N

0 200 400

(SCALE IN FEET)

SITE PLAN BASED ON AERIAL PHOTOGRAPH
OBTAINED FROM GOOGLE EARTH PRO®,
MARCH 3, 2020

SITE PLAN

SE LINWOOD AVENUE IMPROVEMENTS PROJECT
CLACKAMAS COUNTY, OR

FIGURE 3

CLACKCO-106-01

SEPTEMBER 2020

GEODESIGN AN NV5 COMPANY

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DRAFT

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS
0.0		ASPHALT CONCRETE (5.0 inches).	0.4				
		AGGREGATE BASE (8.0 inches).	1.1				
		Loose, brown GRAVEL with silt and sand (GP-GM); moist, gravel is subrounded, sand is fine to coarse.					
2.5						9	
5.0				P200		6	Infiltration test at 5.0 feet. P200 = 5%
7.5							
10.0						5	
		Exploration completed at a depth of 11.5 feet.	11.5				Surface elevation was not measured at the time of exploration.
12.5		Hammer efficiency factor is 80.8 percent.					
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: L. Gose COMPLETED: 06/30/20

BORING METHOD: hollow-stem auger (see document text) BORING BIT DIAMETER: 6 inches

GEODESIGN INC AN NV5 COMPANY

CLACKCO-106-01

BORING B-3

SEPTEMBER 2020

SE LINWOOD AVENUE IMPROVEMENTS PROJECT
CLACKAMAS COUNTY, OR

FIGURE A-3

BORING LOG - GDI-NV5 - 1 PER PAGE CLACKCO-106-01-B1_5-C1_14.GPJ GDI_NV5.GDT PRINT DATE: 9/23/20:KT

DRAFT

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % ▥ RQD% ▨ CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS
0.0		ASPHALT CONCRETE (9.0 inches).					
		AGGREGATE BASE (6.0 inches).	0.8				
		Medium stiff, brown, sandy SILT with gravel (ML); moist, sand is fine.	1.3				
2.5						▲ 7	
5.0		stiff at 5.0 feet		P200		▲ 9 ●	Infiltration test at 5.0 feet. P200 = 55%
7.5							
10.0						▲ 6	
		Exploration completed at a depth of 11.5 feet.	11.5				Surface elevation was not measured at the time of exploration.
12.5		Hammer efficiency factor is 69.2 percent.					
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							

DRILLED BY: Western States Soil Conservation, Inc. LOGGED BY: L. Gose COMPLETED: 07/10/20

BORING METHOD: hollow-stem auger (see document text) BORING BIT DIAMETER: 6 inches

GEODESIGN INC AN NV5 COMPANY

CLACKCO-106-01

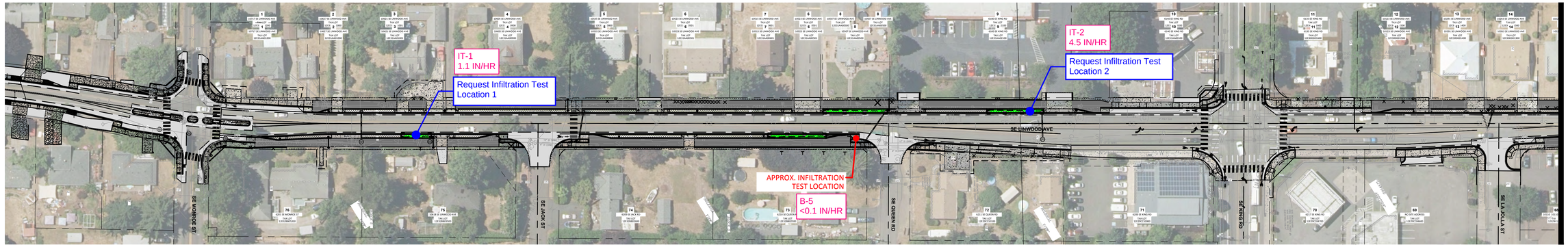
SEPTEMBER 2020

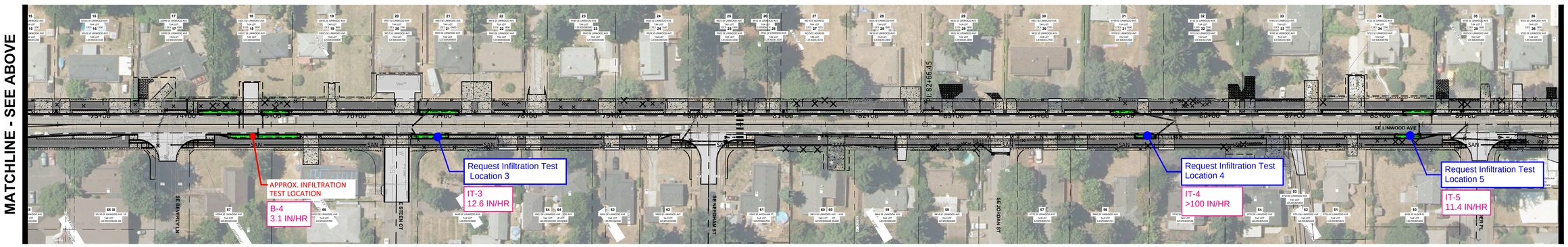
BORING B-4

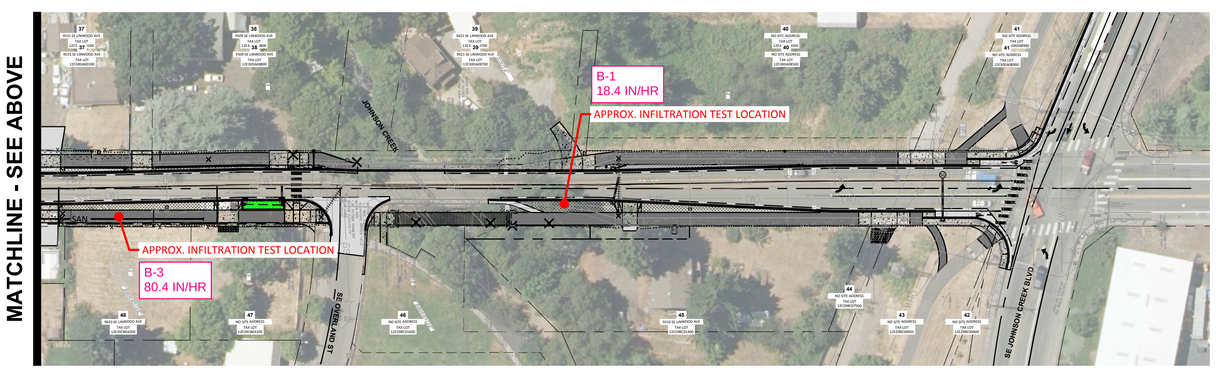
SE LINWOOD AVENUE IMPROVEMENTS PROJECT
CLACKAMAS COUNTY, OR

FIGURE A-4

BORING LOG - GDI-NV5 - 1 PER PAGE CLACKCO-106-01-B1_5-C1_14.GPJ GDI_NV5.GDT PRINT DATE: 9/23/20:KT







Infiltration testing to include both in-situ infiltration rates as well as groundwater documentation.

0 30 60 120

SCALE: 1" = 60'

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR
DRAWN: ---
CHECKED: ---
DATE: MARCH 2022

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS

INFILTRATION TESTING LOCATIONS REQUEST

LINWOOD AVENUE IMPROVEMENT PROJECT

MILWAUKIE, OR

SHEET NO. 1

JOB NO. CLA-93

Appendix C – Water Quality, Infiltration and Quantity

BASIN C PLANTERS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 5 - Planter C1

Pond Data

Contours -User defined Contour area (sqft), Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	350	0	0
0.27	97.52	350	17	17
0.55	97.80	350	17	35
0.82	98.07	350	17	52
1.10	98.35	350	17	69
1.37	98.62	350	17	86
1.64	98.89	350	17	104
1.92	99.17	350	17	121
2.19	99.44	350	17	138
2.47	99.72	350	17	155
2.74	99.99	350	17	173
2.75	100.00	350	4	176
3.00	100.25	350	87	264
3.25	100.50	350	87	351
3.50	100.75	350	87	439
3.58	100.83	350	28	467

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.80	0.00	0.00
Span (in)	= 12.00	0.80	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 10.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	17	97.52	0.00	0.00	---	---	0.00	---	---	---	0.081	---	0.081
0.55	35	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.081	---	0.083
0.82	52	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.081	---	0.090
1.10	69	98.35	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.081	---	0.094
1.37	86	98.62	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.096
1.64	104	98.89	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.099
1.92	121	99.17	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.101
2.19	138	99.44	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.103
2.47	155	99.72	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.104
2.74	173	99.99	0.03 ic	0.02 ic	---	---	0.00	---	---	---	0.081	---	0.106
2.75	176	100.00	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.081	---	0.106
3.00	264	100.25	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.081	---	0.107
3.25	351	100.50	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.081	---	0.109
3.50	439	100.75	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.081	---	0.110
3.58	467	100.83	0.39 ic	0.03 ic	---	---	0.35	---	---	---	0.081	---	0.465

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.001	2	1168	33	------	------	------	exCa
2	SBUH Runoff	0.001	2	1168	23	------	------	------	exCb
3	SBUH Runoff	0.001	2	482	59	------	------	------	exCe
4	SBUH Runoff	0.035	2	474	485	------	------	------	exCd
5	Combine	0.035	2	476	601	1, 2, 3, 4	------	------	exC - Pre-Developed
7	SBUH Runoff	0.022	2	474	313	------	------	------	C1a
8	SBUH Runoff	0.000	2	n/a	0	------	------	------	C1b
9	SBUH Runoff	0.001	2	1168	23	------	------	------	C1c
10	SBUH Runoff	0.032	2	474	445	------	------	------	C1d
11	SBUH Runoff	0.000	2	482	1	------	------	------	C1e
12	Combine	0.054	2	474	783	7, 8, 9, 10, 11	------	------	C1 - Post Developed
14	SBUH Runoff	0.010	2	474	138	------	------	------	C2a
15	SBUH Runoff	0.000	2	1168	2	------	------	------	C2c
16	SBUH Runoff	0.000	2	482	9	------	------	------	C2e
17	SBUH Runoff	0.003	2	474	40	------	------	------	C2d
18	Combine	0.013	2	476	189	14, 15, 16, 17	------	------	C2 - Post-Developed
20	Reservoir	0.000	2	468	0	12	97.43	11.4	Planter C1
21	Reservoir	0.050	2	482	782	12	100.08	29.2	Planter C1 - WQ

WQ planter will fully infiltrate through 18 inch soil media without reaching overflow

Proposed Planter can fully infiltrate WQ storm runoff

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

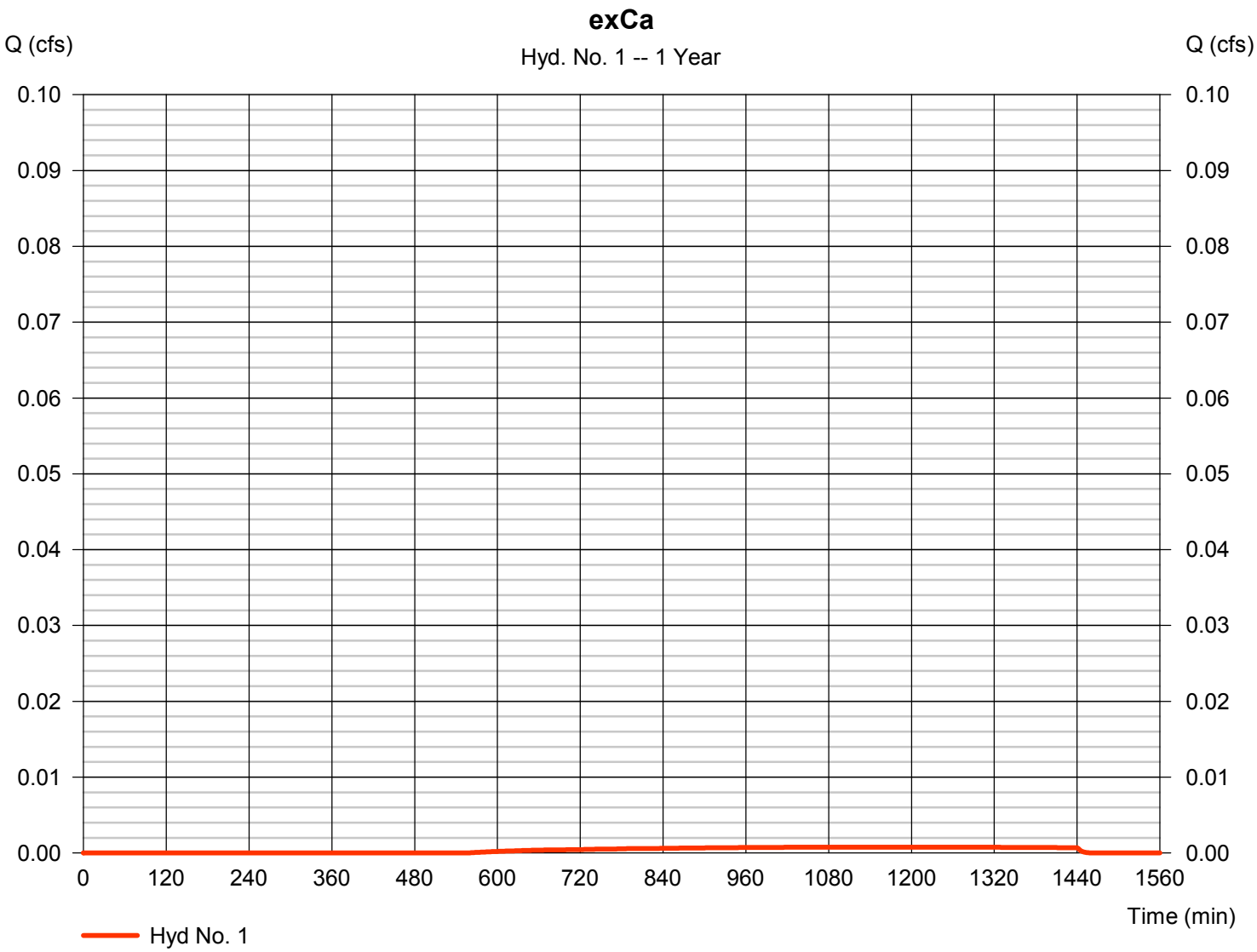
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 1

exCa

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1168 min
Time interval	= 2 min	Hyd. volume	= 33 cuft
Drainage area	= 0.131 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



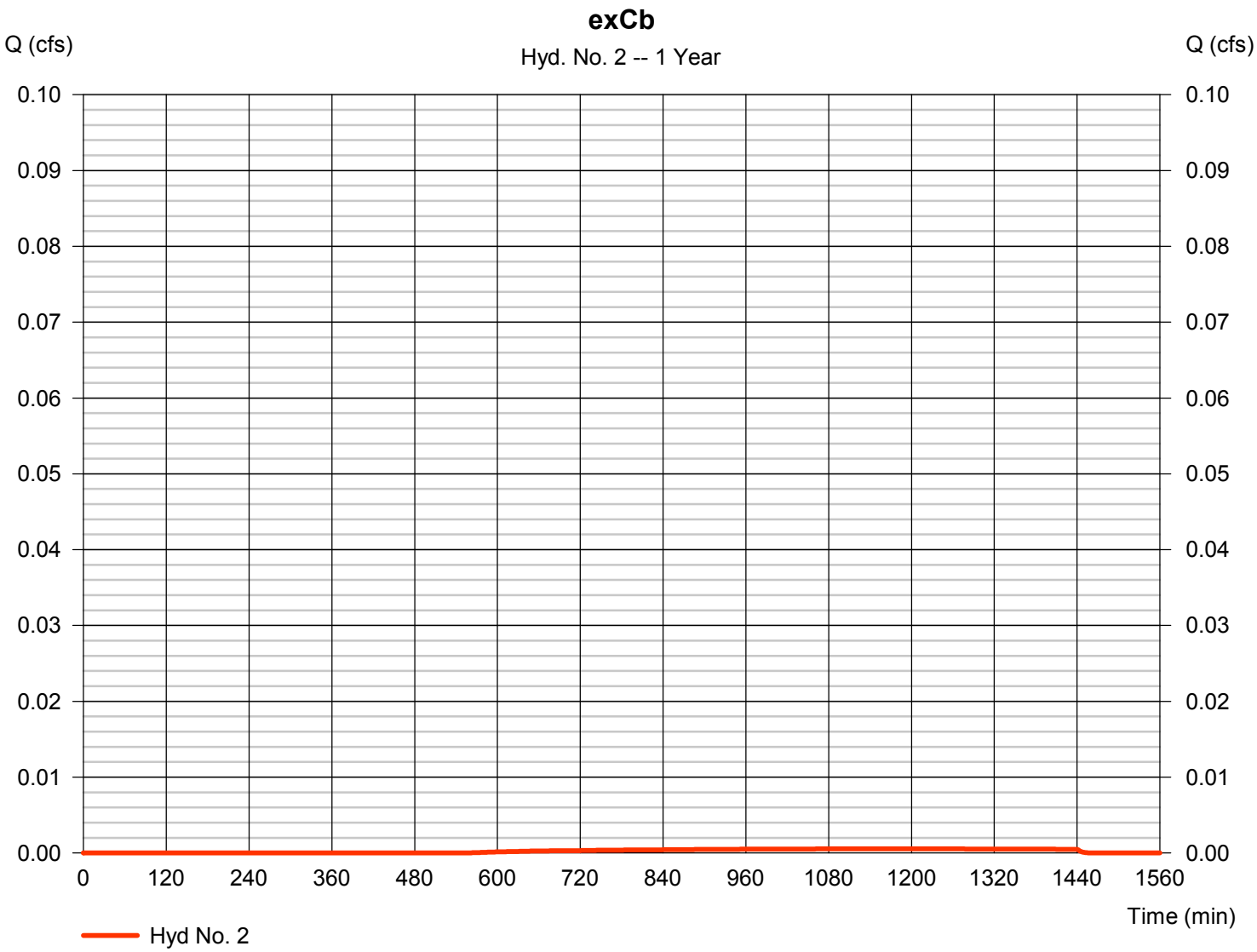
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 2

exCb

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1168 min
Time interval	= 2 min	Hyd. volume	= 23 cuft
Drainage area	= 0.091 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



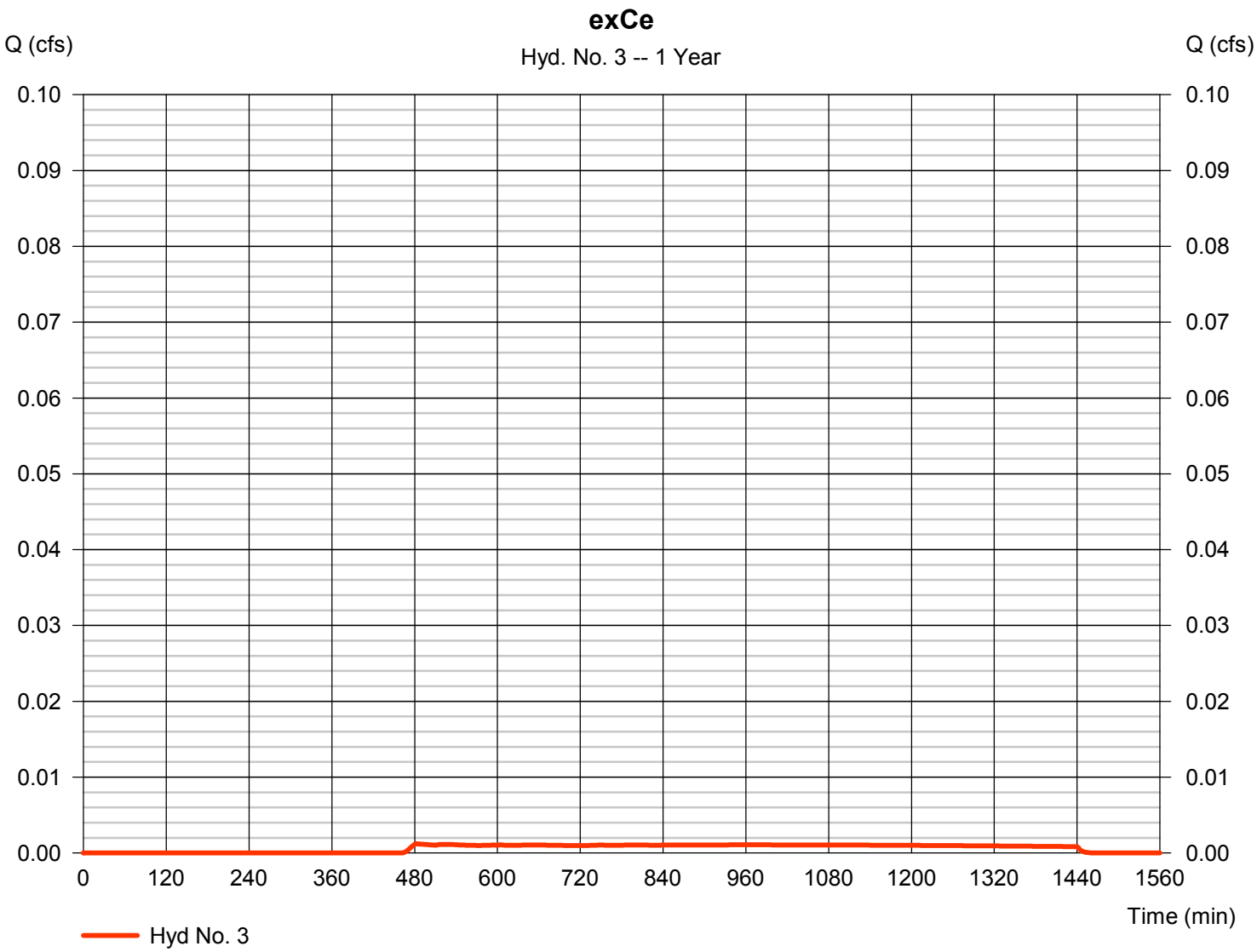
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 3

exCe

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 59 cuft
Drainage area	= 0.094 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



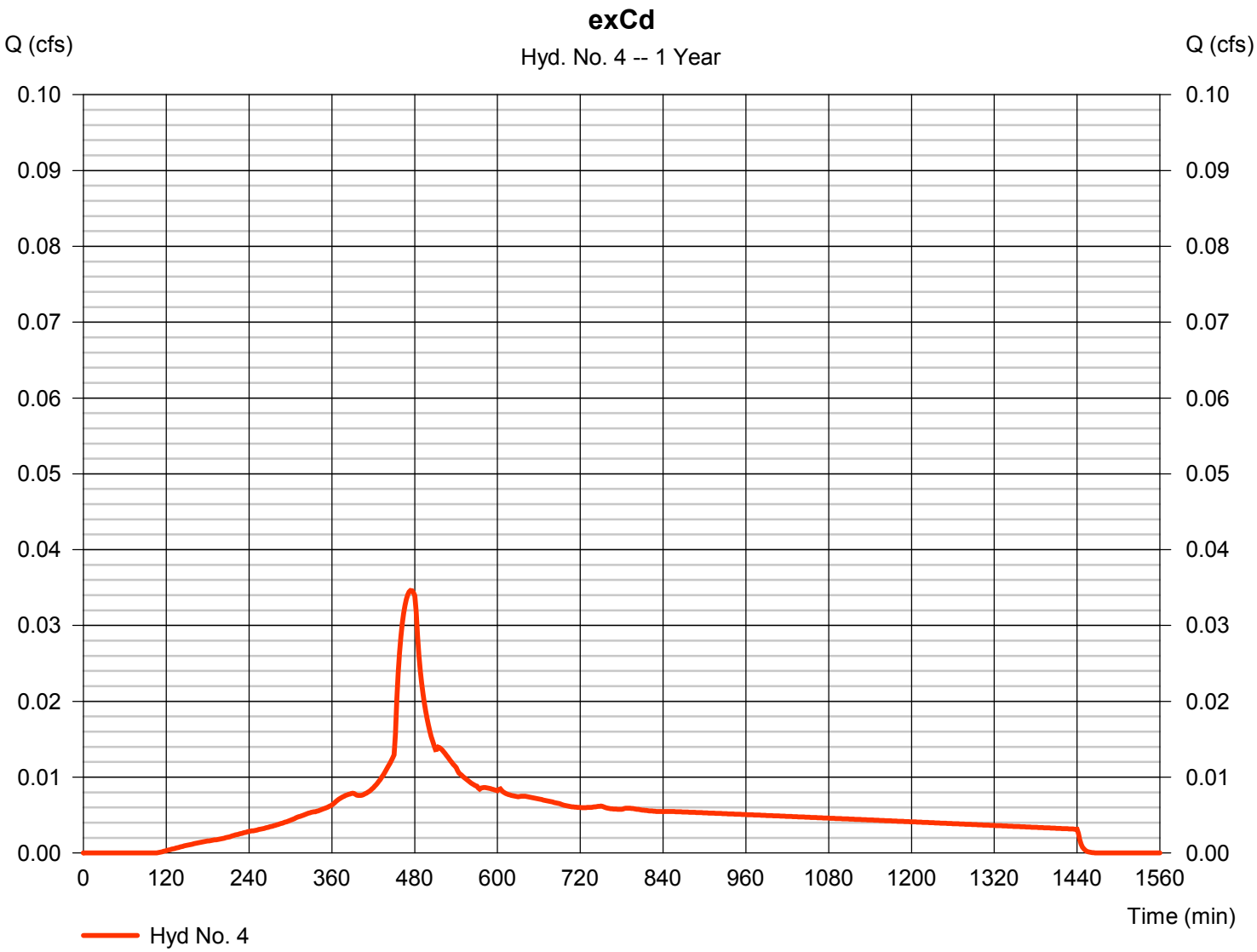
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 4

exCd

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 485 cuft
Drainage area	= 0.169 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



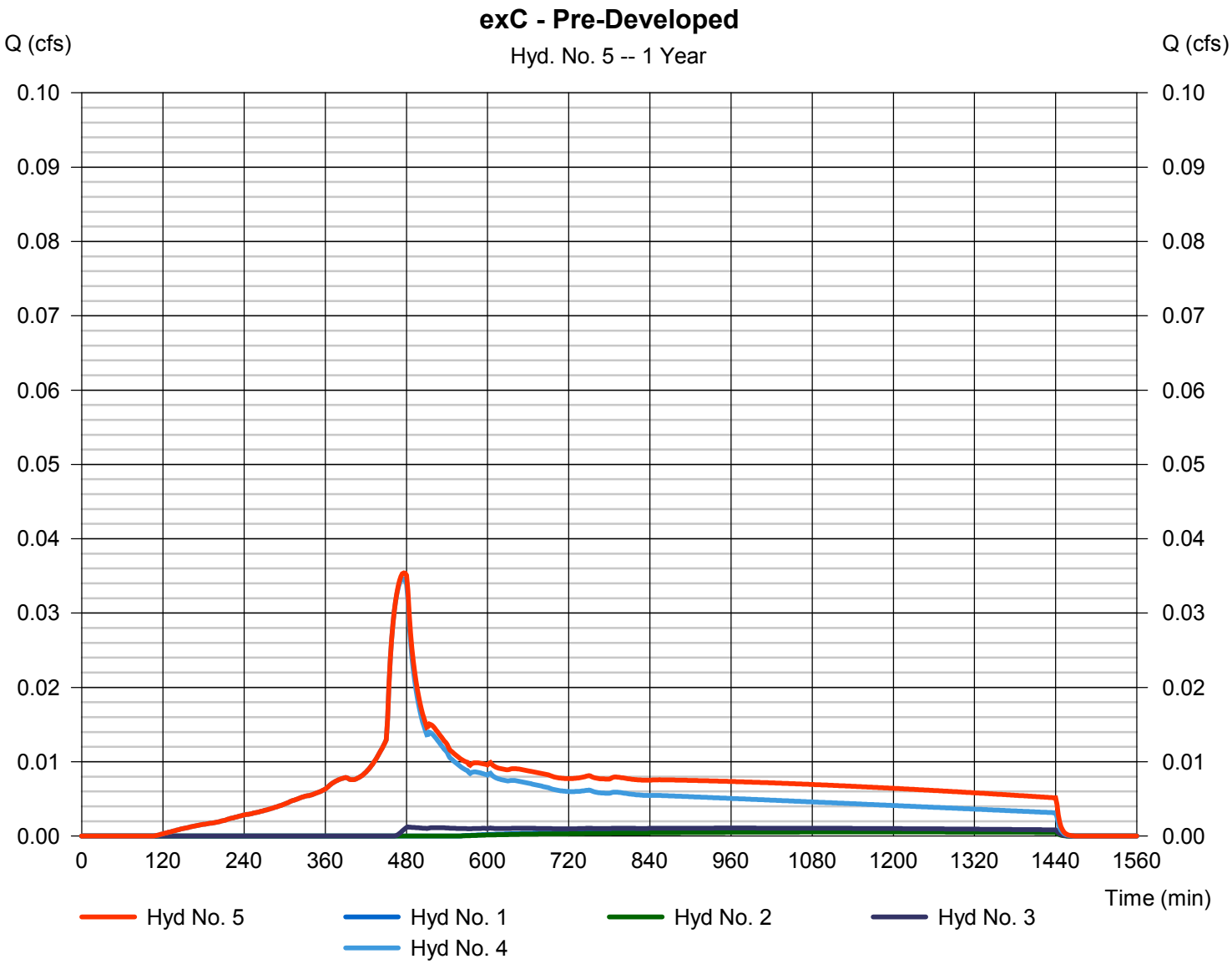
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 5

exC - Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 601 cuft
Inflow hyds.	= 1, 2, 3, 4	Contrib. drain. area	= 0.485 ac



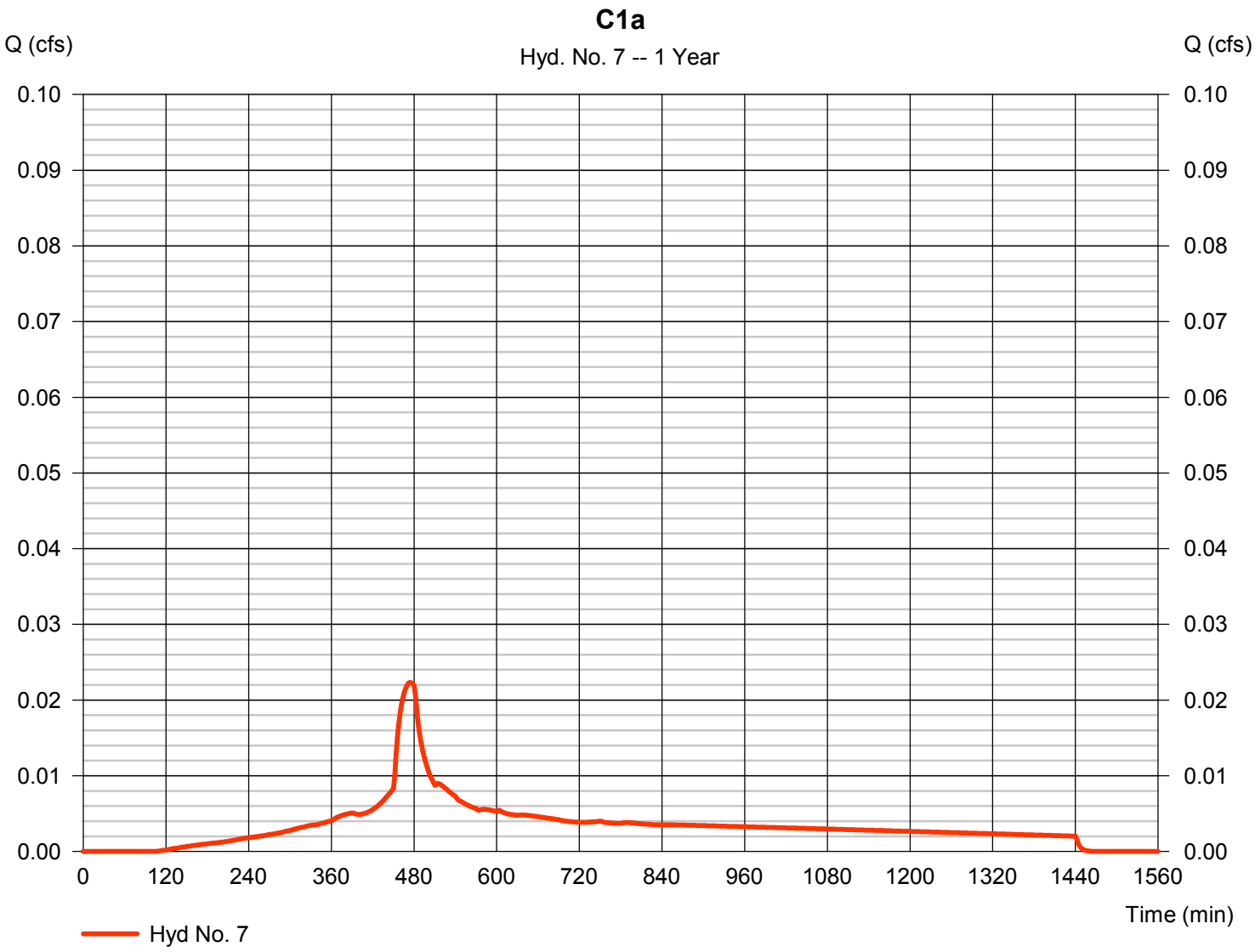
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 7

C1a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.022 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 313 cuft
Drainage area	= 0.109 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



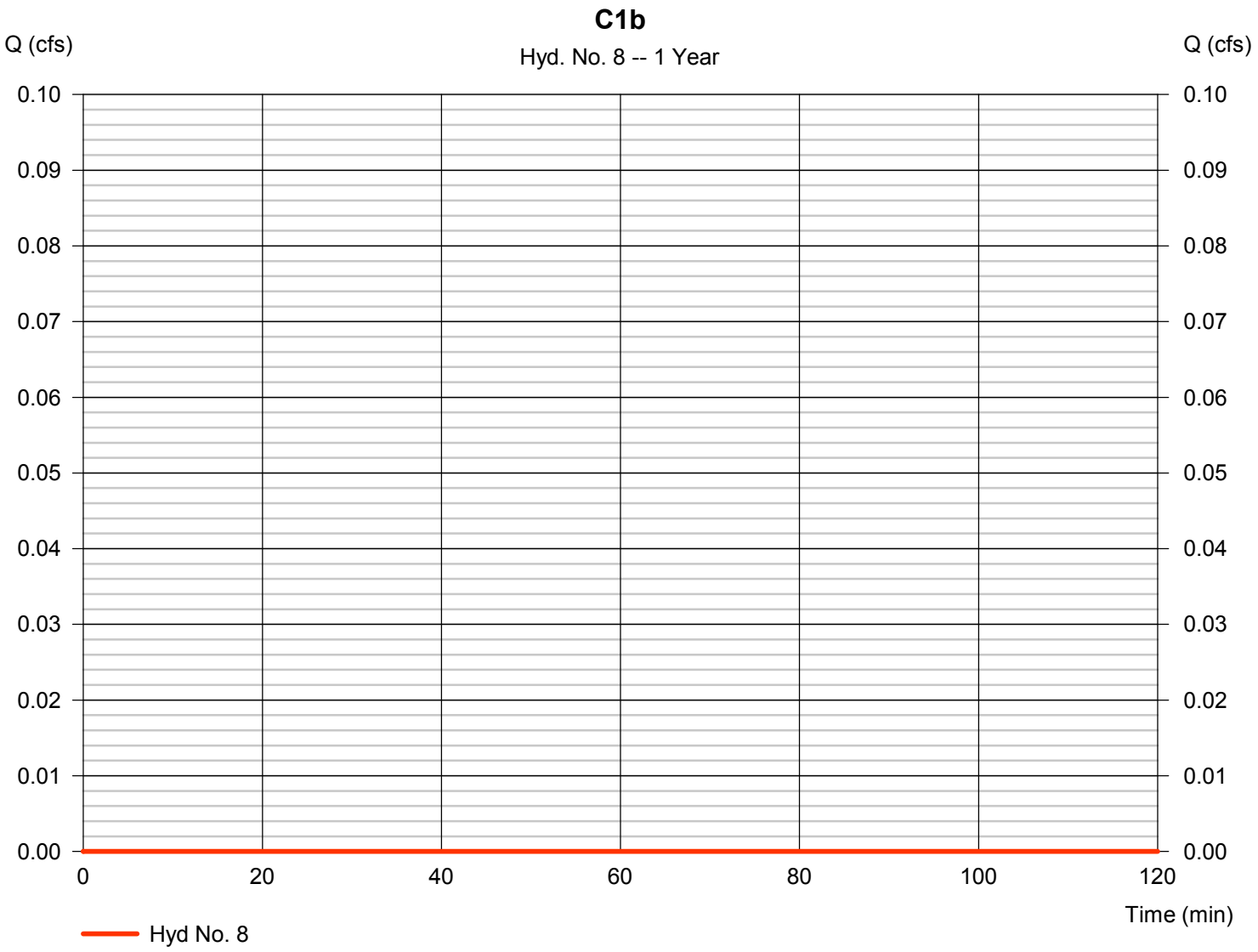
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 8

C1b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.035 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



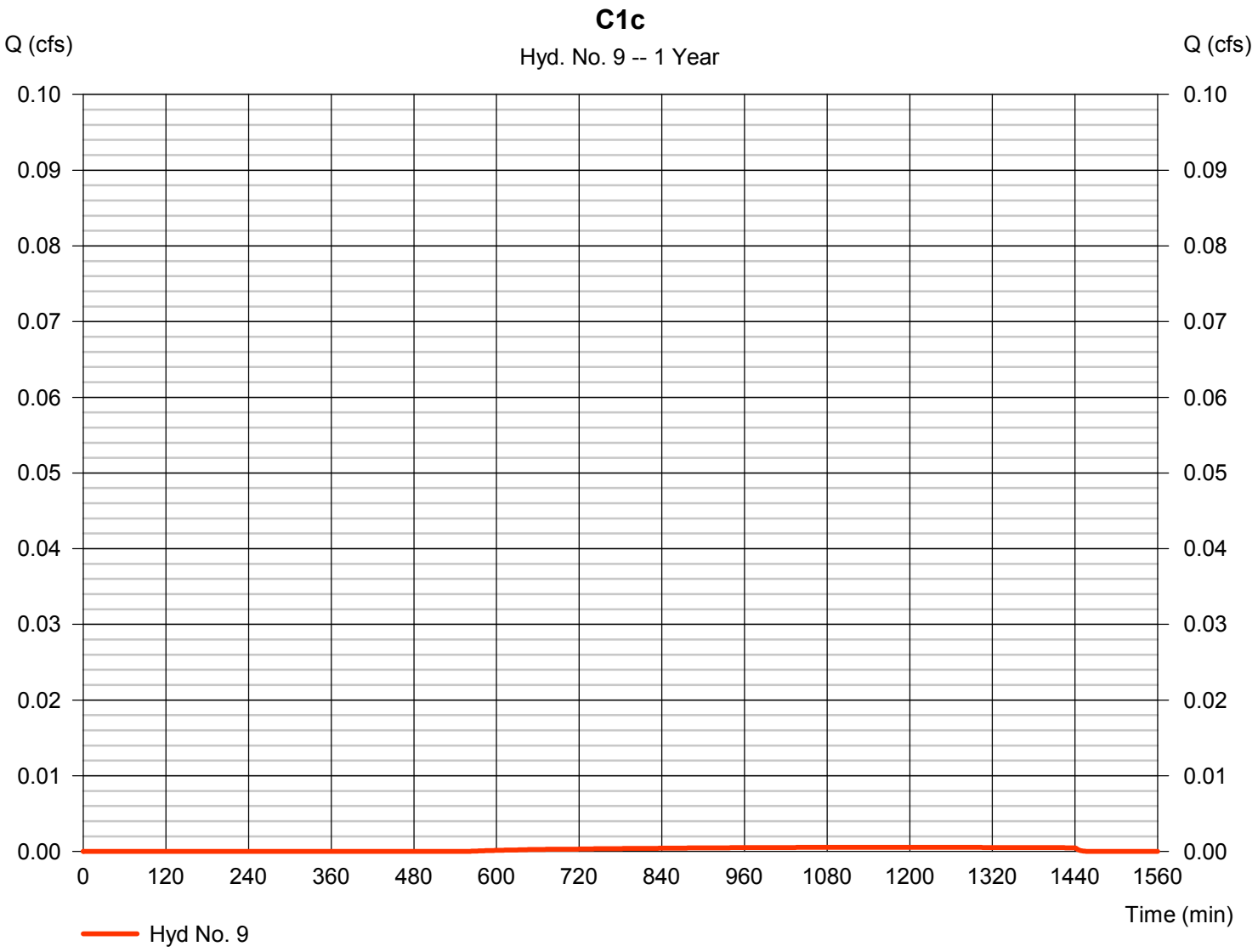
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 9

C1c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 1168 min
Time interval	= 2 min	Hyd. volume	= 23 cuft
Drainage area	= 0.092 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



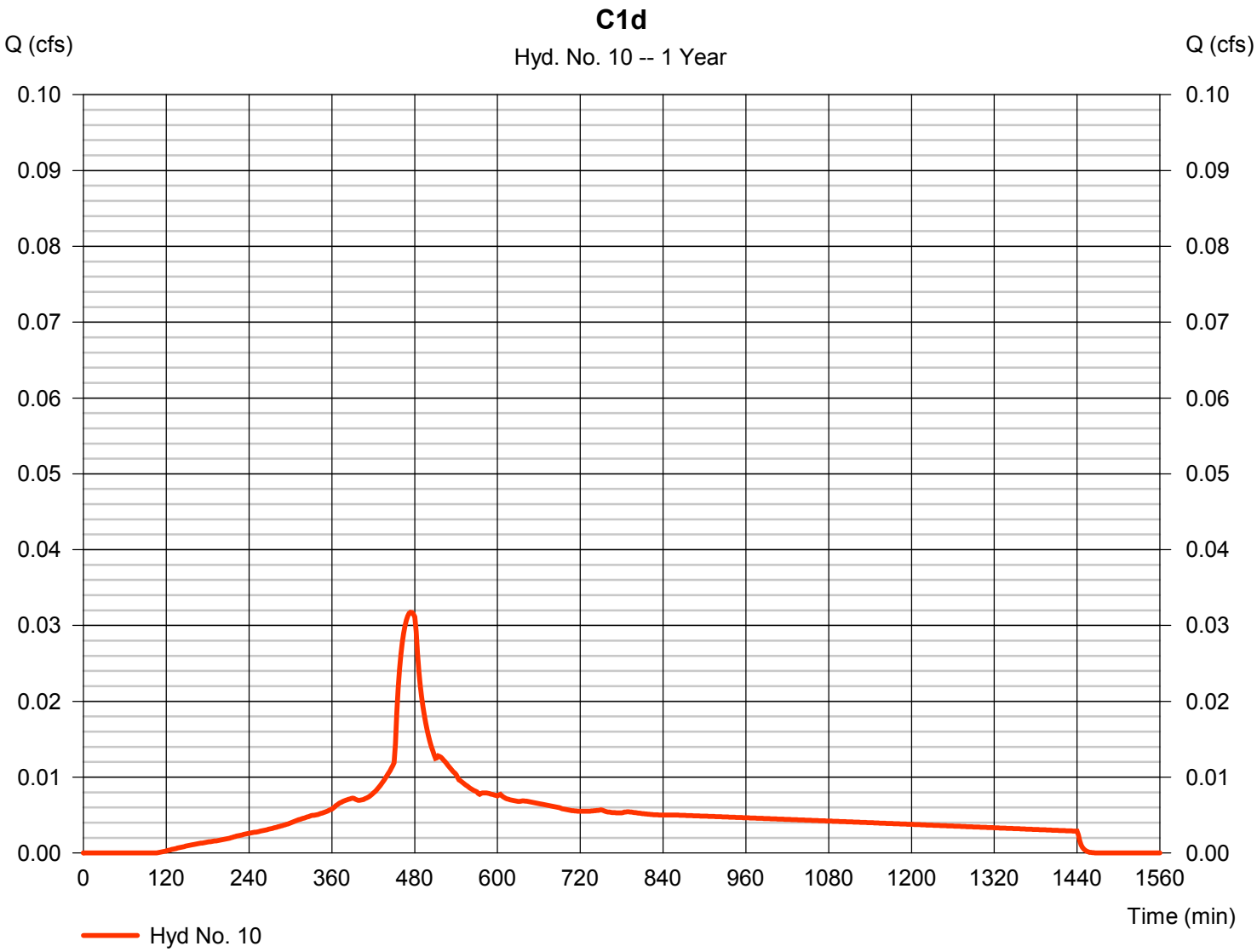
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 10

C1d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.032 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 445 cuft
Drainage area	= 0.155 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



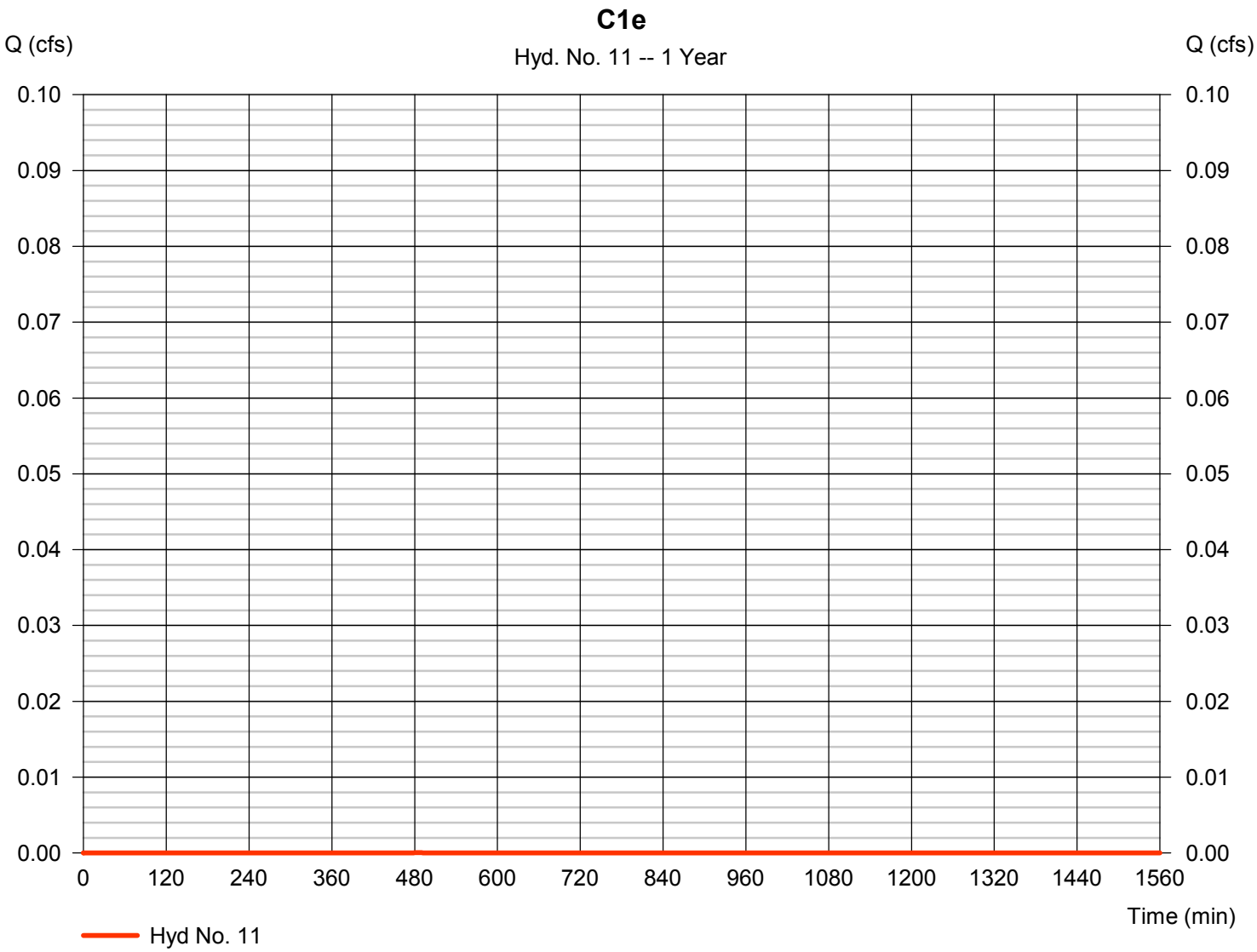
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 11

C1e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.002 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



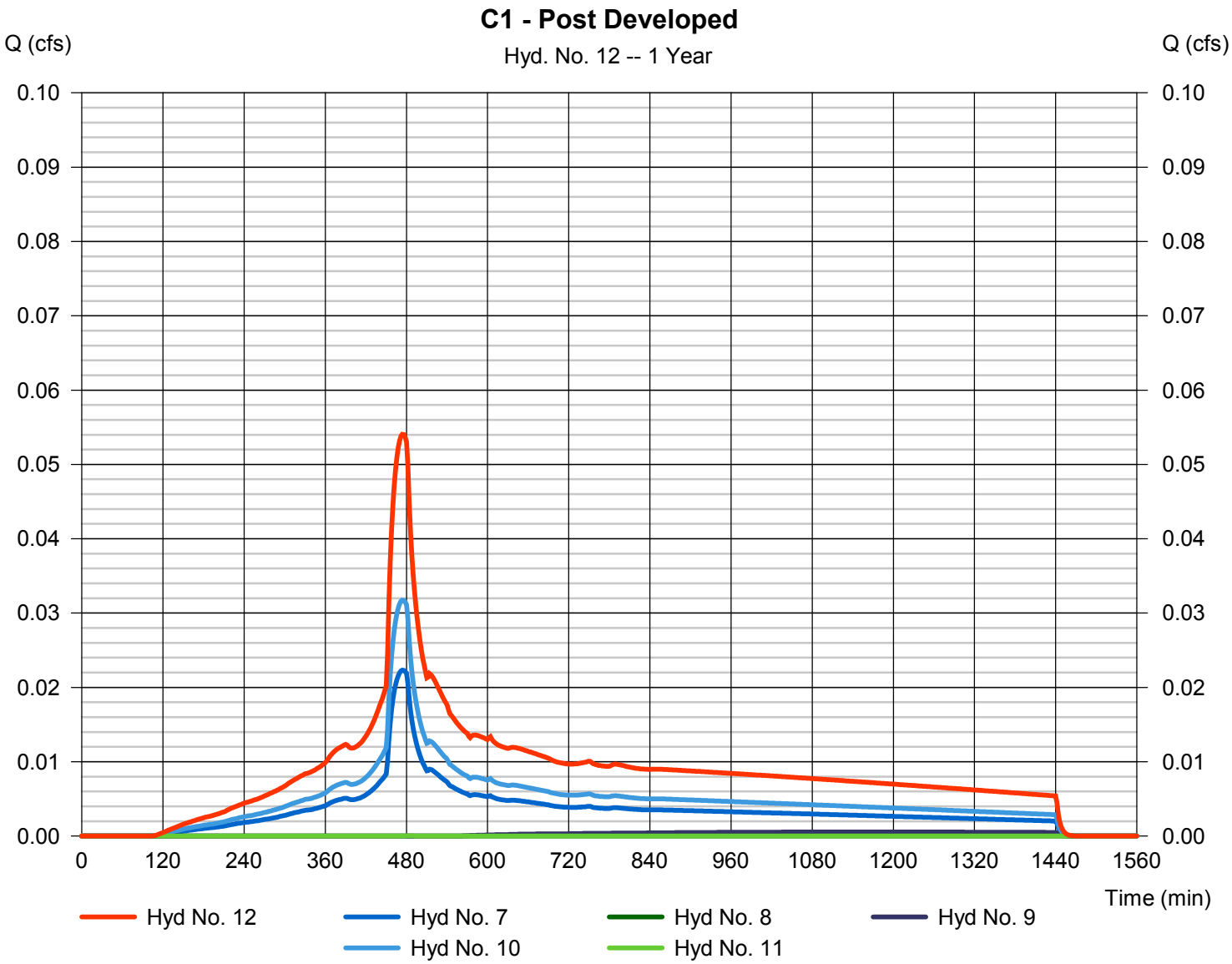
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 12

C1 - Post Developed

Hydrograph type	= Combine	Peak discharge	= 0.054 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 783 cuft
Inflow hyds.	= 7, 8, 9, 10, 11	Contrib. drain. area	= 0.393 ac



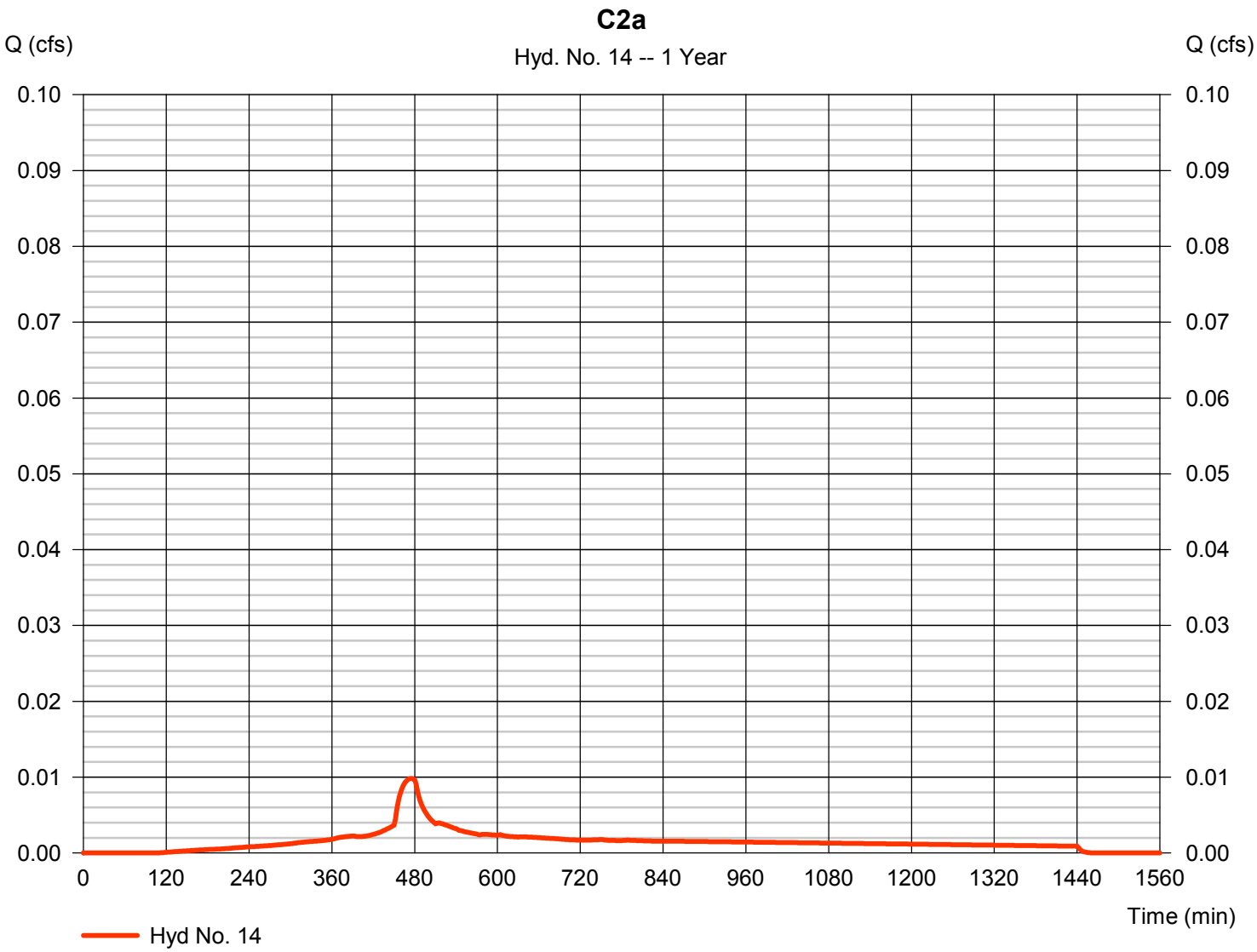
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 14

C2a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 138 cuft
Drainage area	= 0.048 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



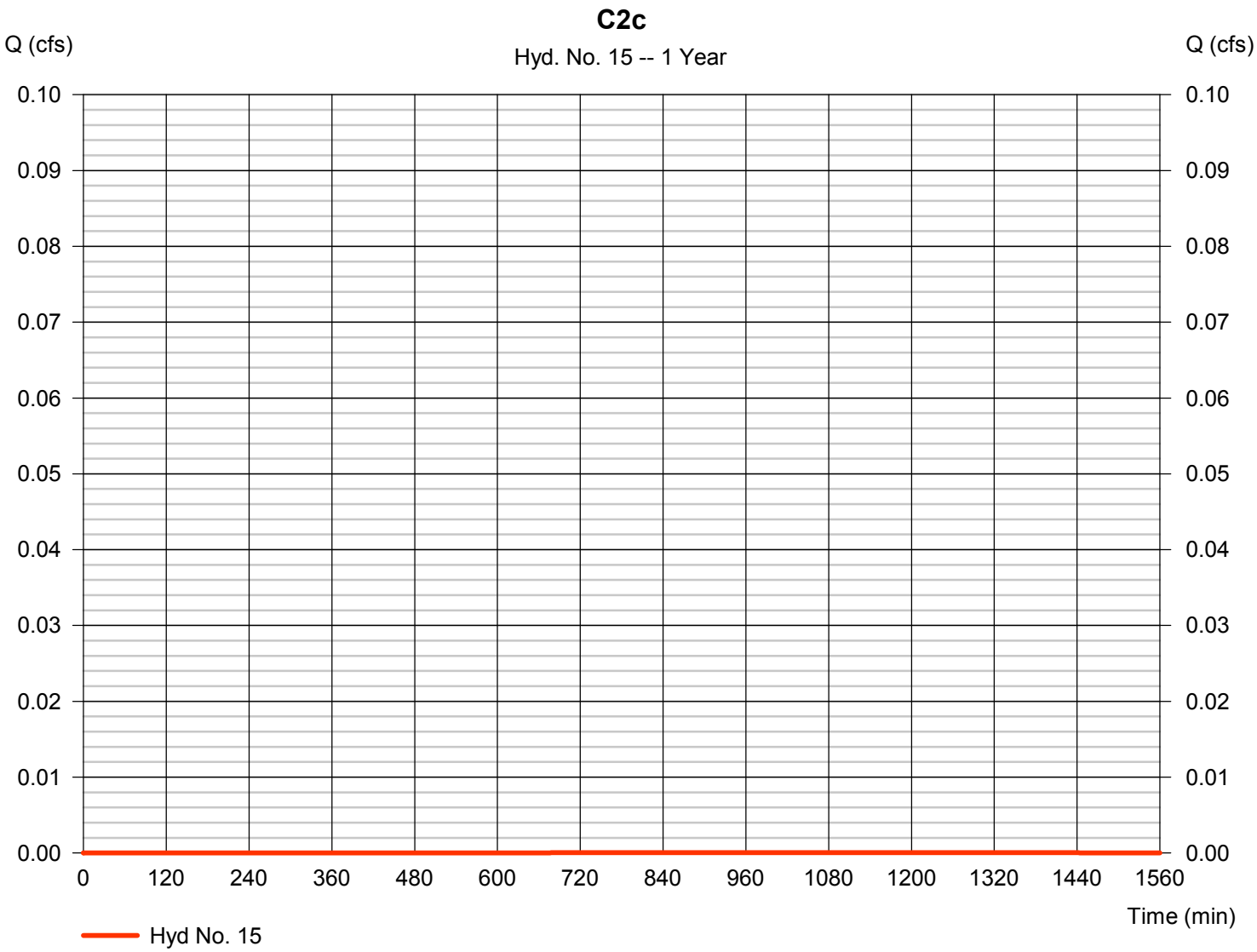
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 15

C2c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1168 min
Time interval	= 2 min	Hyd. volume	= 2 cuft
Drainage area	= 0.008 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



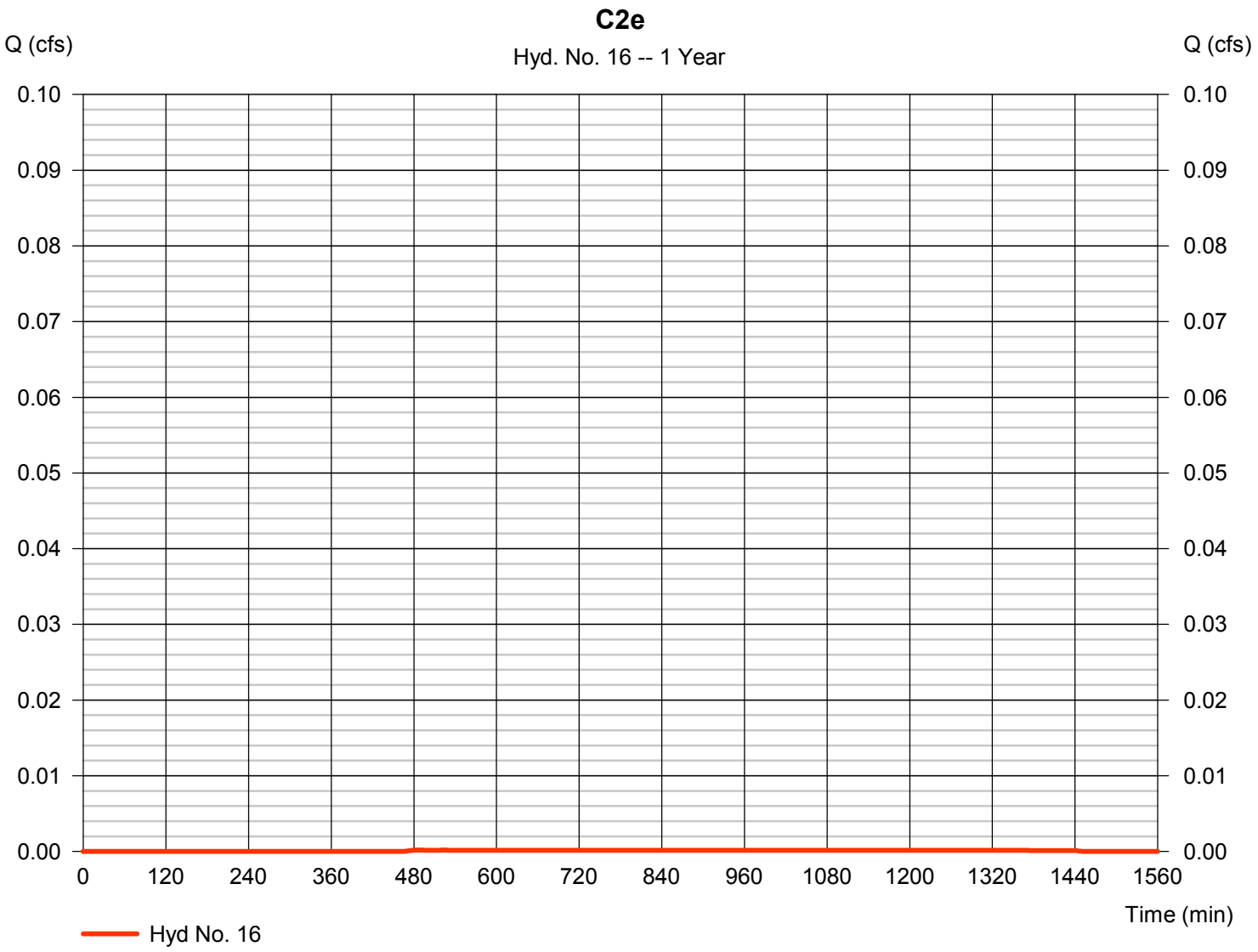
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 16

C2e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 9 cuft
Drainage area	= 0.014 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



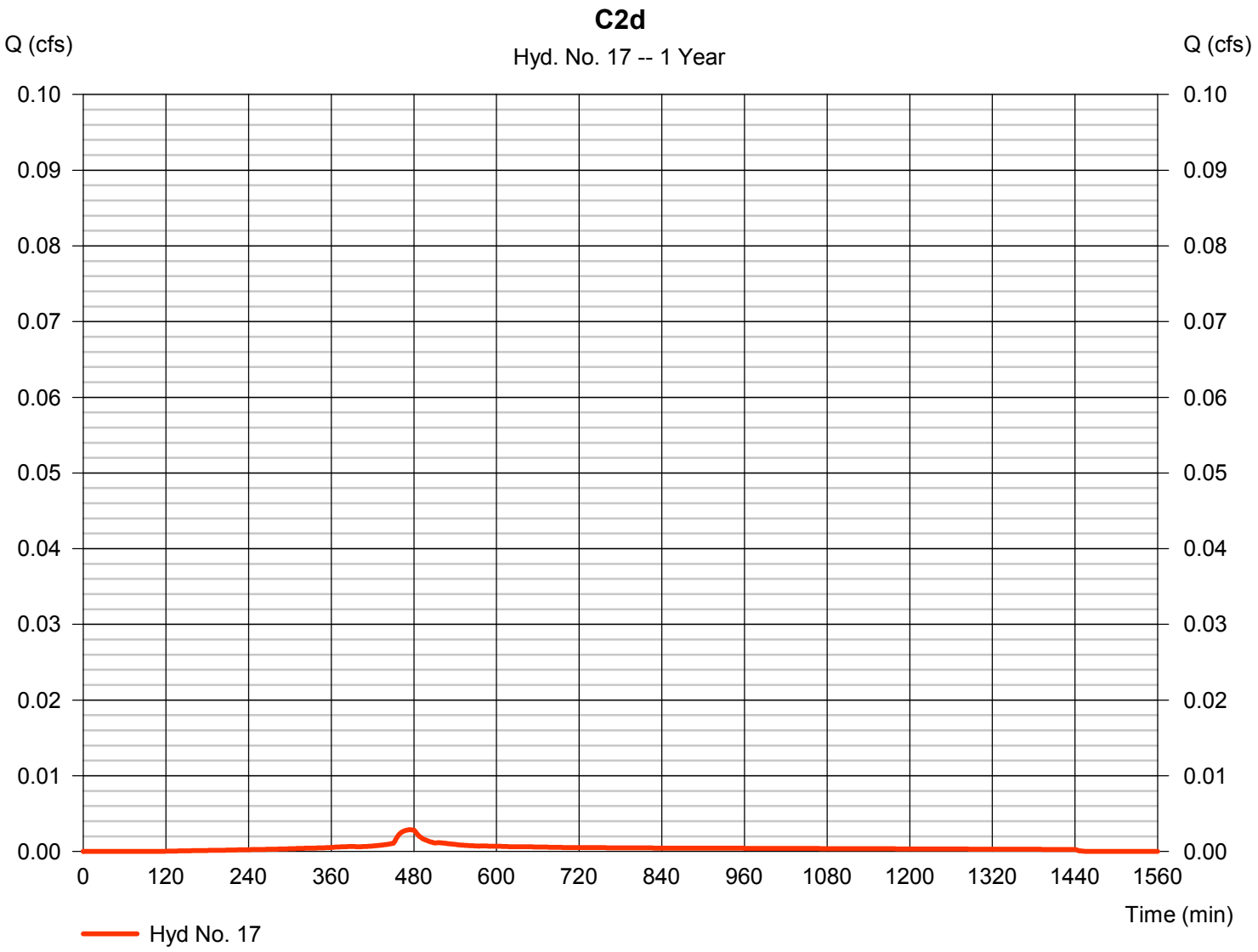
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 17

C2d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 40 cuft
Drainage area	= 0.014 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



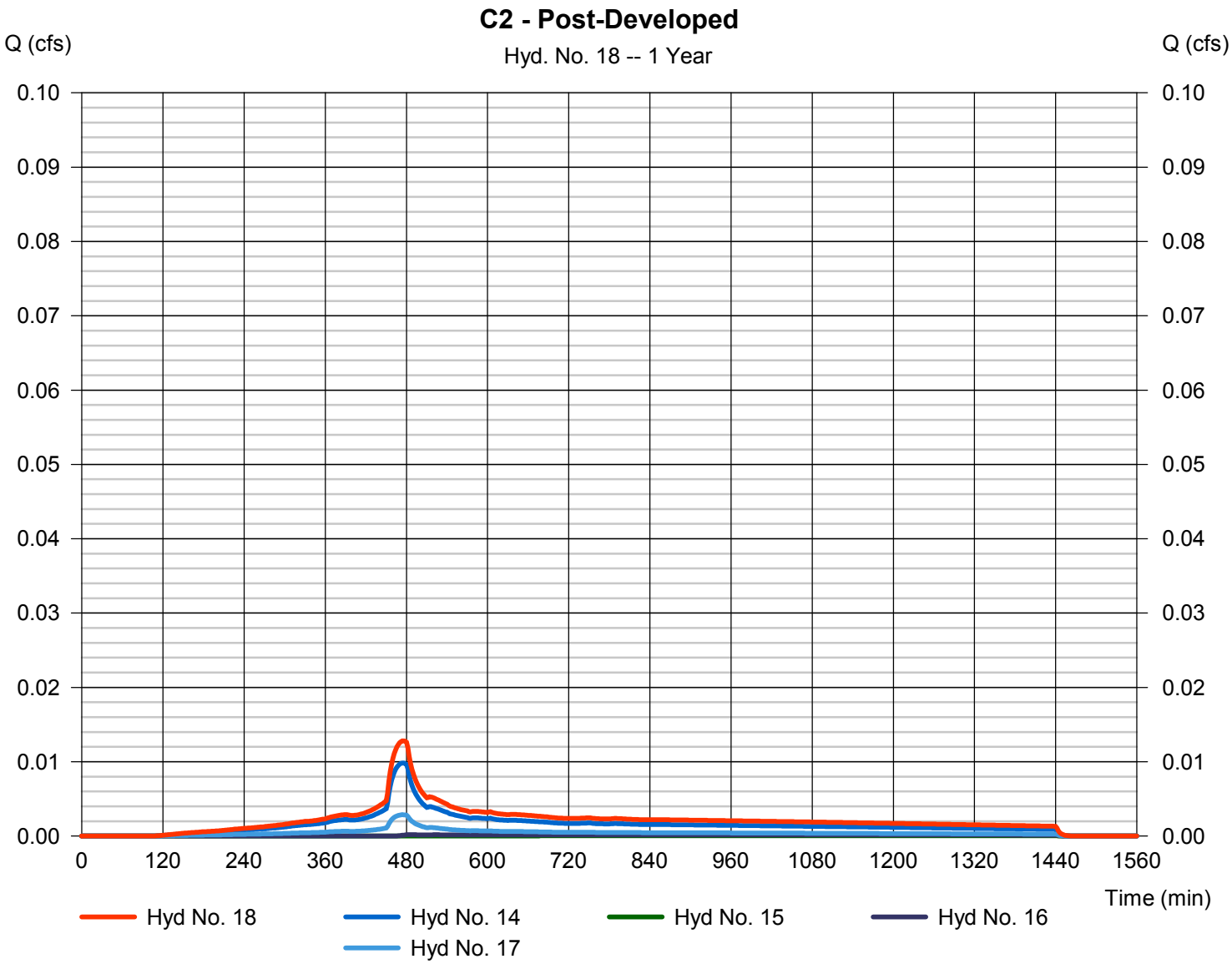
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 18

C2 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.013 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 189 cuft
Inflow hyds.	= 14, 15, 16, 17	Contrib. drain. area	= 0.084 ac



Hydrograph Report

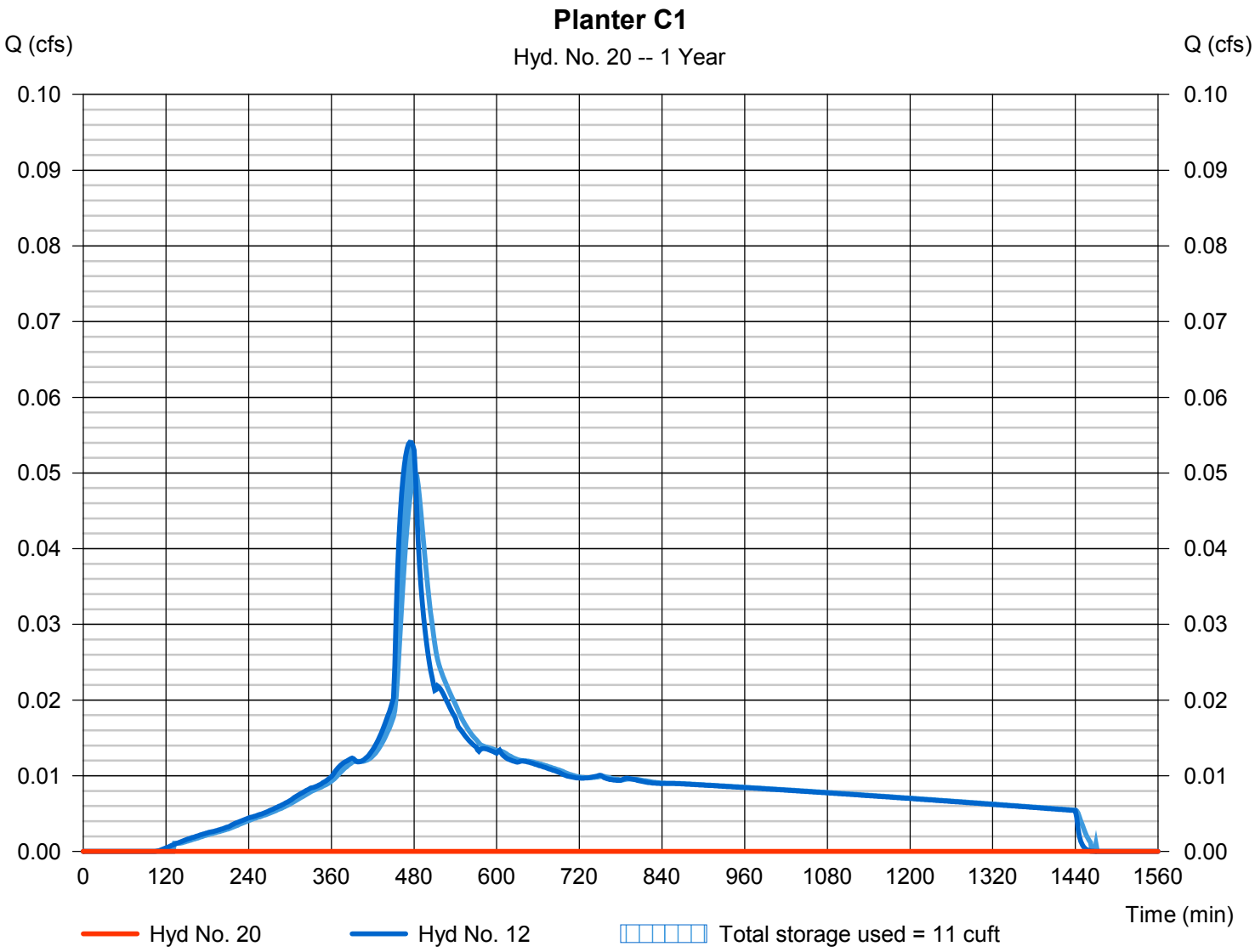
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 20

Planter C1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 468 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 12 - C1 - Post Developed	Max. Elevation	= 97.43 ft
Reservoir name	= Planter C1	Max. Storage	= 11 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

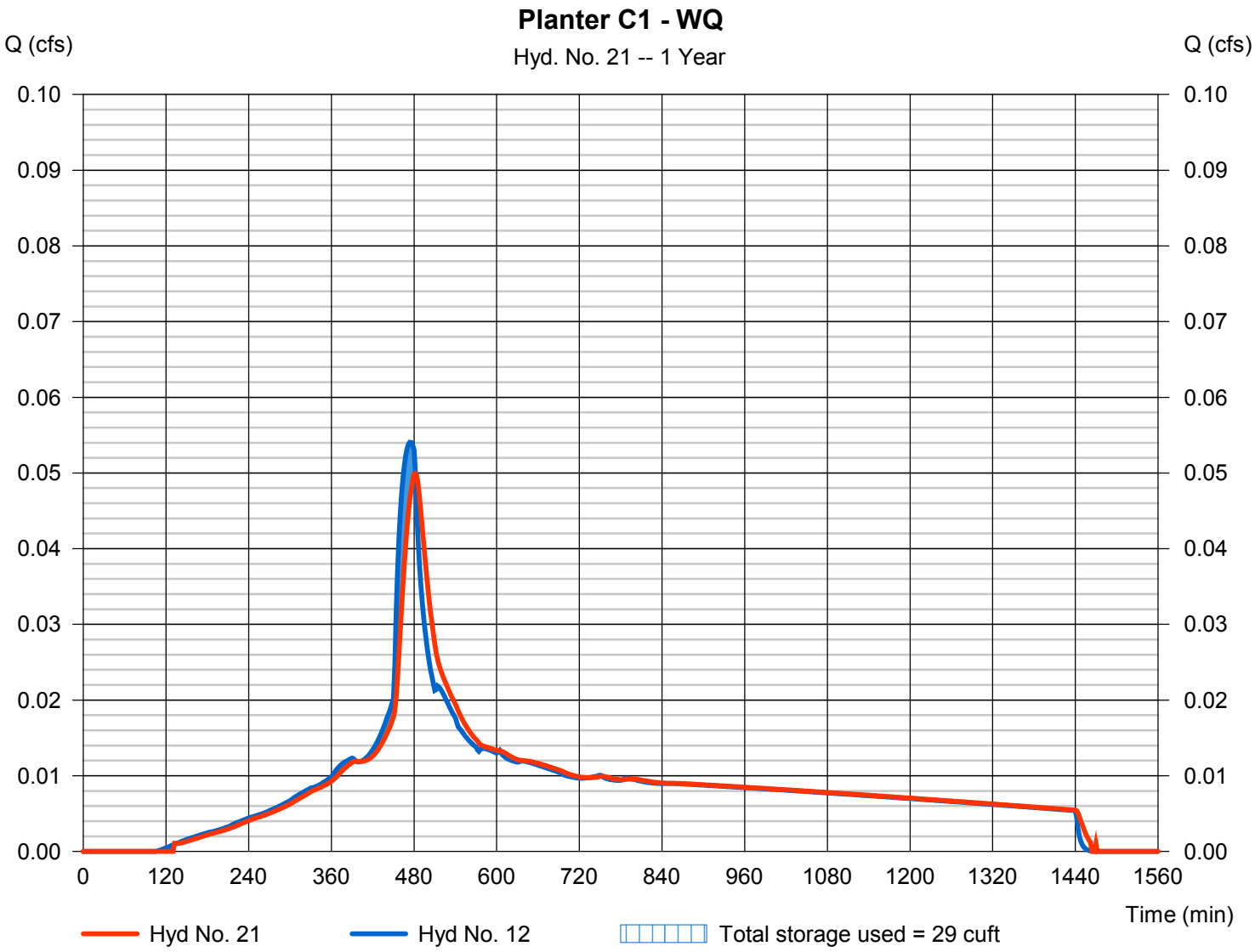
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 21

Planter C1 - WQ

Hydrograph type	= Reservoir	Peak discharge	= 0.050 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 782 cuft
Inflow hyd. No.	= 12 - C1 - Post Developed	Max. Elevation	= 100.08 ft
Reservoir name	= Planter C1 - WQ	Max. Storage	= 29 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 10 - Planter C1 - WQ

Pond Data

Trapezoid -Bottom L x W = 50.0 x 7.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	350	0	0
0.08	100.08	350	29	29
0.17	100.17	350	29	58
0.25	100.25	350	29	87
0.33	100.33	350	29	116
0.41	100.42	350	29	145
0.50	100.50	350	29	174
0.58	100.58	350	29	203
0.66	100.66	350	29	232
0.75	100.75	350	29	261
0.83	100.83	350	29	291

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	1.10	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	29	100.08	0.00	0.00	---	---	0.00	---	---	---	0.050	---	0.050
0.17	58	100.17	0.00	0.00	---	---	0.00	---	---	---	0.051	---	0.051
0.25	87	100.25	0.00	0.00	---	---	0.00	---	---	---	0.053	---	0.053
0.33	116	100.33	0.00	0.00	---	---	0.00	---	---	---	0.054	---	0.054
0.41	145	100.42	0.00	0.00	---	---	0.00	---	---	---	0.055	---	0.055
0.50	174	100.50	0.00	0.00	---	---	0.00	---	---	---	0.056	---	0.056
0.58	203	100.58	0.00	0.00	---	---	0.00	---	---	---	0.058	---	0.058
0.66	232	100.66	0.00	0.00	---	---	0.00	---	---	---	0.059	---	0.059
0.75	261	100.75	0.00	0.00	---	---	0.00	---	---	---	0.060	---	0.060
0.83	291	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.062	---	0.417

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.023	2	480	430	------	------	------	exCa
2	SBUH Runoff	0.016	2	480	299	------	------	------	exCb
3	SBUH Runoff	0.027	2	480	429	------	------	------	exCe
4	SBUH Runoff	0.102	2	474	1,454	------	------	------	exCd
5	Combine	0.166	2	478	2,613	1, 2, 3, 4	------	------	exC - Pre-Developed
7	SBUH Runoff	0.065	2	474	938	------	------	------	C1a
8	SBUH Runoff	0.000	2	1196	20	------	------	------	C1b
9	SBUH Runoff	0.016	2	480	302	------	------	------	C1c
10	SBUH Runoff	0.093	2	474	1,334	------	------	------	C1d
11	SBUH Runoff	0.001	2	480	9	------	------	------	C1e
12	Combine	0.175	2	474	2,603	7, 8, 9, 10, 11	------	------	C1 - Post Developed
14	SBUH Runoff	0.029	2	474	413	------	------	------	C2a
15	SBUH Runoff	0.001	2	480	26	------	------	------	C2c
16	SBUH Runoff	0.004	2	480	64	------	------	------	C2e
17	SBUH Runoff	0.008	2	474	120	------	------	------	C2d
18	Combine	0.043	2	474	624	14, 15, 16, 17	------	------	C2 - Post-Developed
20	Reservoir	0.022	2	492	91	12	99.54	144	Planter C1
21	Reservoir	0.090	2	498	2,602	12	100.76	268	Planter C1 - WQ

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.000	2	n/a	0	------	------	------	exCa
2	SBUH Runoff	0.000	2	n/a	0	------	------	------	exCb
3	SBUH Runoff	0.000	2	1354	4	------	------	------	exCe
4	SBUH Runoff	0.013	2	476	195	------	------	------	exCd
5	Combine	0.013	2	476	199	1, 2, 3, 4	------	------	exC - Pre-Developed
7	SBUH Runoff	0.009	2	476	126	------	------	------	C1a
8	SBUH Runoff	0.000	2	n/a	0	------	------	------	C1b
9	SBUH Runoff	0.000	2	n/a	0	------	------	------	C1c
10	SBUH Runoff	0.012	2	476	179	------	------	------	C1d
11	SBUH Runoff	0.000	2	1354	0	------	------	------	C1e
12	Combine	0.021	2	476	305	7, 8, 9, 10, 11	------	------	C1 - Post Developed
14	SBUH Runoff	0.004	2	476	55	------	------	------	C2a
15	SBUH Runoff	0.000	2	n/a	0	------	------	------	C2c
16	SBUH Runoff	0.000	2	1354	1	------	------	------	C2e
17	SBUH Runoff	0.001	2	476	16	------	------	------	C2d
18	Combine	0.005	2	476	72	14, 15, 16, 17	------	------	C2 - Post-Developed
20	Reservoir	0.000	2	500	0	12	97.32	4.44	Planter C1
21	Reservoir	0.019	2	482	304	12	100.03	11.3	Planter C1 - WQ

Proposed Planter can fully infiltrate 0.5 inch storm

Infiltration Event - 0.5" Storm

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.060	2	480	934	------	------	------	exCa
2	SBUH Runoff	0.041	2	480	649	------	------	------	exCb
3	SBUH Runoff	0.057	2	478	839	------	------	------	exCe
4	SBUH Runoff	0.159	2	474	2,310	------	------	------	exCd
5	Combine	0.316	2	476	4,731	1, 2, 3, 4	------	------	exC - Pre-Developed
7	SBUH Runoff	0.102	2	474	1,490	------	------	------	C1a
8	SBUH Runoff	0.002	2	526	84	------	------	------	C1b
9	SBUH Runoff	0.042	2	480	656	------	------	------	C1c
10	SBUH Runoff	0.146	2	474	2,118	------	------	------	C1d
11	SBUH Runoff	0.001	2	478	18	------	------	------	C1e
12	Combine	0.291	2	474	4,366	7, 8, 9, 10, 11	------	------	C1 - Post Developed
14	SBUH Runoff	0.045	2	474	656	------	------	------	C2a
15	SBUH Runoff	0.004	2	480	57	------	------	------	C2c
16	SBUH Runoff	0.009	2	478	125	------	------	------	C2e
17	SBUH Runoff	0.013	2	474	191	------	------	------	C2d
18	Combine	0.070	2	474	1,029	14, 15, 16, 17	------	------	C2 - Post-Developed
20	Reservoir	0.029	2	524	371	12	100.70	422	Planter C1
21	Reservoir	0.291	2	476	4,366	12	100.81	283	Planter C1 - WQ

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.083	2	478	1,251	------	------	------	exCa
2	SBUH Runoff	0.058	2	478	869	------	------	------	exCb
3	SBUH Runoff	0.076	2	476	1,086	------	------	------	exCe
4	SBUH Runoff	0.191	2	474	2,800	------	------	------	exCd
5	Combine	0.406	2	476	6,006	1, 2, 3, 4	------	------	exC - Pre-Developed
7	SBUH Runoff	0.123	2	474	1,806	------	------	------	C1a
8	SBUH Runoff	0.005	2	480	135	------	------	------	C1b
9	SBUH Runoff	0.058	2	478	878	------	------	------	C1c
10	SBUH Runoff	0.176	2	474	2,568	------	------	------	C1d
11	SBUH Runoff	0.002	2	476	23	------	------	------	C1e
12	Combine	0.362	2	474	5,410	7, 8, 9, 10, 11	------	------	C1 - Post Developed
14	SBUH Runoff	0.054	2	474	795	------	------	------	C2a
15	SBUH Runoff	0.005	2	478	76	------	------	------	C2c
16	SBUH Runoff	0.011	2	476	162	------	------	------	C2e
17	SBUH Runoff	0.016	2	474	232	------	------	------	C2d
18	Combine	0.086	2	474	1,265	14, 15, 16, 17	------	------	C2 - Post-Developed
20	Reservoir	0.234	2	484	737	12	100.81	458	Planter C1
21	Reservoir	0.362	2	476	5,409	12	100.82	288	Planter C1 - WQ

Proposed Planter capable of conveying 100 Year storm flows

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

BASIN D PLANTERS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 11 - Planter D1

Pond Data

Contours -User defined Contour area (sqft) = 50.0 at 0.00 ft, Bottom clev = 97.25 ft, Depth = 2.74 ft, Volume = 100.99 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	200	0	0
0.27	97.52	200	10	10
0.55	97.80	200	10	20
0.82	98.07	200	10	30
1.10	98.35	200	10	39
1.37	98.62	200	10	49
1.64	98.89	200	10	59
1.92	99.17	200	10	69
2.19	99.44	200	10	79
2.47	99.72	200	10	89
2.74	99.99	200	10	99
2.75	100.00	200	2	101
3.00	100.25	200	50	151
3.25	100.50	200	50	201
3.50	100.75	200	50	251
3.58	100.83	200	16	267

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.00	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 5.700 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	10	97.52	0.00	0.00	---	---	0.00	---	---	---	0.026	---	0.026
0.55	20	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.026	---	0.029
0.82	30	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.040
1.10	39	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.026	---	0.046
1.37	49	98.62	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.026	---	0.050
1.64	59	98.89	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.026	---	0.054
1.92	69	99.17	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.026	---	0.057
2.19	79	99.44	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.026	---	0.060
2.47	89	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.026	---	0.063
2.74	99	99.99	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.026	---	0.065
2.75	101	100.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.026	---	0.065
3.00	151	100.25	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.026	---	0.068
3.25	201	100.50	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.026	---	0.070
3.50	251	100.75	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.026	---	0.072
3.58	267	100.83	0.40 ic	0.05 ic	---	---	0.35	---	---	---	0.026	---	0.427

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 5 - Planter D2

Pond Data

Contours -User defined Contour area = 40.0 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Compute vol. -Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 cuft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	160	0	0
0.27	97.52	160	8	8
0.55	97.80	160	8	16
0.82	98.07	160	8	24
1.10	98.35	160	8	32
1.37	98.62	160	8	39
1.64	98.89	160	8	47
1.92	99.17	160	8	55
2.19	99.44	160	8	63
2.47	99.72	160	8	71
2.74	99.99	160	8	79
2.75	100.00	140	1	80
3.25	100.50	140	70	150
3.50	100.75	140	35	185
3.58	100.83	140	11	197

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.10	0.00	0.00
Span (in)	= 12.00	1.10	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 5.700 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	8	97.52	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.55	16	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.021	---	0.024
0.82	24	98.07	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.021	---	0.038
1.10	32	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.021	---	0.045
1.37	39	98.62	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.021	---	0.050
1.64	47	98.89	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.021	---	0.054
1.92	55	99.17	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.021	---	0.058
2.19	63	99.44	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.021	---	0.062
2.47	71	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.021	---	0.065
2.74	79	99.99	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.021	---	0.068
2.75	80	100.00	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.021	---	0.068
3.25	150	100.50	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.021	---	0.073
3.50	185	100.75	0.06 ic	0.05 ic	---	---	0.00	---	---	---	0.021	---	0.076
3.58	197	100.83	0.42 ic	0.06 ic	---	---	0.35	---	---	---	0.021	---	0.431

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 7 - Planter D3

Pond Data

Contours -User defined contour areas. Conic method used for volume calculation. Begin at elevation, 97.25 ft

Top area -152 sqft, Side slope = 0.001 , Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 ft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	152	0	0
0.27	97.52	152	7	7
0.55	97.80	152	7	15
0.82	98.07	152	7	22
1.10	98.35	152	7	30
1.37	98.62	152	7	37
1.64	98.89	152	7	45
1.92	99.17	152	7	52
2.19	99.44	152	7	60
2.47	99.72	152	7	67
2.74	99.99	152	7	75
2.75	100.00	152	2	76
3.00	100.25	152	38	114
3.25	100.50	152	38	152
3.50	100.75	152	38	190
3.58	100.83	152	12	203

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.00	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 10.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	7	97.52	0.00	0.00	---	---	0.00	---	---	---	0.035	---	0.035
0.55	15	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.035	---	0.038
0.82	22	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.035	---	0.049
1.10	30	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.035	---	0.055
1.37	37	98.62	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.035	---	0.059
1.64	45	98.89	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.035	---	0.063
1.92	52	99.17	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.035	---	0.066
2.19	60	99.44	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.035	---	0.069
2.47	67	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.035	---	0.072
2.74	75	99.99	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.035	---	0.074
2.75	76	100.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.035	---	0.074
3.00	114	100.25	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.035	---	0.076
3.25	152	100.50	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.035	---	0.078
3.50	190	100.75	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.035	---	0.080
3.58	203	100.83	0.40 ic	0.05 ic	---	---	0.35	---	---	---	0.035	---	0.436

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 9 - Planter D4

Pond Data

Contours -User defined Contour area = 43.0 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Compute vol. -Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 cuft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	172	0	0
0.27	97.52	172	8	8
0.55	97.80	172	8	17
0.82	98.07	172	8	25
1.10	98.35	172	8	34
1.37	98.62	172	8	42
1.64	98.89	172	8	51
1.92	99.17	172	8	59
2.19	99.44	172	8	68
2.47	99.72	172	8	76
2.74	99.99	172	8	85
2.75	100.00	172	2	87
3.00	100.25	172	43	130
3.25	100.50	172	43	173
3.50	100.75	172	43	216
3.58	100.83	172	14	229

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.10	0.00	0.00
Span (in)	= 12.00	1.10	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 10.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	8	97.52	0.00	0.00	---	---	0.00	---	---	---	0.040	---	0.040
0.55	17	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.040	---	0.042
0.82	25	98.07	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.040	---	0.057
1.10	34	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.040	---	0.063
1.37	42	98.62	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.040	---	0.069
1.64	51	98.89	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.040	---	0.073
1.92	59	99.17	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.040	---	0.077
2.19	68	99.44	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.040	---	0.081
2.47	76	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.040	---	0.084
2.74	85	99.99	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.040	---	0.087
2.75	87	100.00	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.040	---	0.087
3.00	130	100.25	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.040	---	0.090
3.25	173	100.50	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.040	---	0.092
3.50	216	100.75	0.06 ic	0.05 ic	---	---	0.00	---	---	---	0.040	---	0.094
3.58	229	100.83	0.42 ic	0.06 ic	---	---	0.35	---	---	---	0.040	---	0.450

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	0.005	0.081	0.000	-------	-------	0.165	-------	0.216	exDa
2	SBUH Runoff	------	0.005	0.074	0.000	-------	-------	0.151	-------	0.197	exDb
3	SBUH Runoff	------	0.008	0.062	0.001	-------	-------	0.119	-------	0.151	exDe
4	SBUH Runoff	------	0.069	0.201	0.027	-------	-------	0.315	-------	0.380	exDd (Overlay)
5	Combine	1, 2, 3, 4	0.085	0.416	0.027	-------	-------	0.748	-------	0.943	exD - Pre-Developed
7	SBUH Runoff	------	0.010	0.028	0.004	-------	-------	0.044	-------	0.053	D1a
8	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.006	-------	0.009	D1b
9	SBUH Runoff	------	0.001	0.020	0.000	-------	-------	0.041	-------	0.053	D1c
10	SBUH Runoff	------	0.017	0.051	0.007	-------	-------	0.080	-------	0.096	D1d
11	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.003	-------	0.004	D1e
12	Combine	7, 8, 9, 10, 11	0.028	0.102	0.011	-------	-------	0.174	-------	0.216	D1 - Post Developed
14	SBUH Runoff	------	0.009	0.026	0.003	-------	-------	0.040	-------	0.049	D2a
15	SBUH Runoff	------	0.000	0.001	0.000	-------	-------	0.006	-------	0.009	D2b
16	SBUH Runoff	------	0.001	0.018	0.000	-------	-------	0.036	-------	0.048	D2c
17	SBUH Runoff	------	0.015	0.045	0.006	-------	-------	0.071	-------	0.085	D2d
18	Combine	14, 15, 16, 17	0.025	0.089	0.009	-------	-------	0.152	-------	0.189	D2 - Post-Developed
20	SBUH Runoff	------	0.010	0.028	0.004	-------	-------	0.044	-------	0.053	D3a
21	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.001	-------	0.003	D3b
22	SBUH Runoff	------	0.001	0.020	0.000	-------	-------	0.042	-------	0.054	D3c
23	SBUH Runoff	------	0.017	0.050	0.007	-------	-------	0.079	-------	0.095	D3d
24	Combine	20, 21, 22, 23	0.028	0.099	0.010	-------	-------	0.165	-------	0.205	D3 - Post-Developed
26	SBUH Runoff	------	0.014	0.042	0.006	-------	-------	0.066	-------	0.079	D4a
27	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.001	-------	0.003	D4b
28	SBUH Runoff	------	0.001	0.021	0.000	-------	-------	0.043	-------	0.056	D4c
29	SBUH Runoff	------	0.019	0.055	0.007	-------	-------	0.086	-------	0.103	D4d
30	Combine	26, 27, 28, 29	0.034	0.117	0.013	-------	-------	0.194	-------	0.241	D4 - Post-Developed
32	SBUH Runoff	------	0.012	0.035	0.005	-------	-------	0.055	-------	0.066	D5a
33	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.000	-------	0.001	D5b
34	SBUH Runoff	------	0.001	0.010	0.000	-------	-------	0.019	-------	0.024	D5e
35	Combine	32, 33, 34	0.013	0.045	0.005	-------	-------	0.073	-------	0.091	D5 - Post-Developed
37	Reservoir	12	0.000	0.039	0.000	-------	-------	0.060	-------	0.192	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
38	Reservoir	18	0.000	0.044	0.000	-------	-------	0.058	-------	0.189	Planter D2
39	Reservoir	24	0.000	0.036	0.000	-------	-------	0.050	-------	0.181	Planter D3
40	Reservoir	30	0.000	0.046	0.000	-------	-------	0.081	-------	0.216	Planter D4
42	Reservoir	12	0.026	0.067	0.010	-------	-------	0.173	-------	0.215	Planter D1 - WQ Design
43	Reservoir	18	0.022	0.081	0.009	-------	-------	0.152	-------	0.189	Planter D2 - WQ Design
44	Reservoir	24	0.021	0.107	0.010	-------	-------	0.165	-------	0.205	Planter D3 - WQ Design
45	Reservoir	30	0.024	0.122	0.012	-------	-------	0.194	-------	0.241	Planter D4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.005	2	482	186	------	------	------	exDa
2	SBUH Runoff	0.005	2	482	169	------	------	------	exDb
3	SBUH Runoff	0.008	2	480	170	------	------	------	exDe
4	SBUH Runoff	0.069	2	474	962	------	------	------	exDd (Overlay)
5	Combine	0.085	2	480	1,486	1, 2, 3, 4	------	------	exD - Pre-Developed
7	SBUH Runoff	0.010	2	474	135	------	------	------	D1a
8	SBUH Runoff	0.000	2	1436	1	------	------	------	D1b
9	SBUH Runoff	0.001	2	482	46	------	------	------	D1c
10	SBUH Runoff	0.017	2	474	244	------	------	------	D1d
11	SBUH Runoff	0.000	2	480	4	------	------	------	D1e
12	Combine	0.028	2	476	430	7, 8, 9, 10, 11	------	------	D1 - Post Developed
14	SBUH Runoff	0.009	2	474	123	------	------	------	D2a
15	SBUH Runoff	0.000	2	1436	1	------	------	------	D2b
16	SBUH Runoff	0.001	2	482	41	------	------	------	D2c
17	SBUH Runoff	0.015	2	474	215	------	------	------	D2d
18	Combine	0.025	2	476	380	14, 15, 16, 17	------	------	D2 - Post-Developed
20	SBUH Runoff	0.010	2	474	135	------	------	------	D3a
21	SBUH Runoff	0.000	2	n/a	0	------	------	------	D3b
22	SBUH Runoff	0.001	2	482	47	------	------	------	D3c
23	SBUH Runoff	0.017	2	474	241	------	------	------	D3d
24	Combine	0.028	2	476	423	20, 21, 22, 23	------	------	D3 - Post-Developed
26	SBUH Runoff	0.014	2	474	201	------	------	------	D4a
27	SBUH Runoff	0.000	2	n/a	0	------	------	------	D4b
28	SBUH Runoff	0.001	2	482	48	------	------	------	D4c
29	SBUH Runoff	0.019	2	474	261	------	------	------	D4d
30	Combine	0.034	2	476	510	26, 27, 28, 29	------	------	D4 - Post-Developed
32	SBUH Runoff	0.012	2	474	167	------	------	------	D5a
33	SBUH Runoff	0.000	2	n/a	0	------	------	------	D5b
34	SBUH Runoff	0.001	2	480	27	------	------	------	D5e
35	Combine	0.013	2	476	193	32, 33, 34	------	------	D5 - Post-Developed
37	Reservoir	0.000	2	486	0	12	97.52	10.5	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.000	2	460	0	18	97.52	10.8	Planter D2
39	Reservoir	0.000	2	448	0	24	97.47	5.89	Planter D3
40	Reservoir	0.000	2	630	0	30	97.48	7.19	Planter D4
42	Reservoir	0.026	2	482	429	12	100.08	15.5	Planter D1 - WQ Design
43	Reservoir	0.022	2	478	380	18	100.08	14.0	Planter D2 - WQ Design
44	Reservoir	0.021	2	476	422	24	100.10	18.0	Planter D3 - WQ Design
45	Reservoir	0.024	2	468	510	30	100.08	24.3	Planter D4 - WQ Design

WQ planter will fully infiltrate through 18 inch soil media without reaching overflow

Proposed Planter can fully infiltrate WQ storm runoff

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

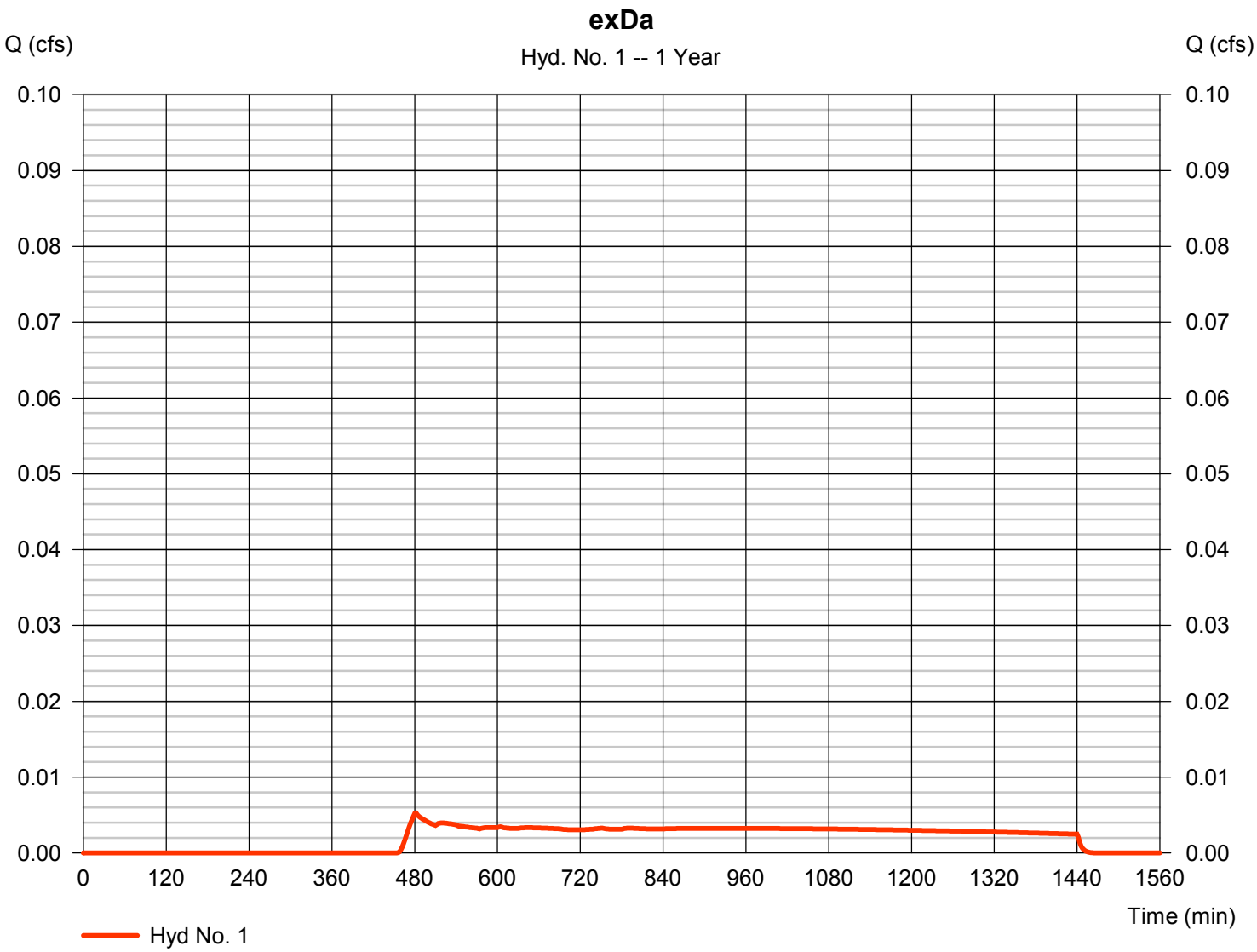
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 1

exDa

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 186 cuft
Drainage area	= 0.259 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



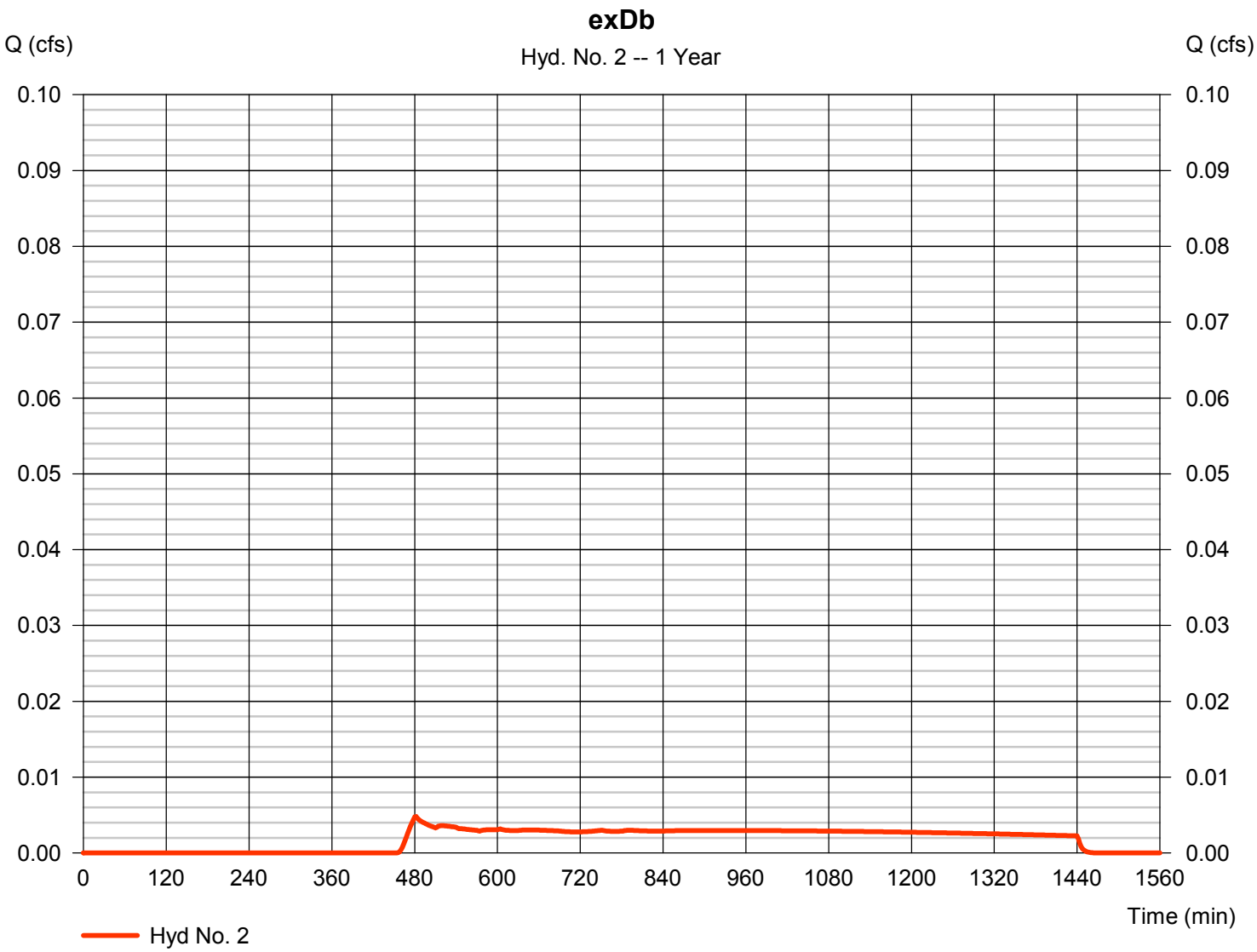
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 2

exDb

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 169 cuft
Drainage area	= 0.236 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



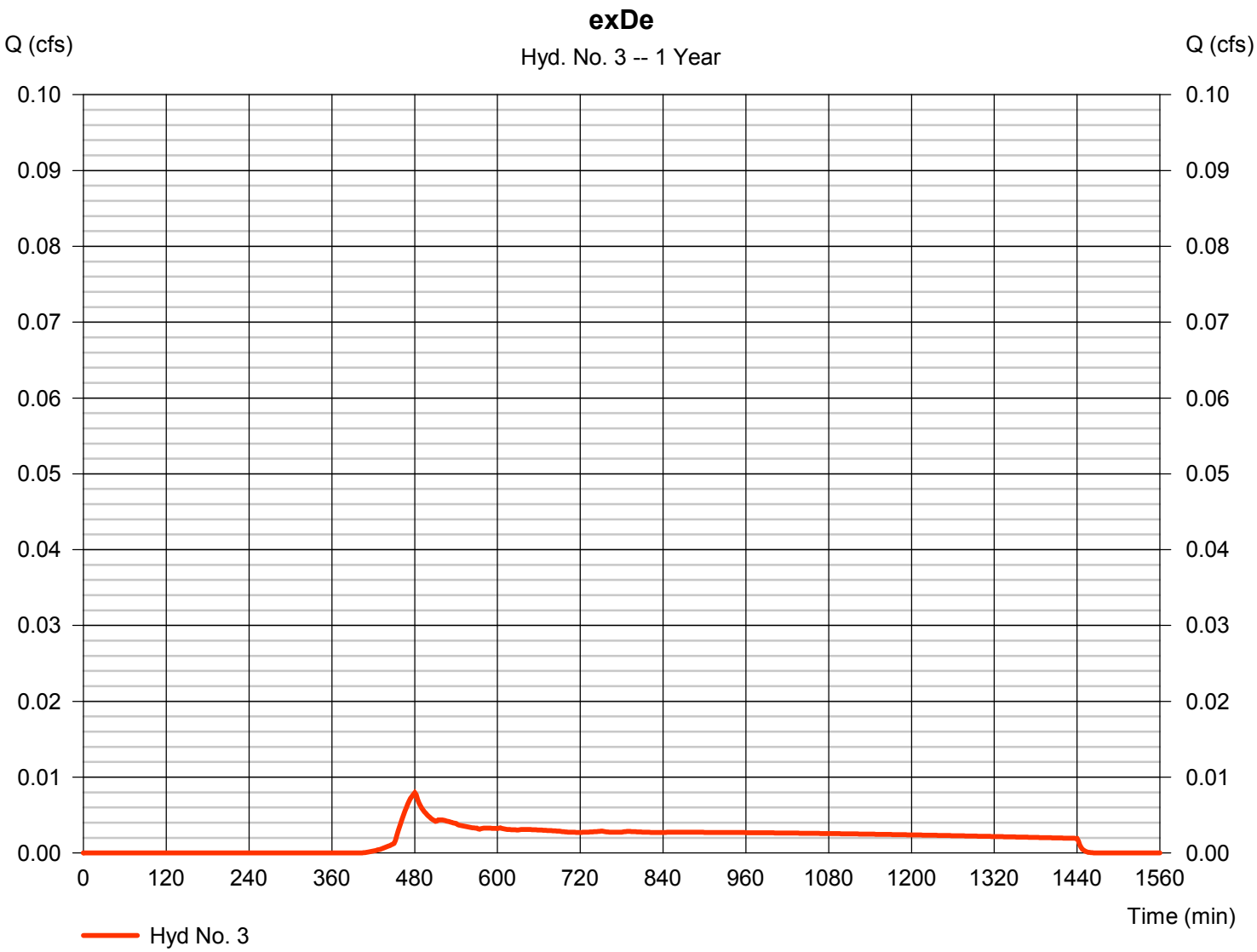
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 3

exDe

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 170 cuft
Drainage area	= 0.164 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



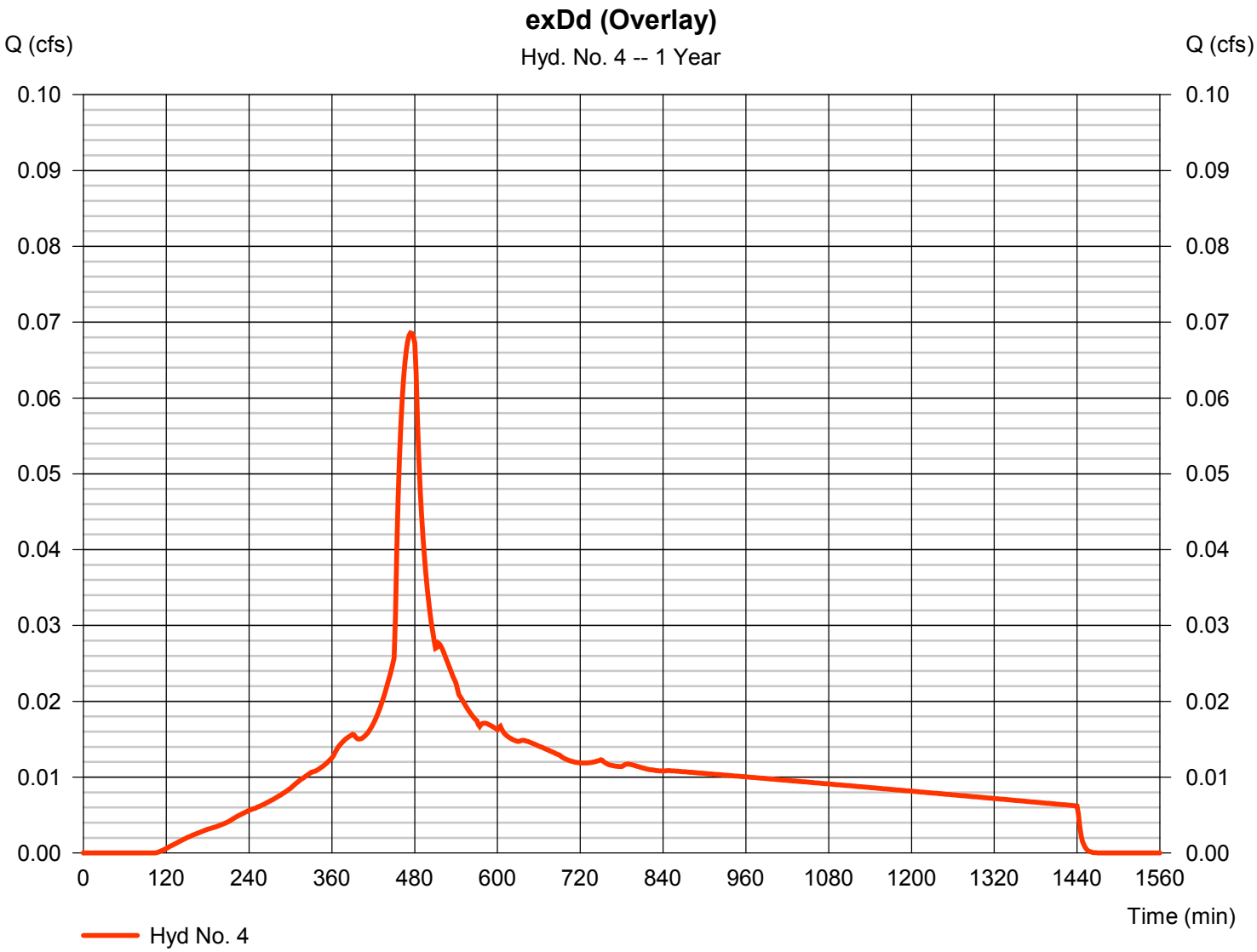
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 4

exDd (Overlay)

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.069 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 962 cuft
Drainage area	= 0.335 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



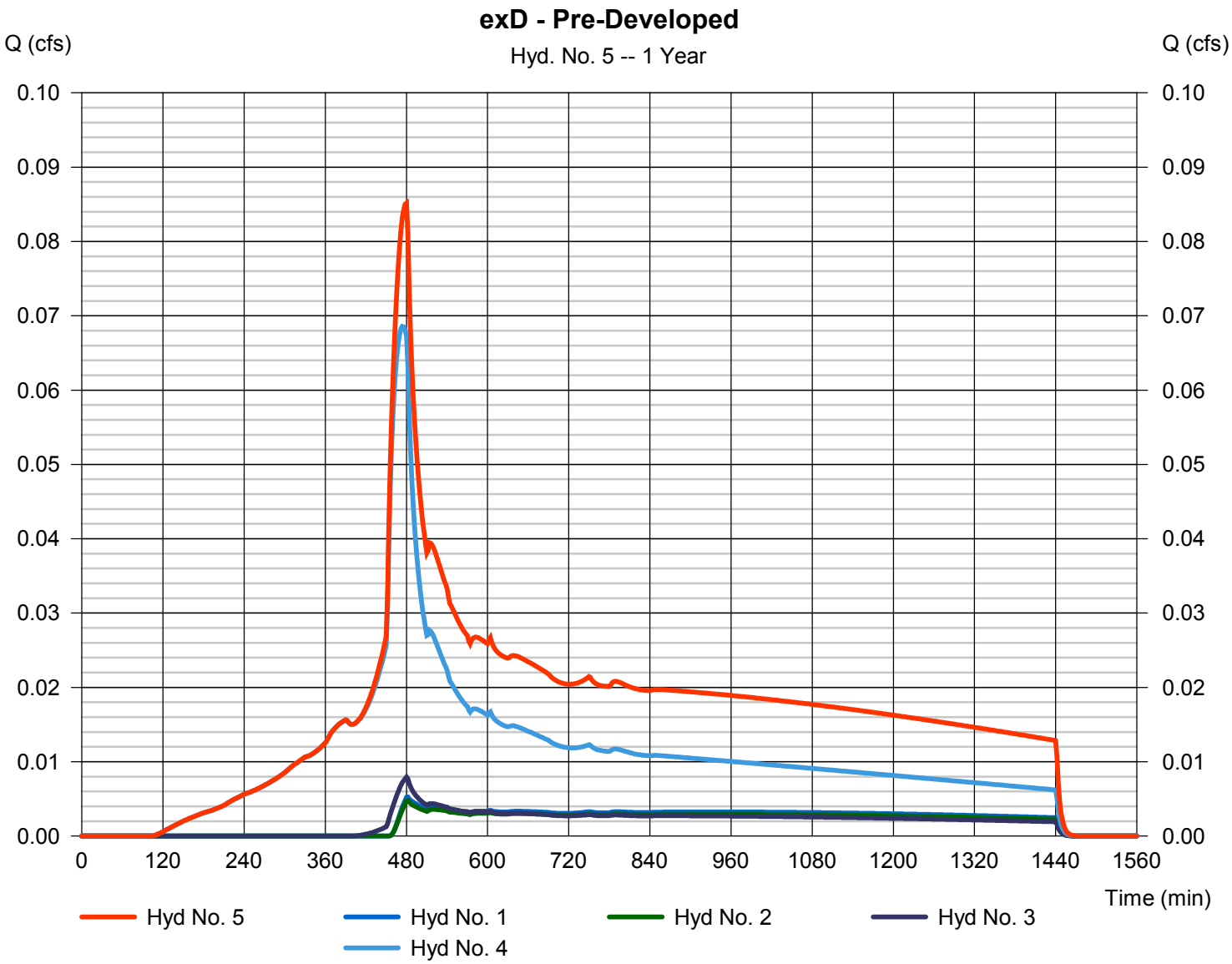
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 5

exD - Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 0.085 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 1,486 cuft
Inflow hyds.	= 1, 2, 3, 4	Contrib. drain. area	= 0.994 ac



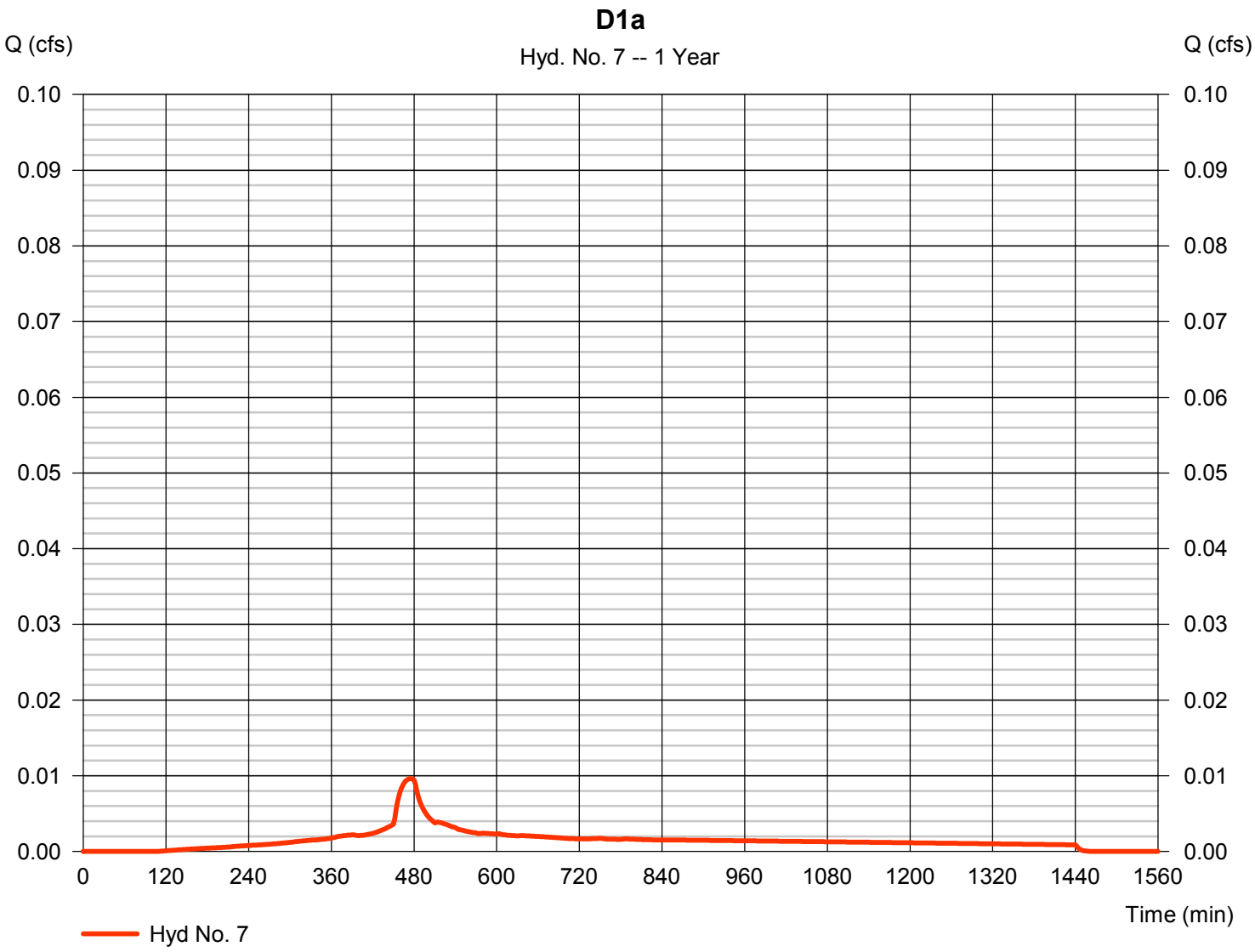
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 7

D1a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 135 cuft
Drainage area	= 0.047 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



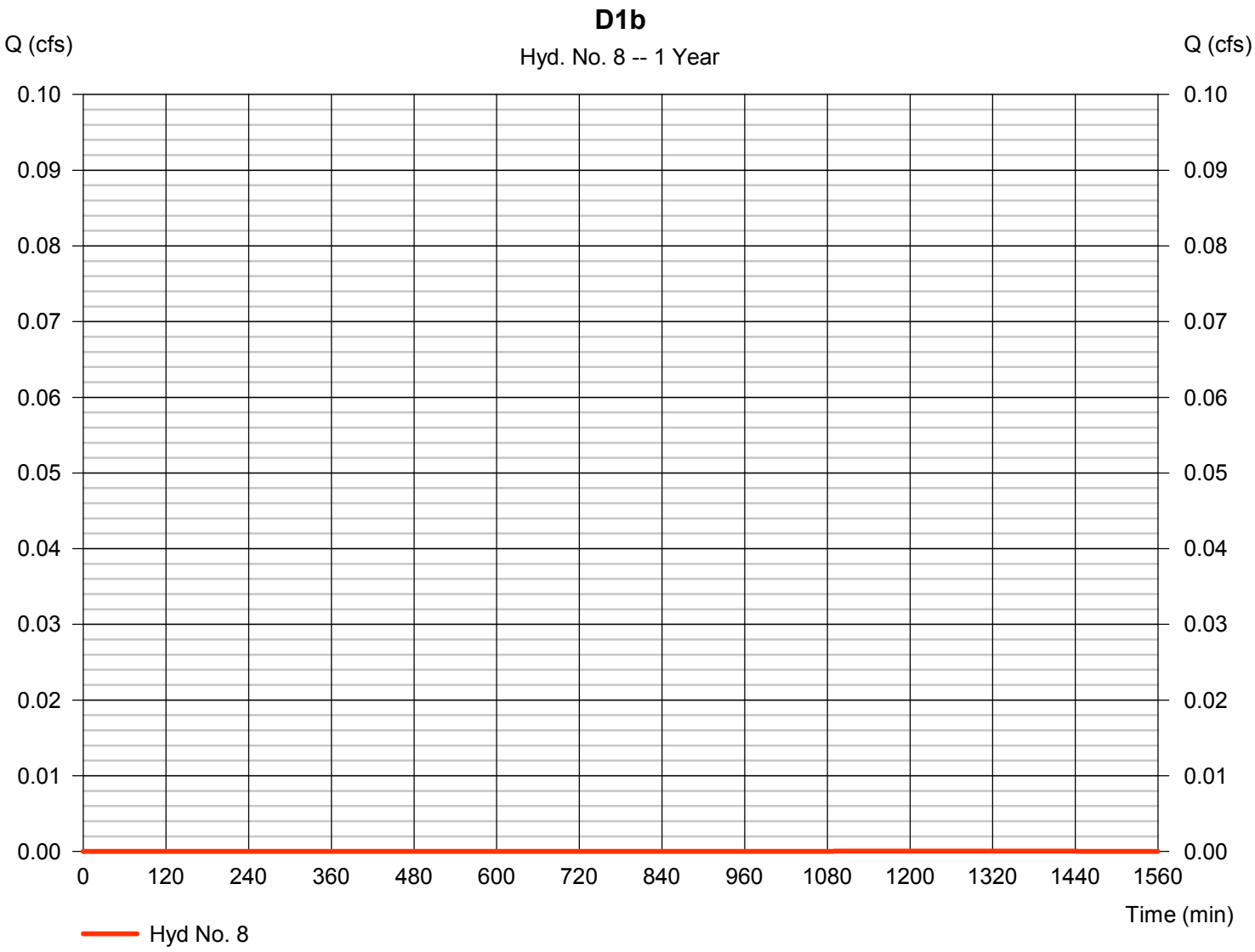
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 8

D1b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.021 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



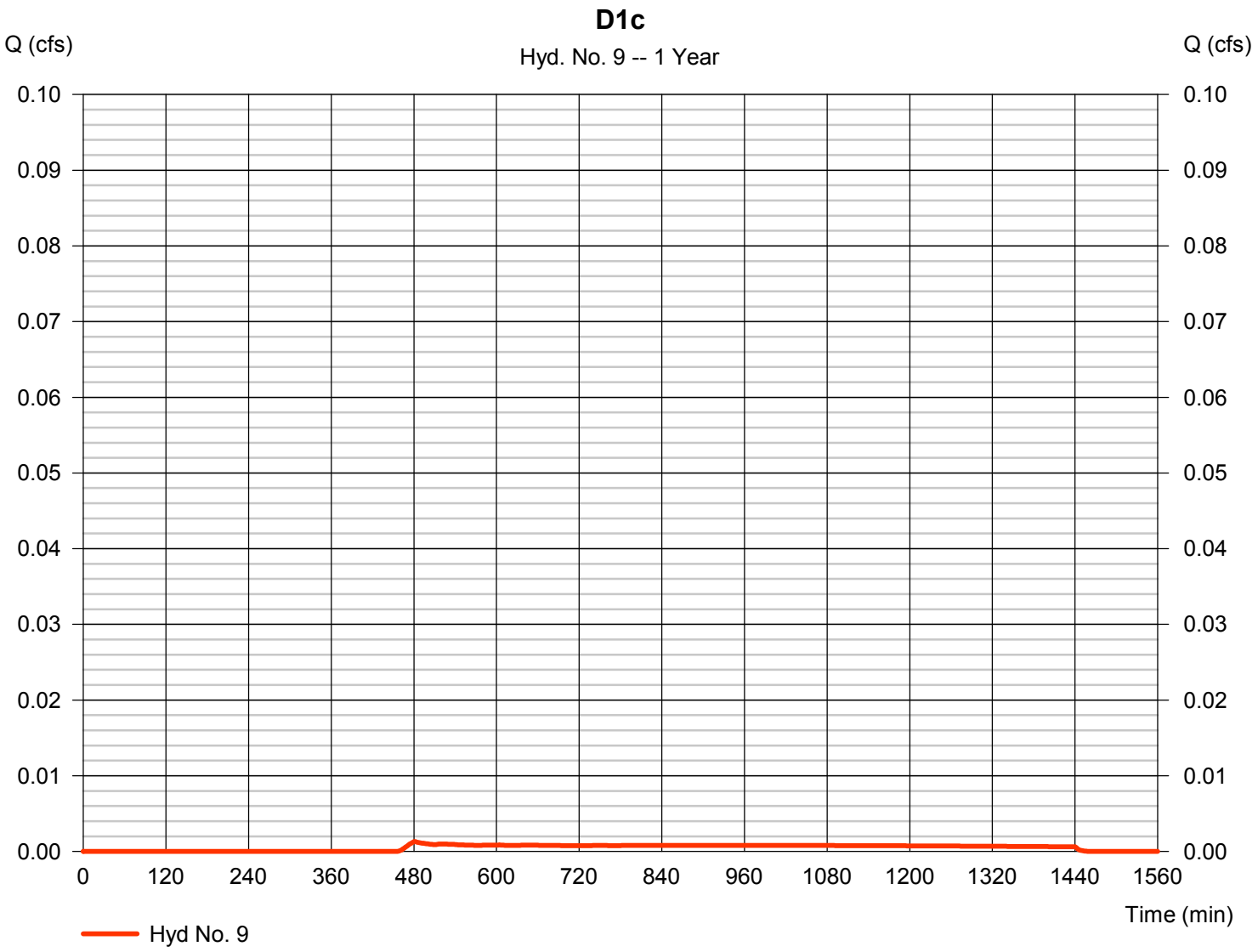
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 9

D1c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 46 cuft
Drainage area	= 0.064 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



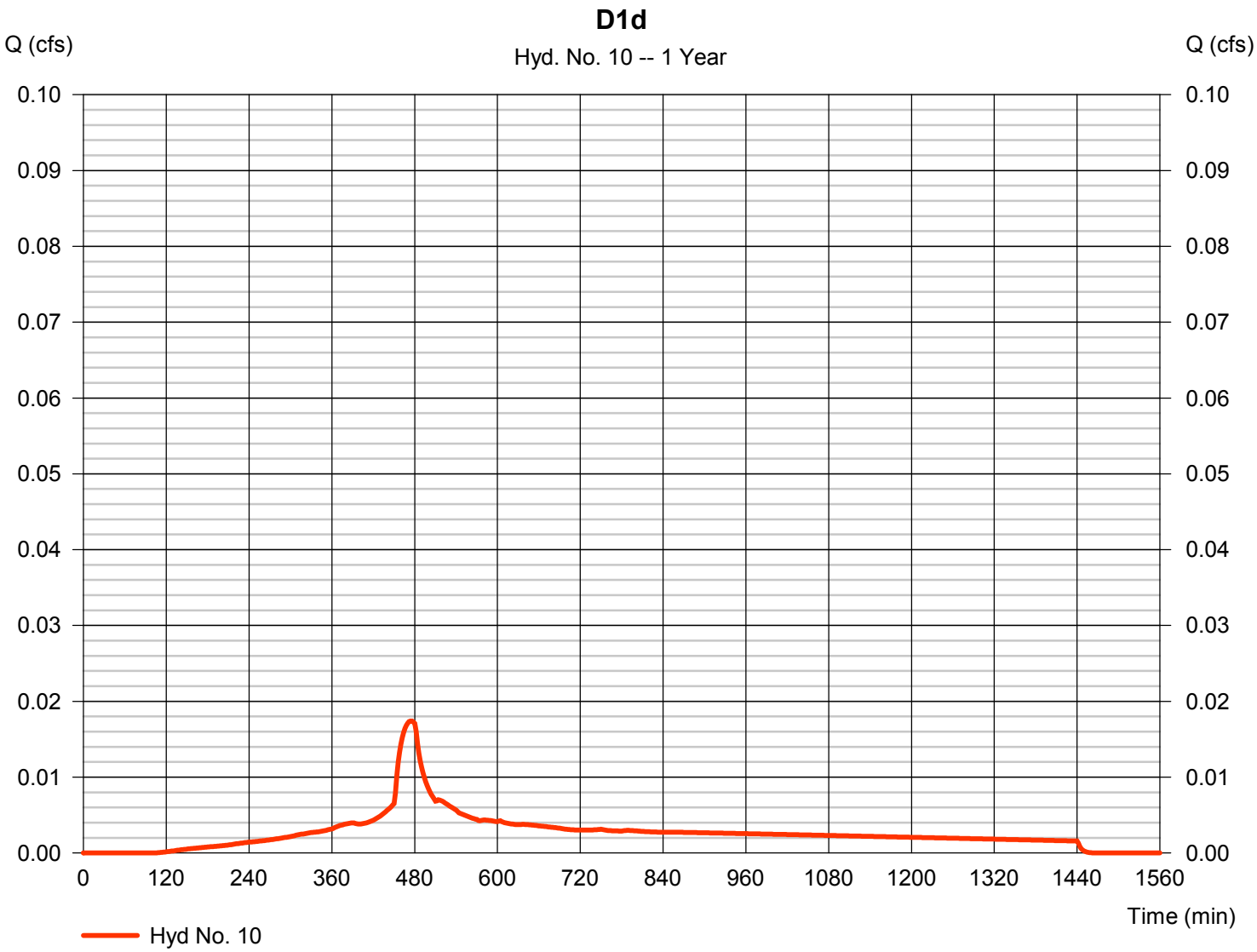
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 10

D1d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.017 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 244 cuft
Drainage area	= 0.085 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



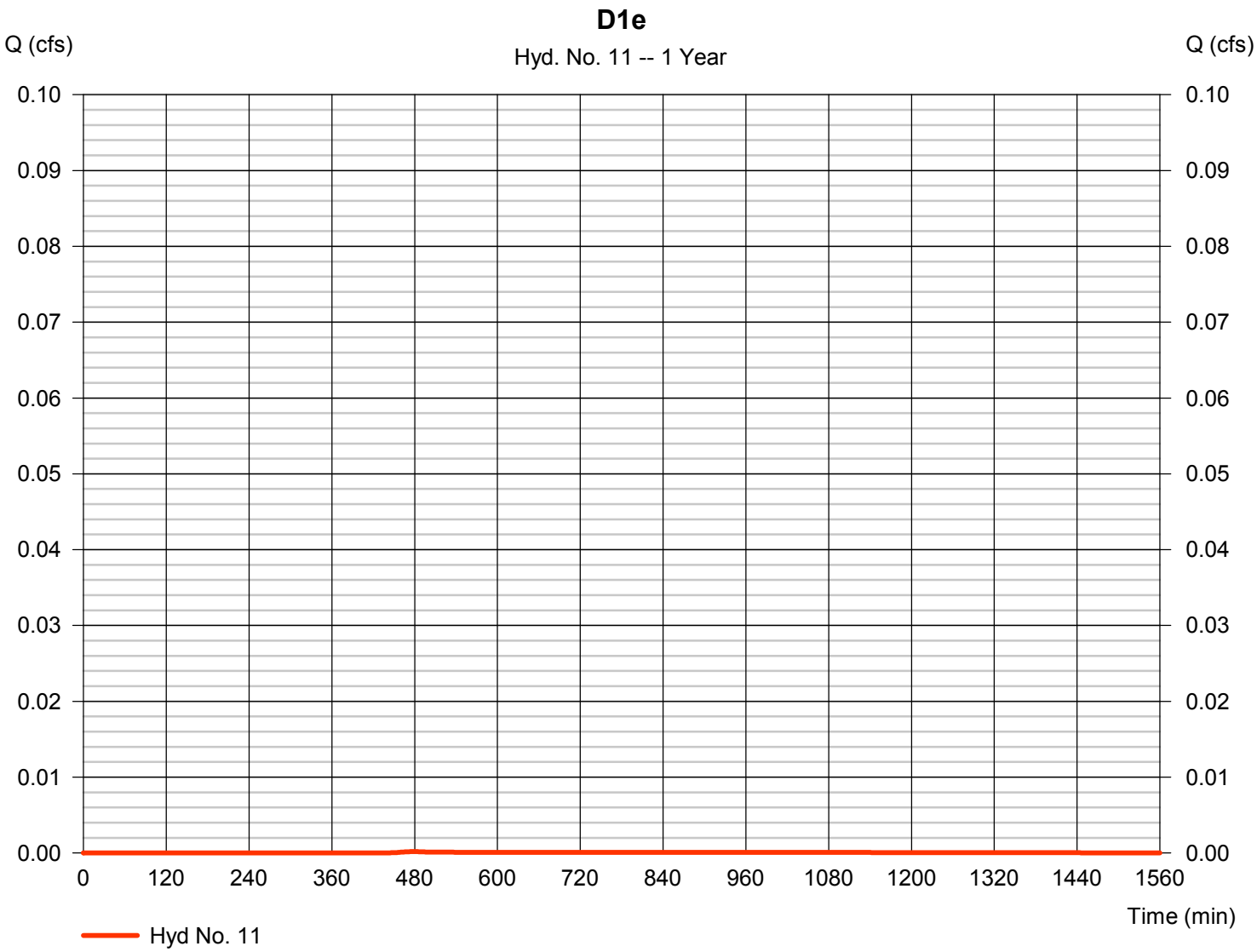
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 11

D1e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 4 cuft
Drainage area	= 0.004 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



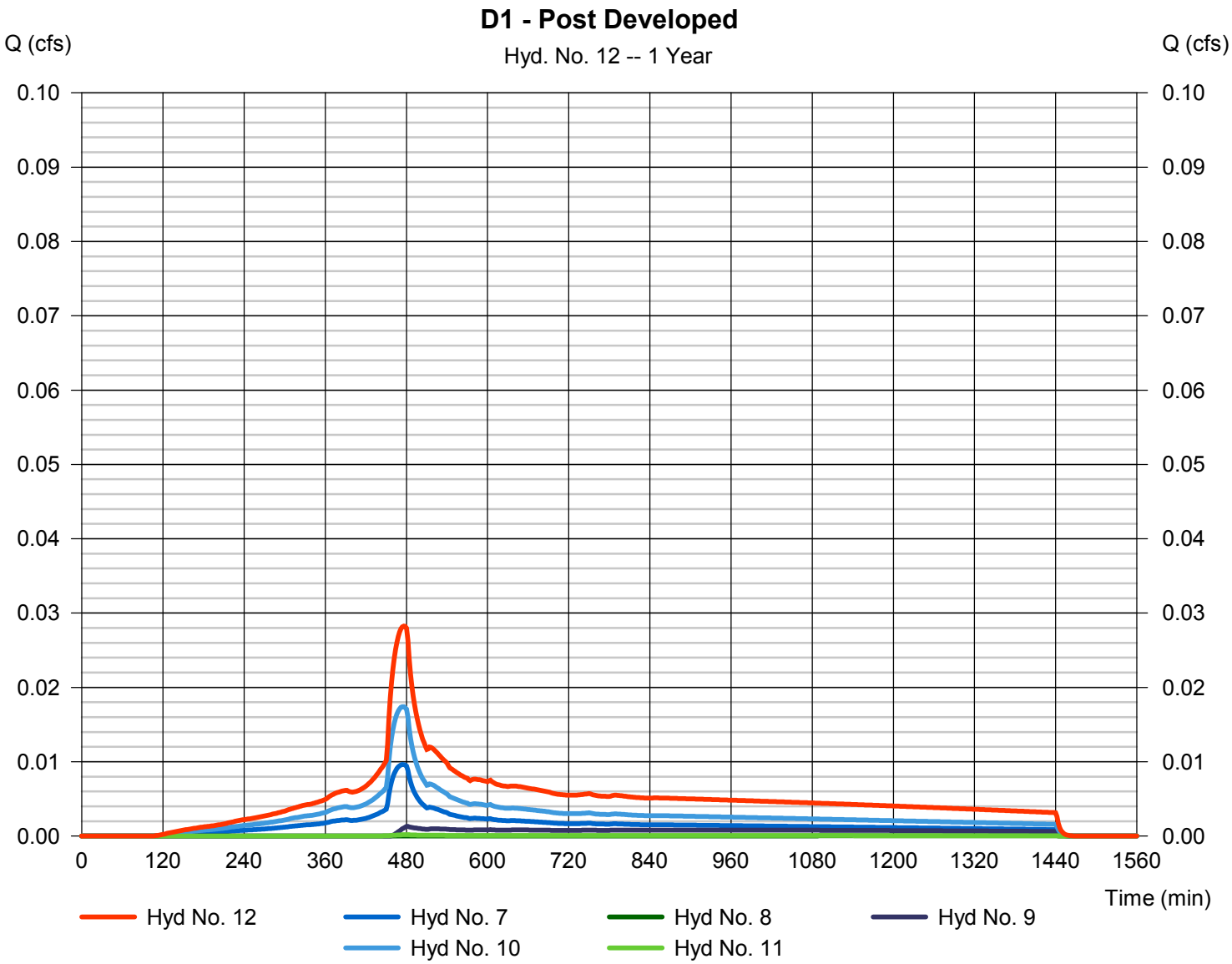
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 12

D1 - Post Developed

Hydrograph type	= Combine	Peak discharge	= 0.028 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 430 cuft
Inflow hyds.	= 7, 8, 9, 10, 11	Contrib. drain. area	= 0.221 ac



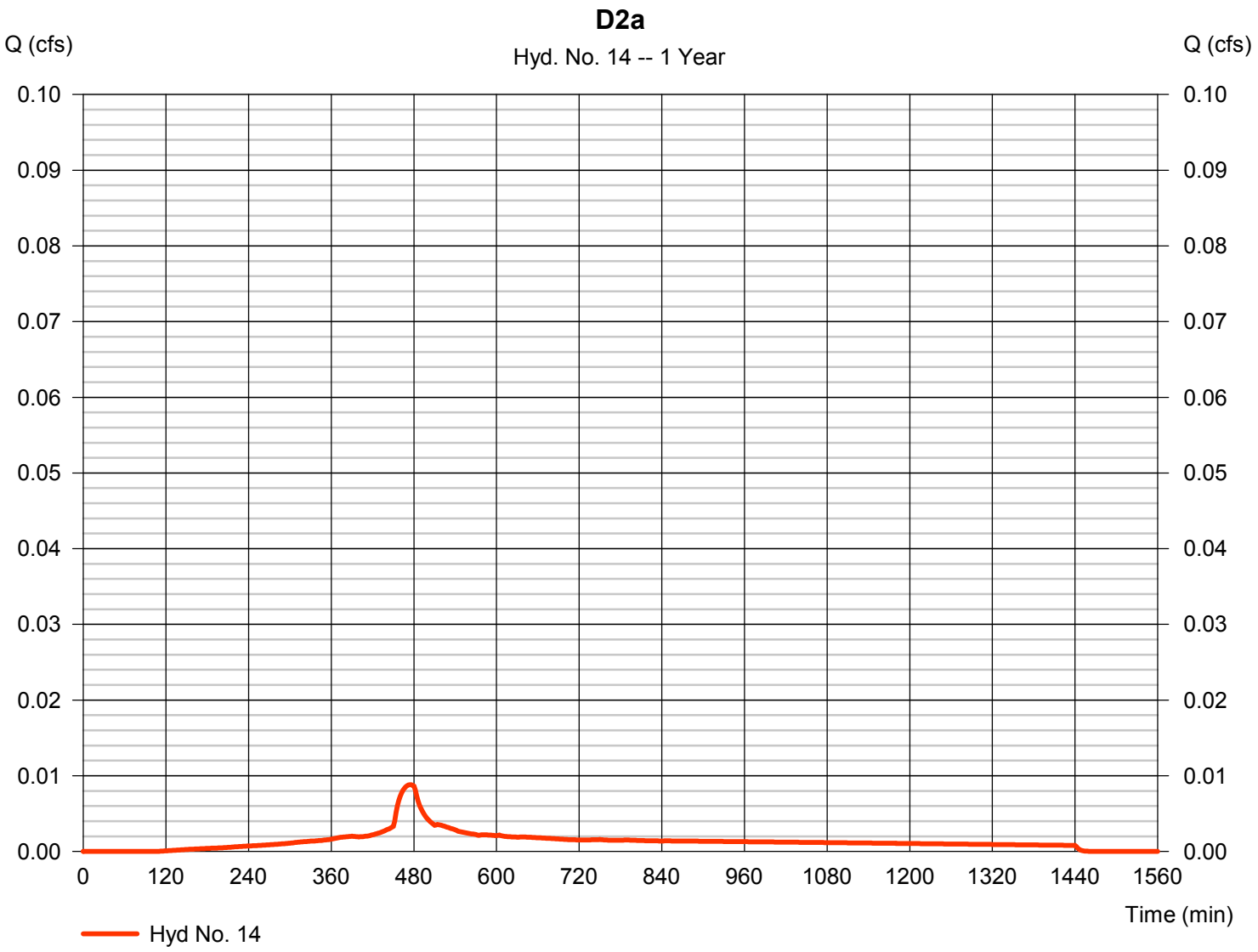
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 14

D2a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 123 cuft
Drainage area	= 0.043 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



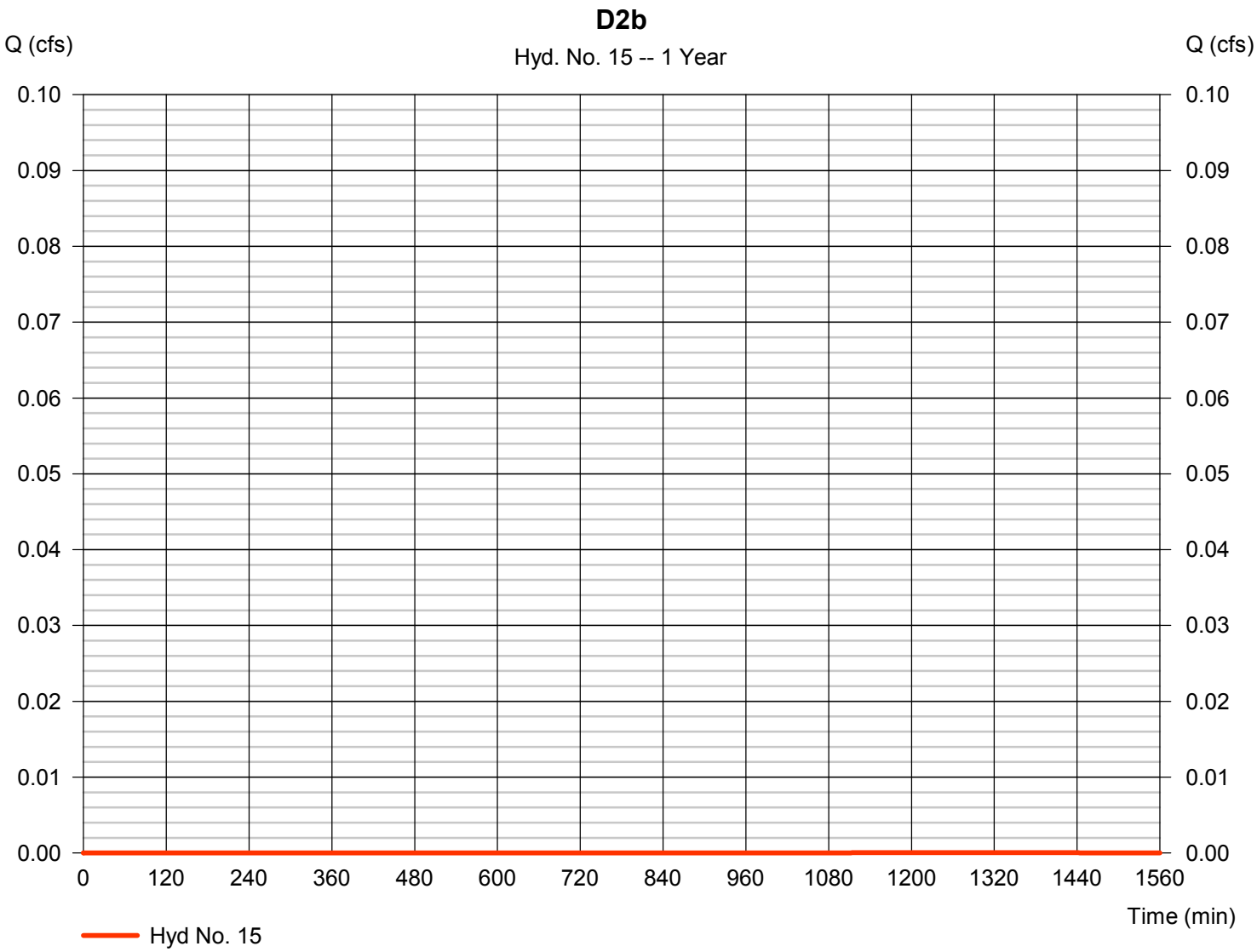
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 15

D2b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.019 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



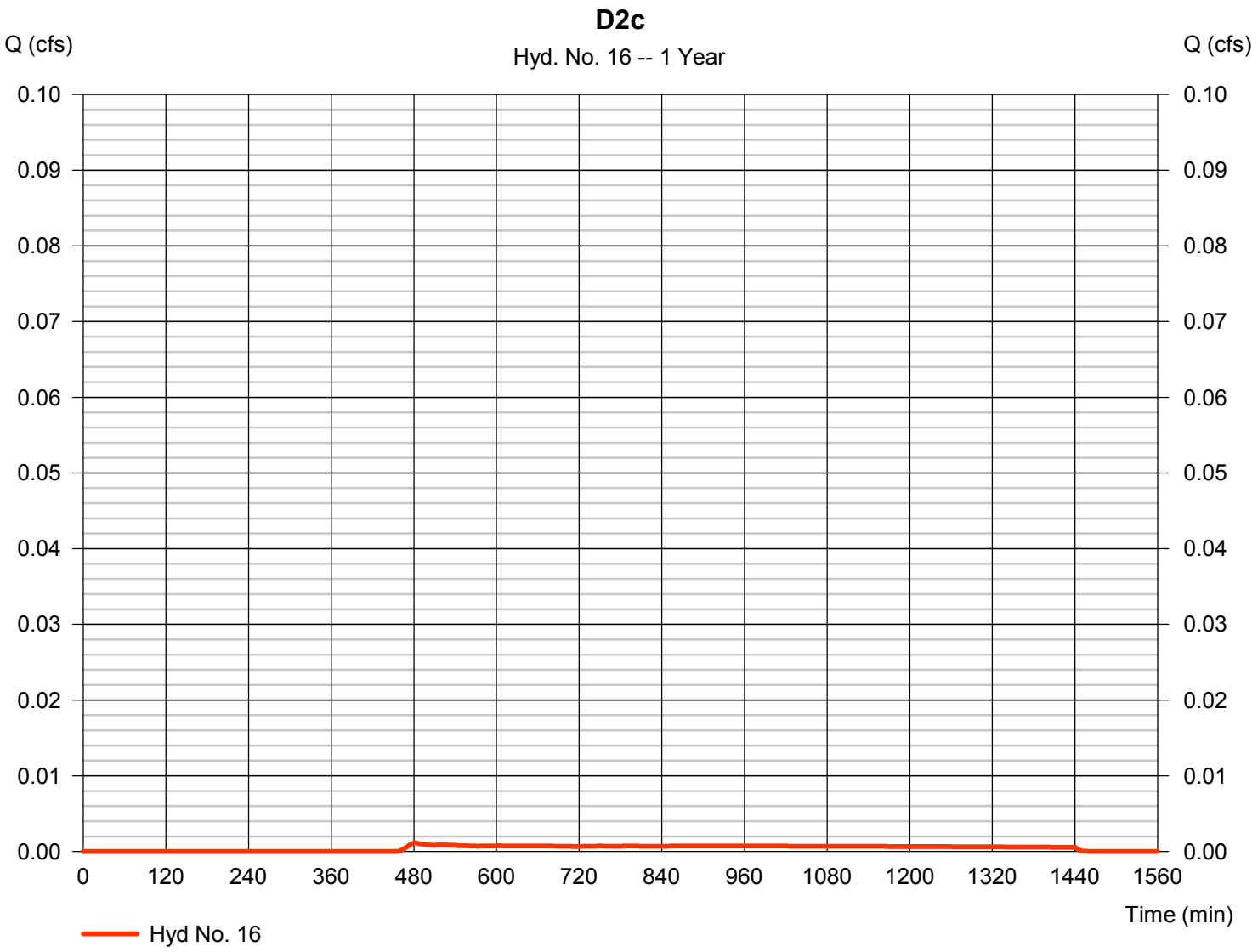
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 16

D2c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 41 cuft
Drainage area	= 0.057 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



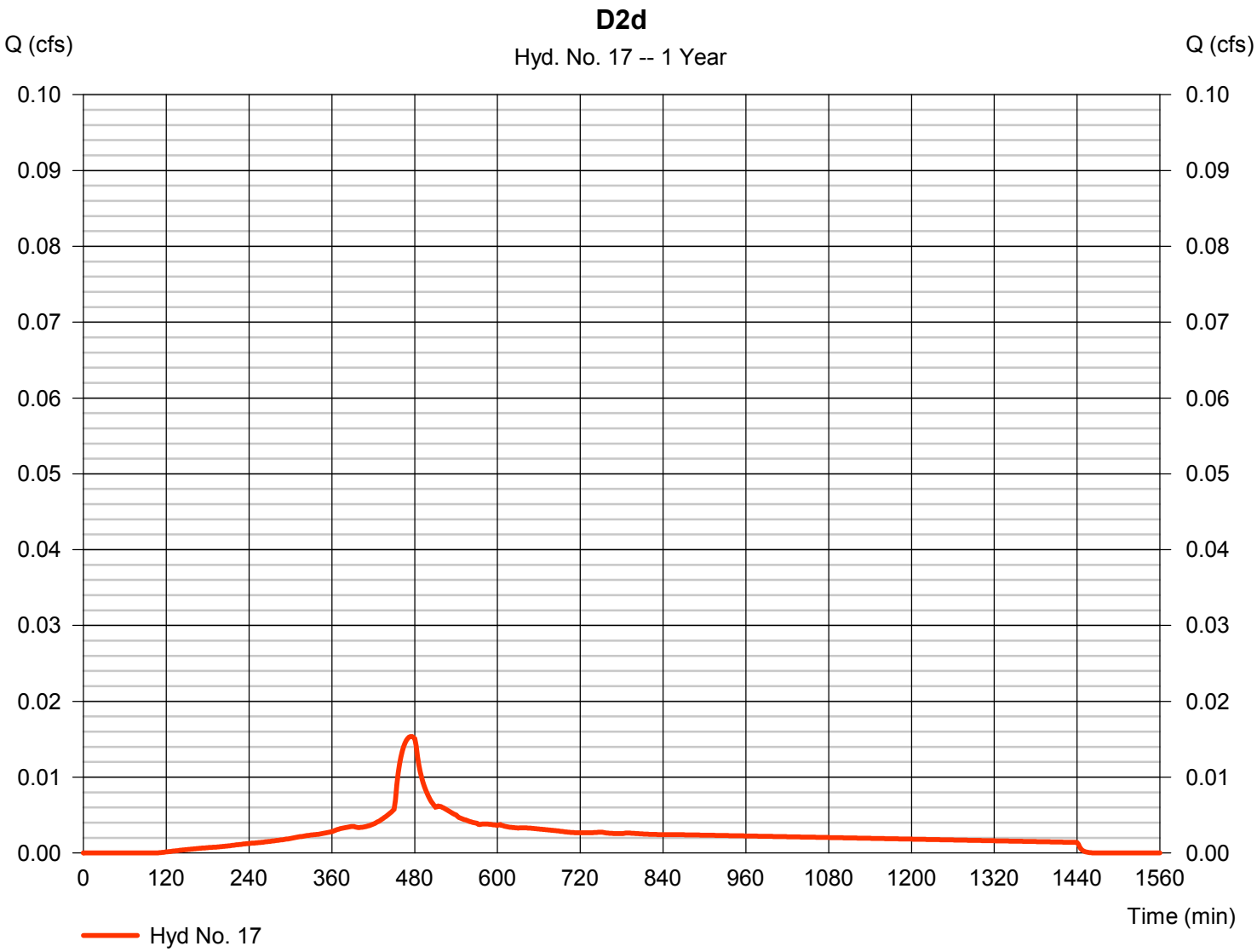
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 17

D2d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 215 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



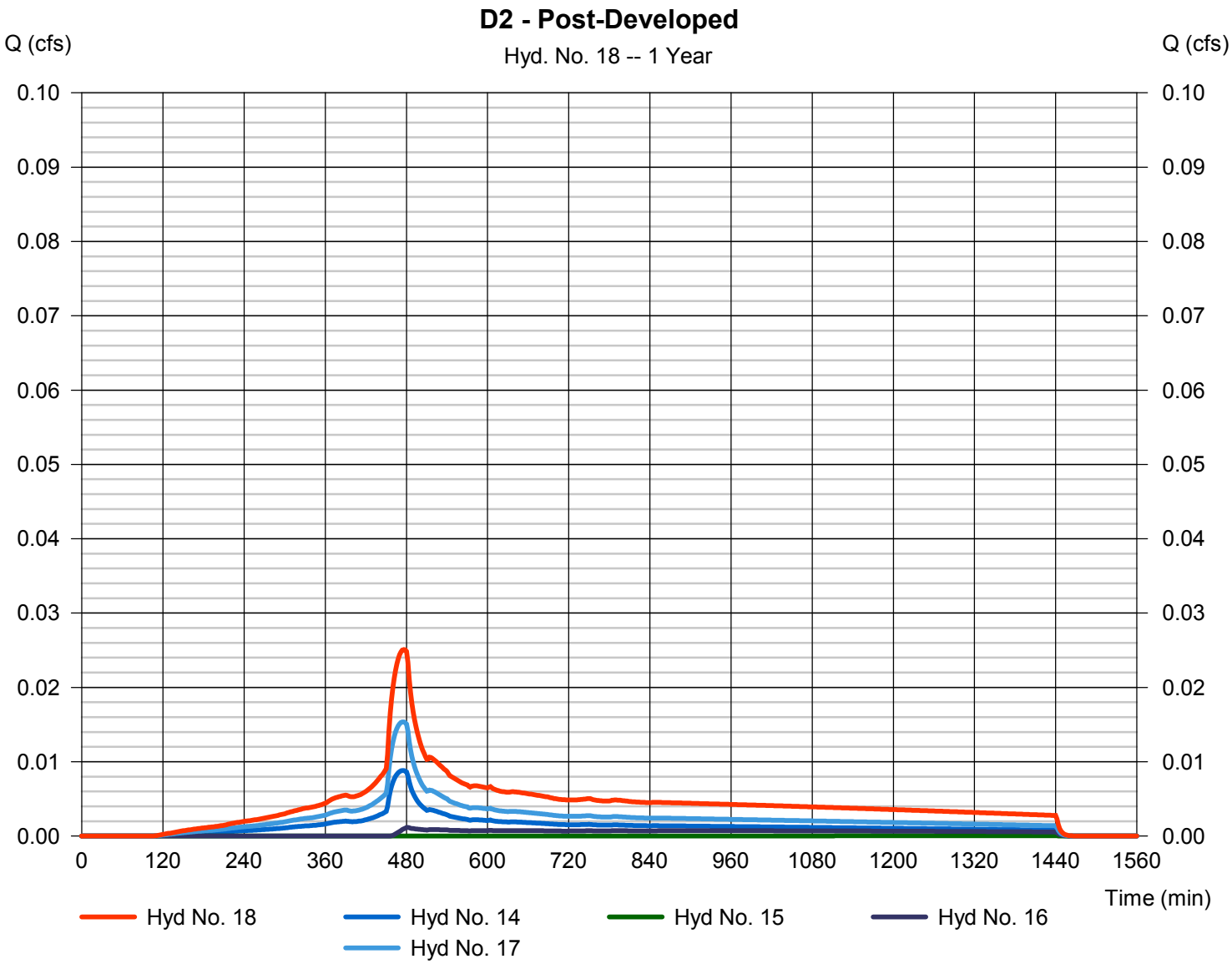
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 18

D2 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.025 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 380 cuft
Inflow hyds.	= 14, 15, 16, 17	Contrib. drain. area	= 0.194 ac



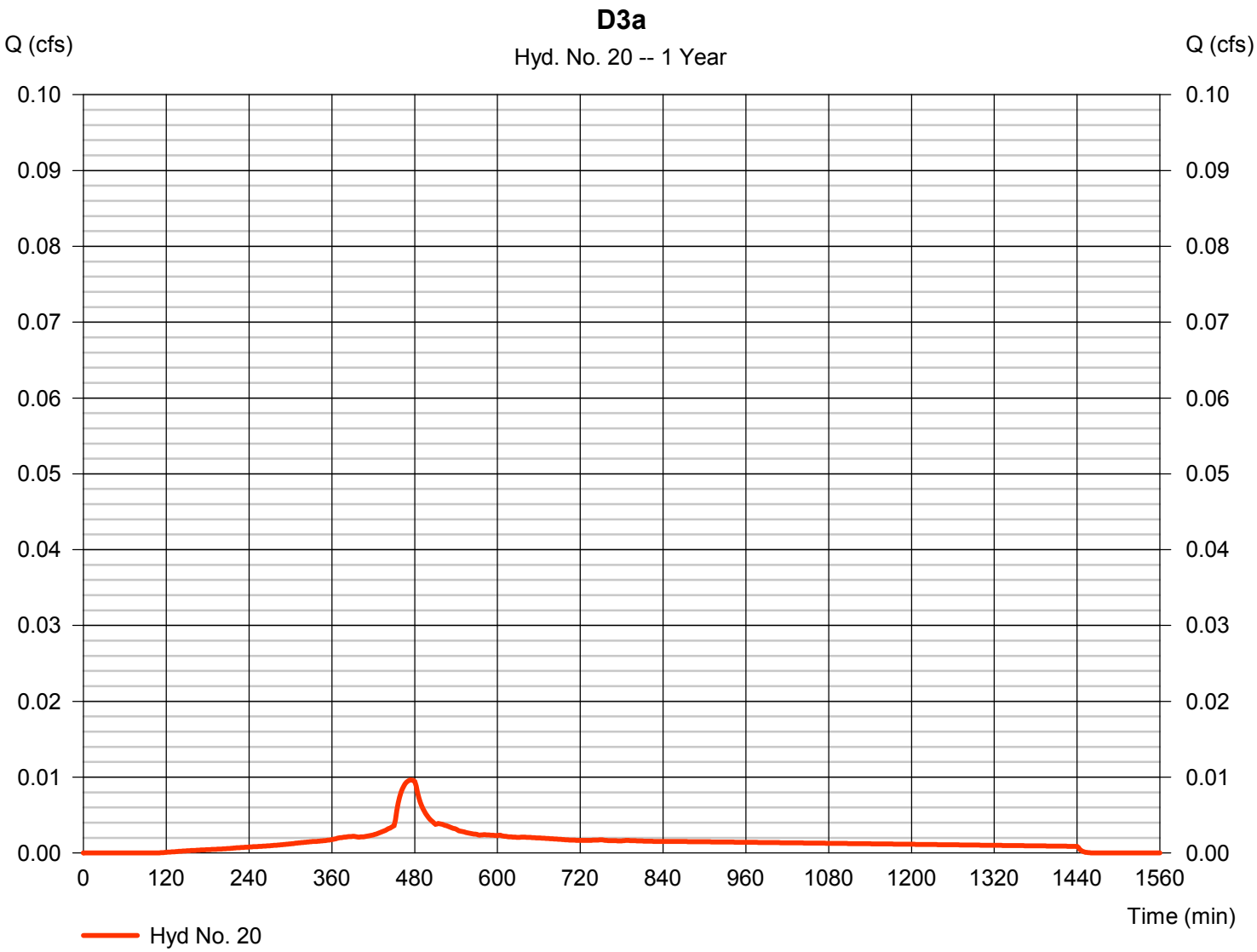
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 20

D3a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 135 cuft
Drainage area	= 0.047 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



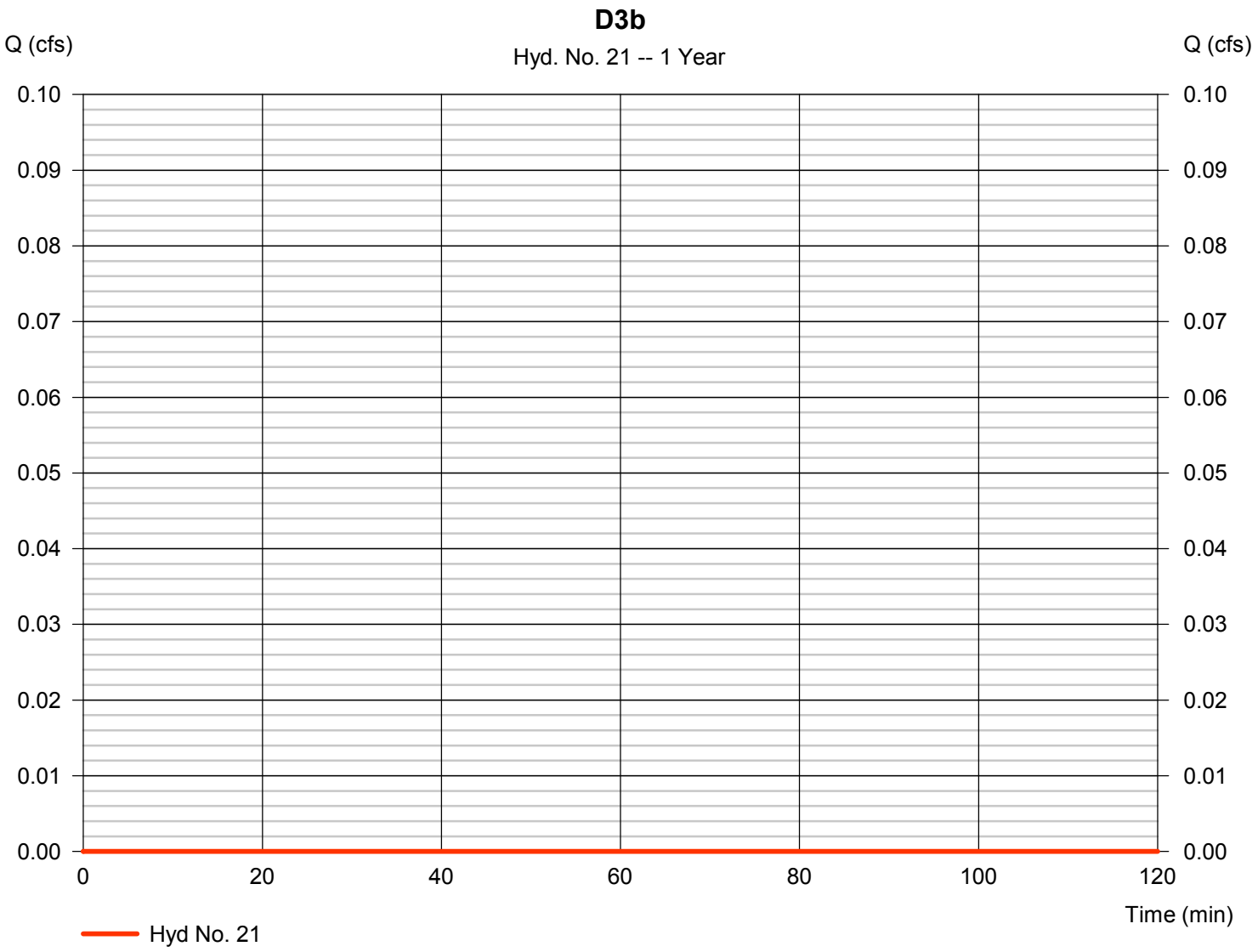
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 21

D3b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.019 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



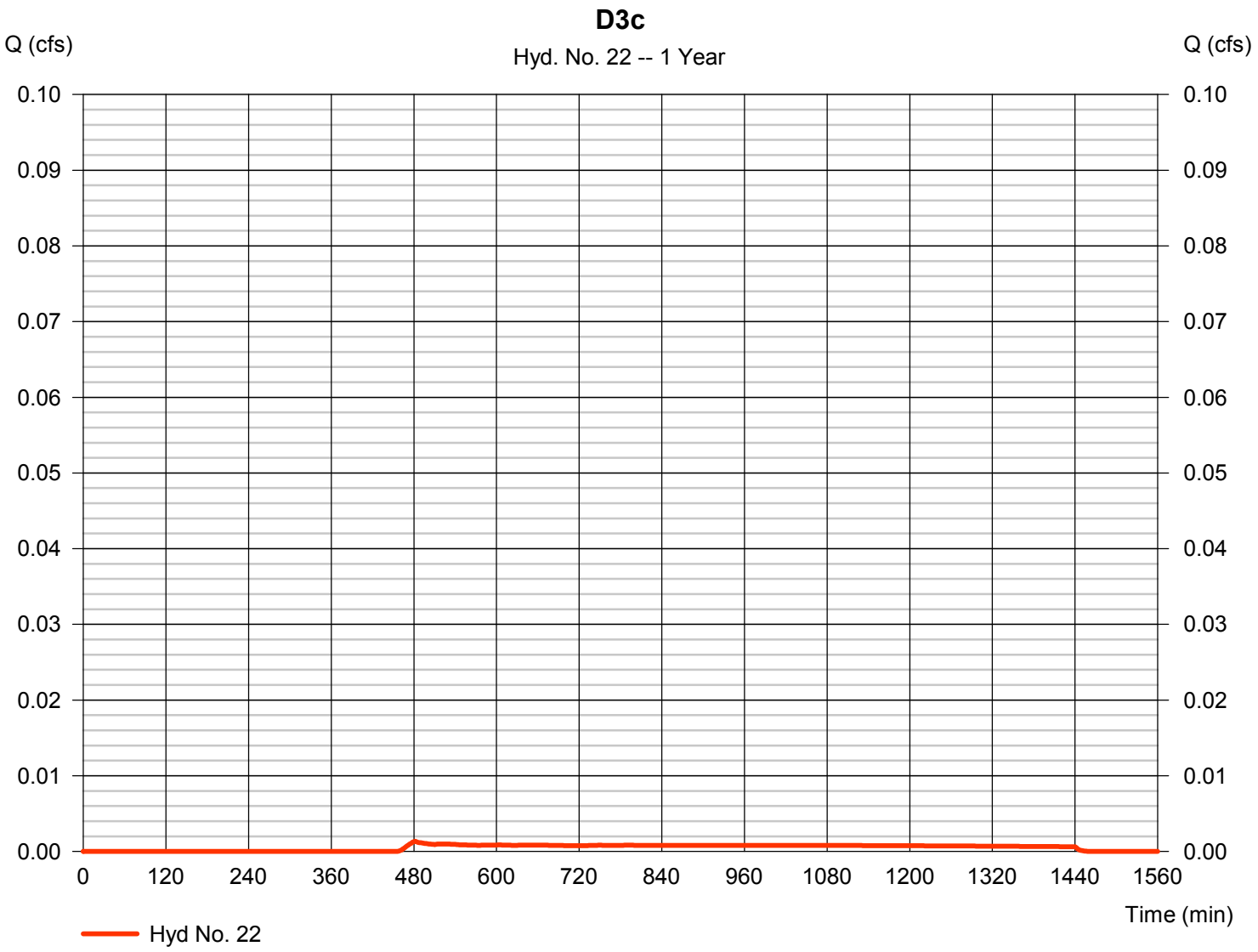
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 22

D3c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 47 cuft
Drainage area	= 0.065 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



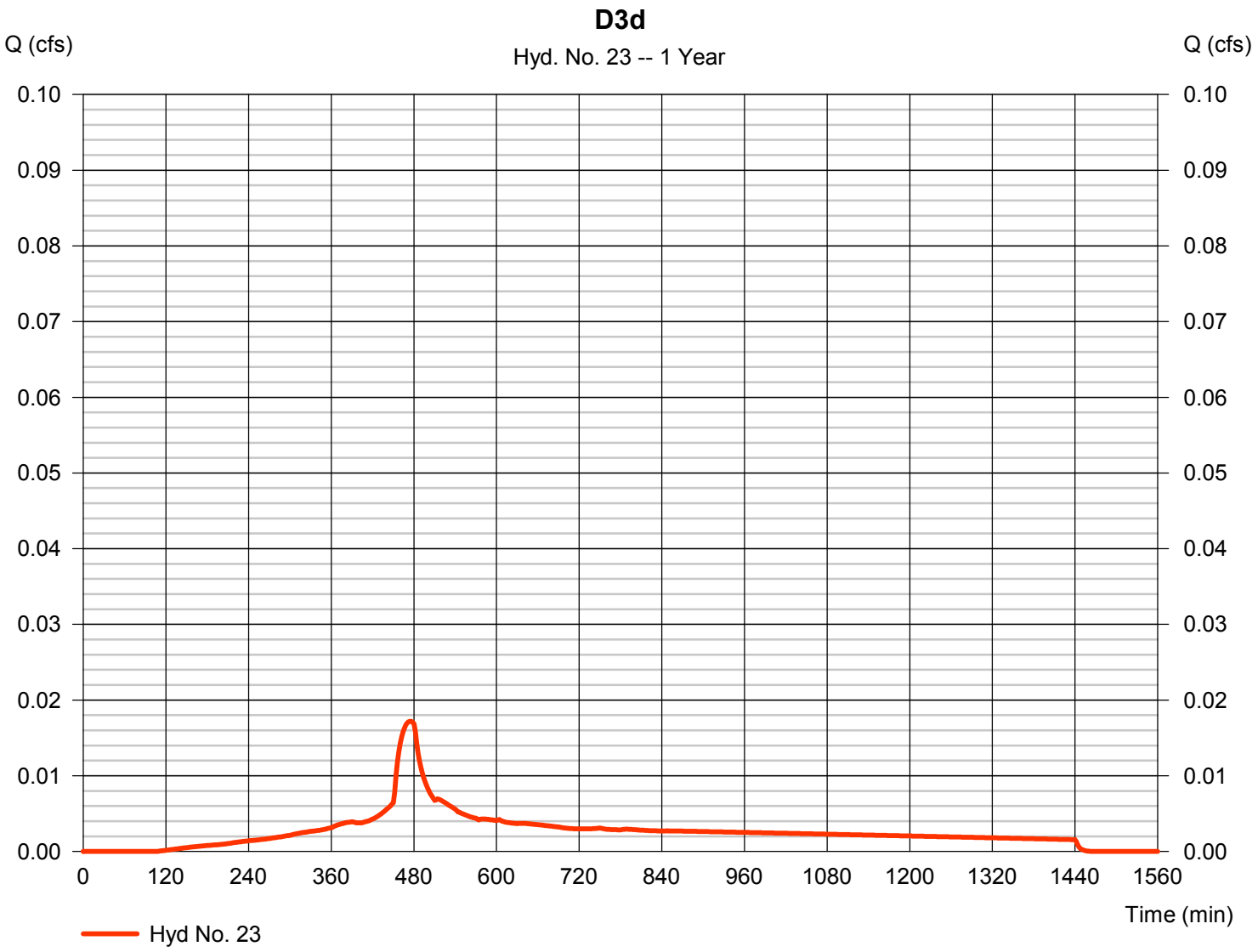
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 23

D3d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.017 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 241 cuft
Drainage area	= 0.084 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



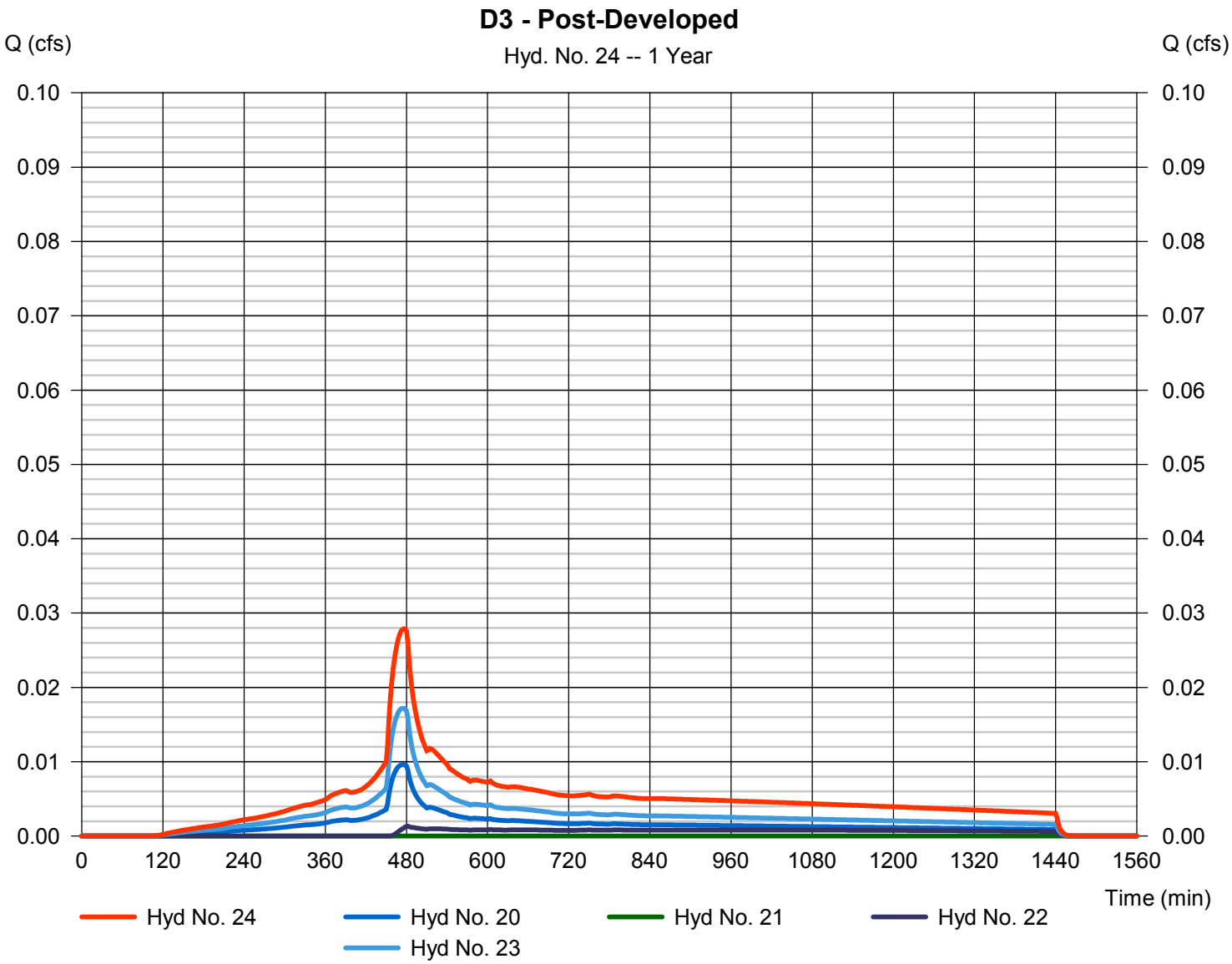
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 24

D3 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.028 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 423 cuft
Inflow hyds.	= 20, 21, 22, 23	Contrib. drain. area	= 0.215 ac



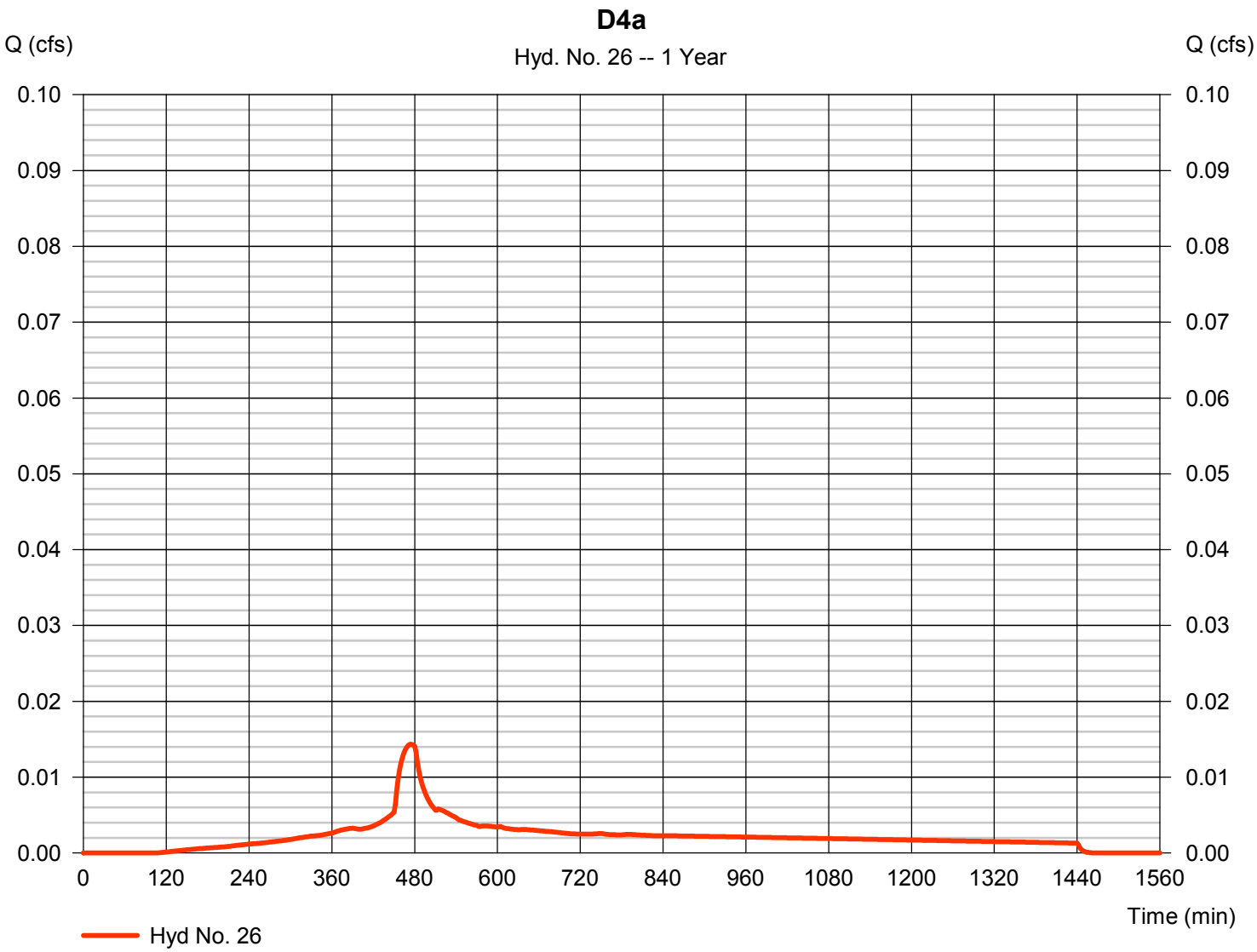
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 26

D4a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 201 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



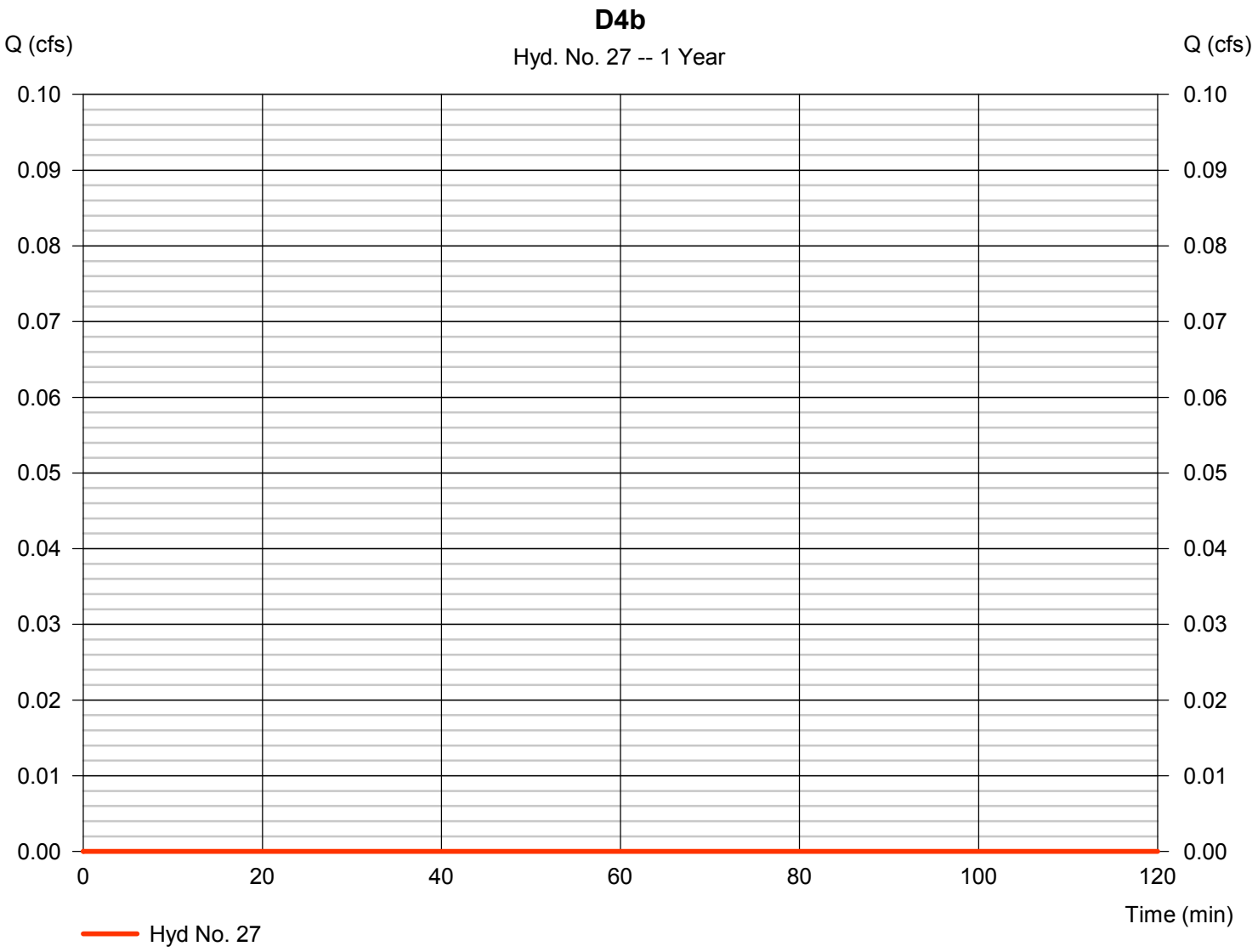
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 27

D4b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.025 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



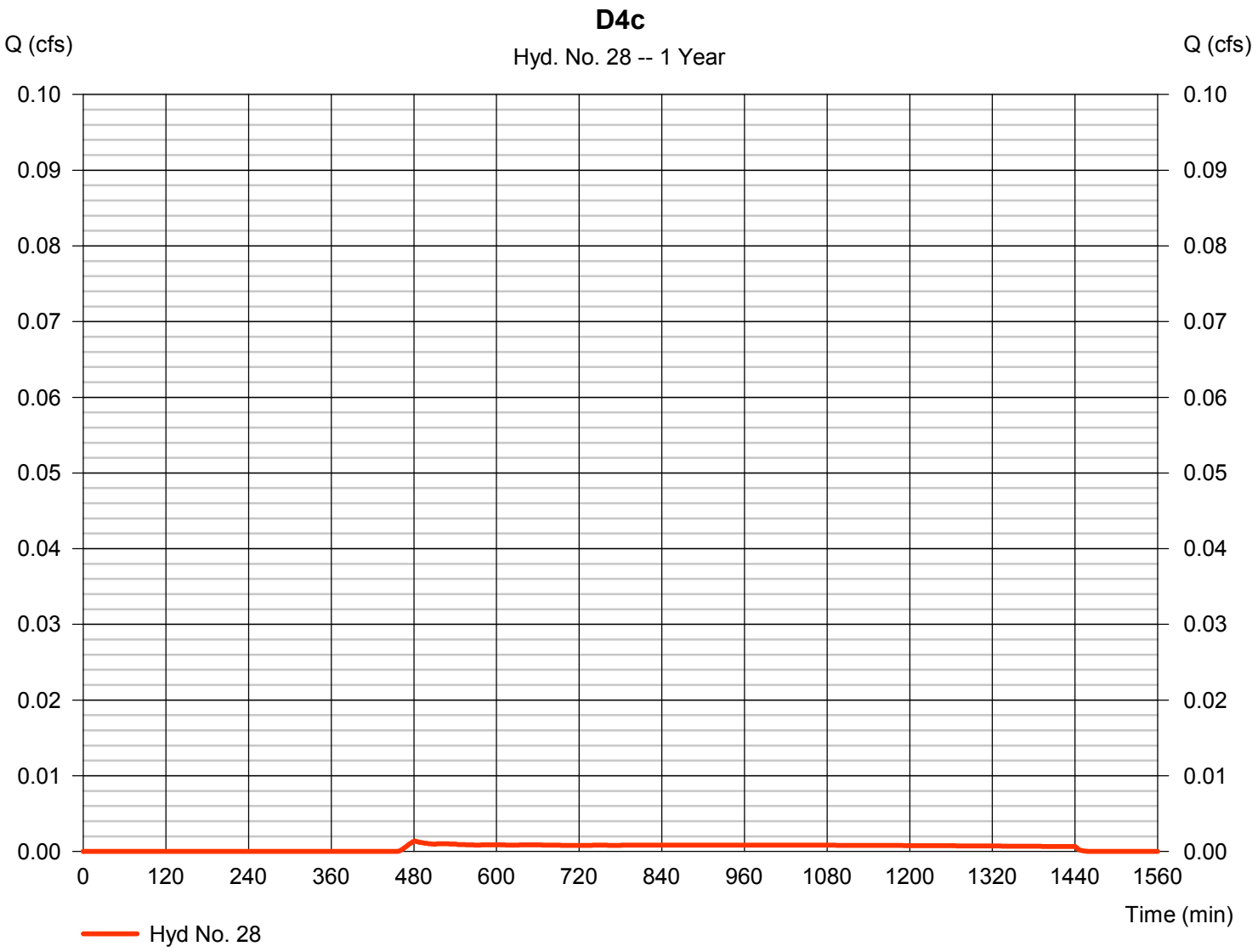
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 28

D4c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 48 cuft
Drainage area	= 0.067 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



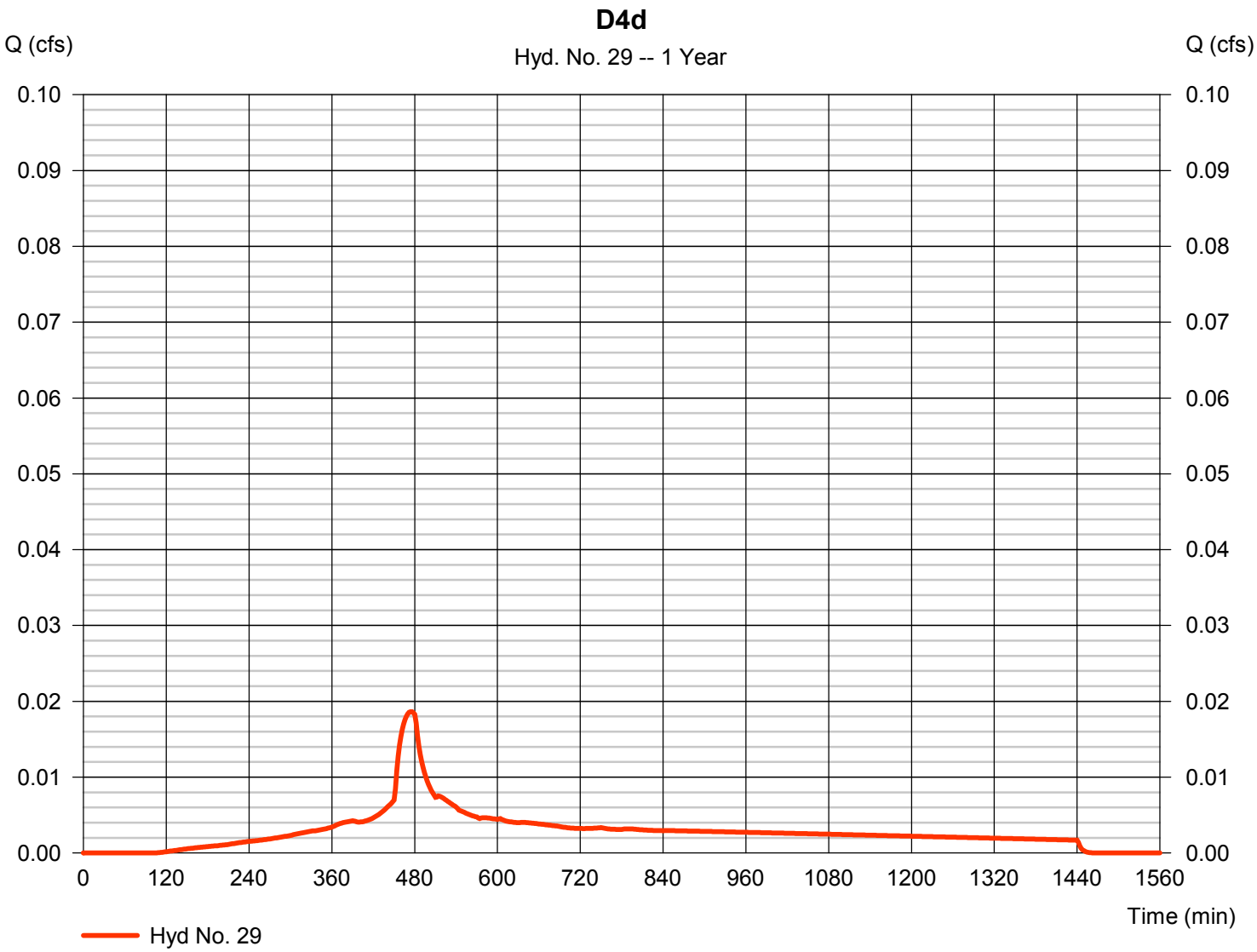
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 29

D4d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 261 cuft
Drainage area	= 0.091 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



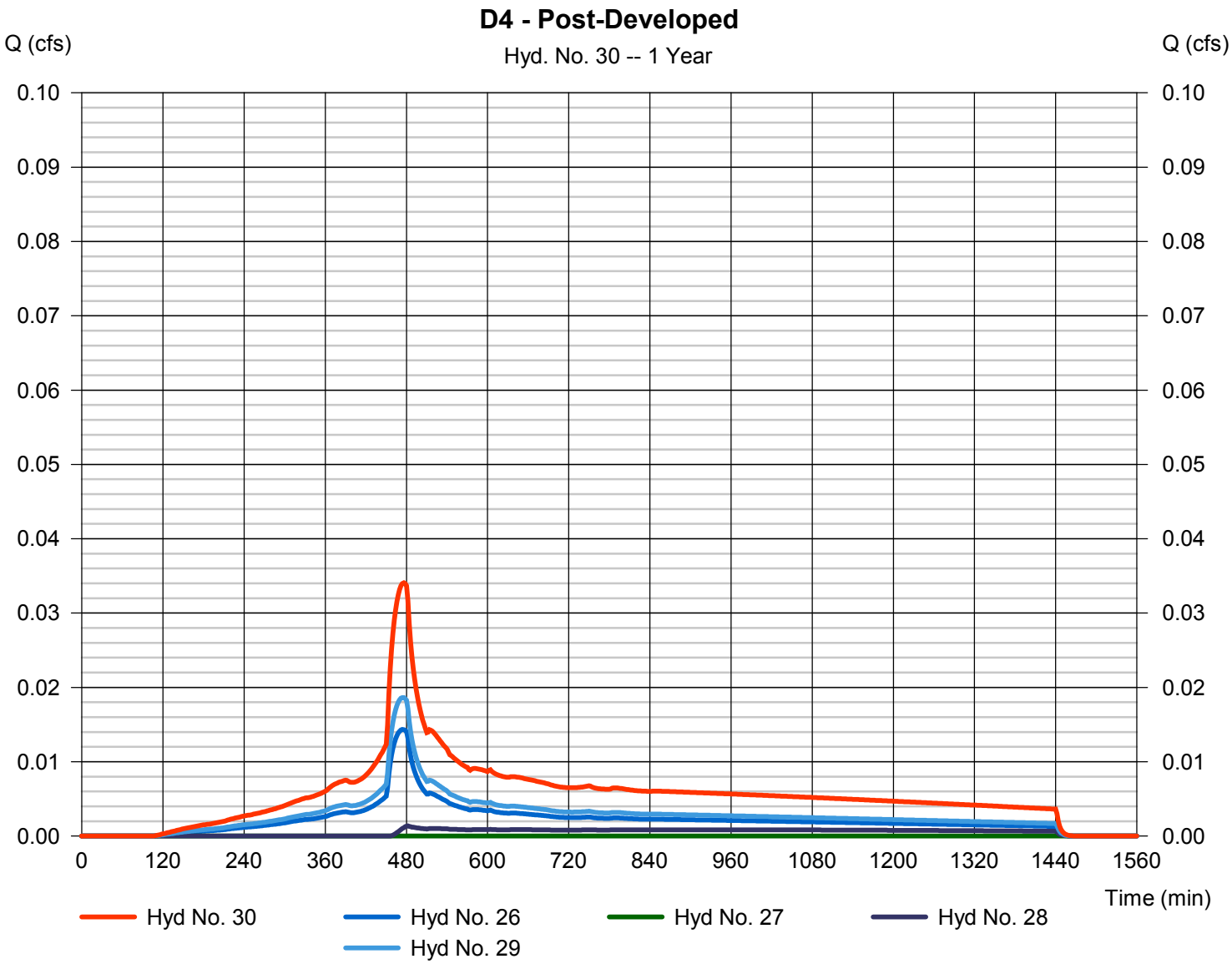
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 30

D4 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.034 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 510 cuft
Inflow hyds.	= 26, 27, 28, 29	Contrib. drain. area	= 0.253 ac



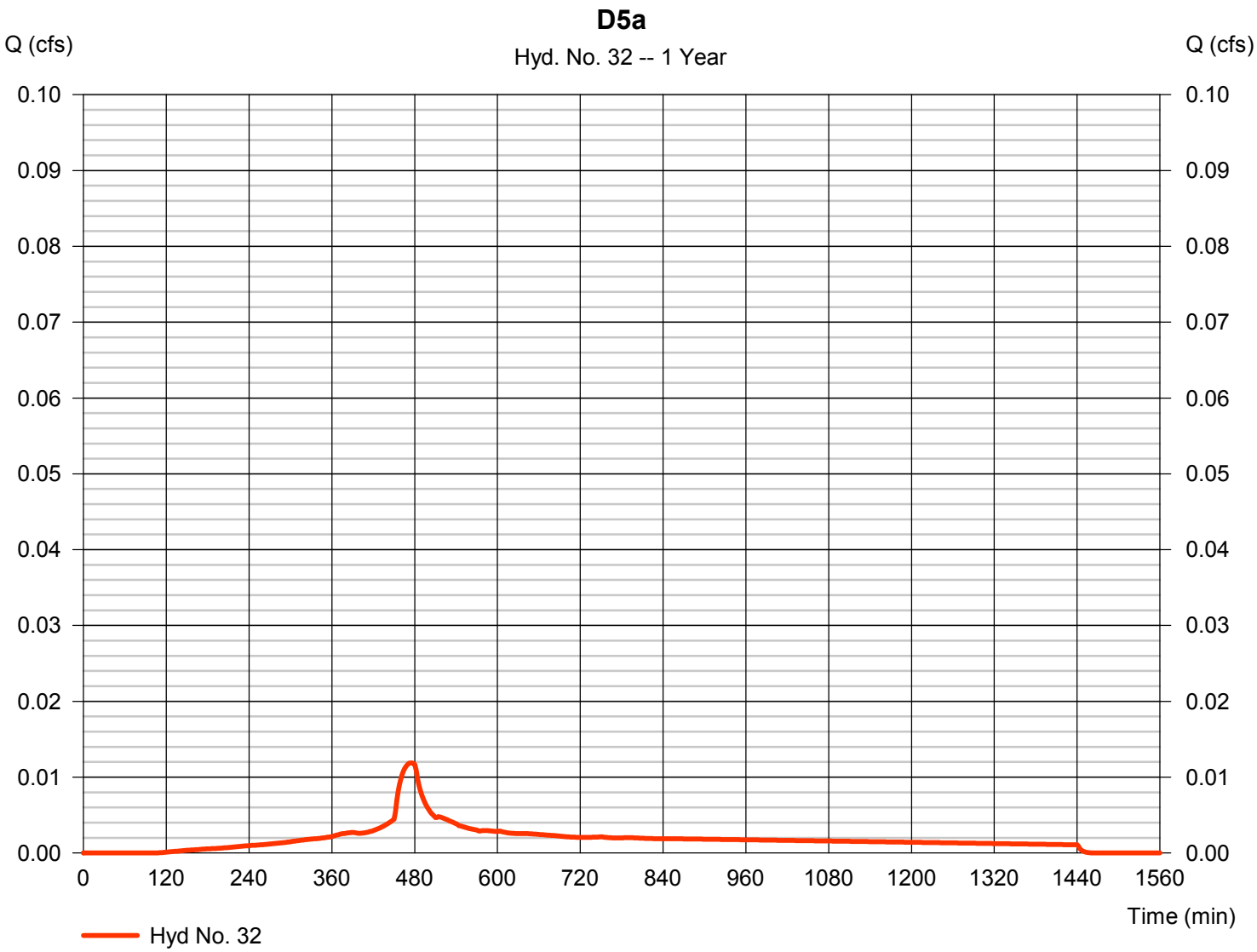
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 32

D5a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 167 cuft
Drainage area	= 0.058 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



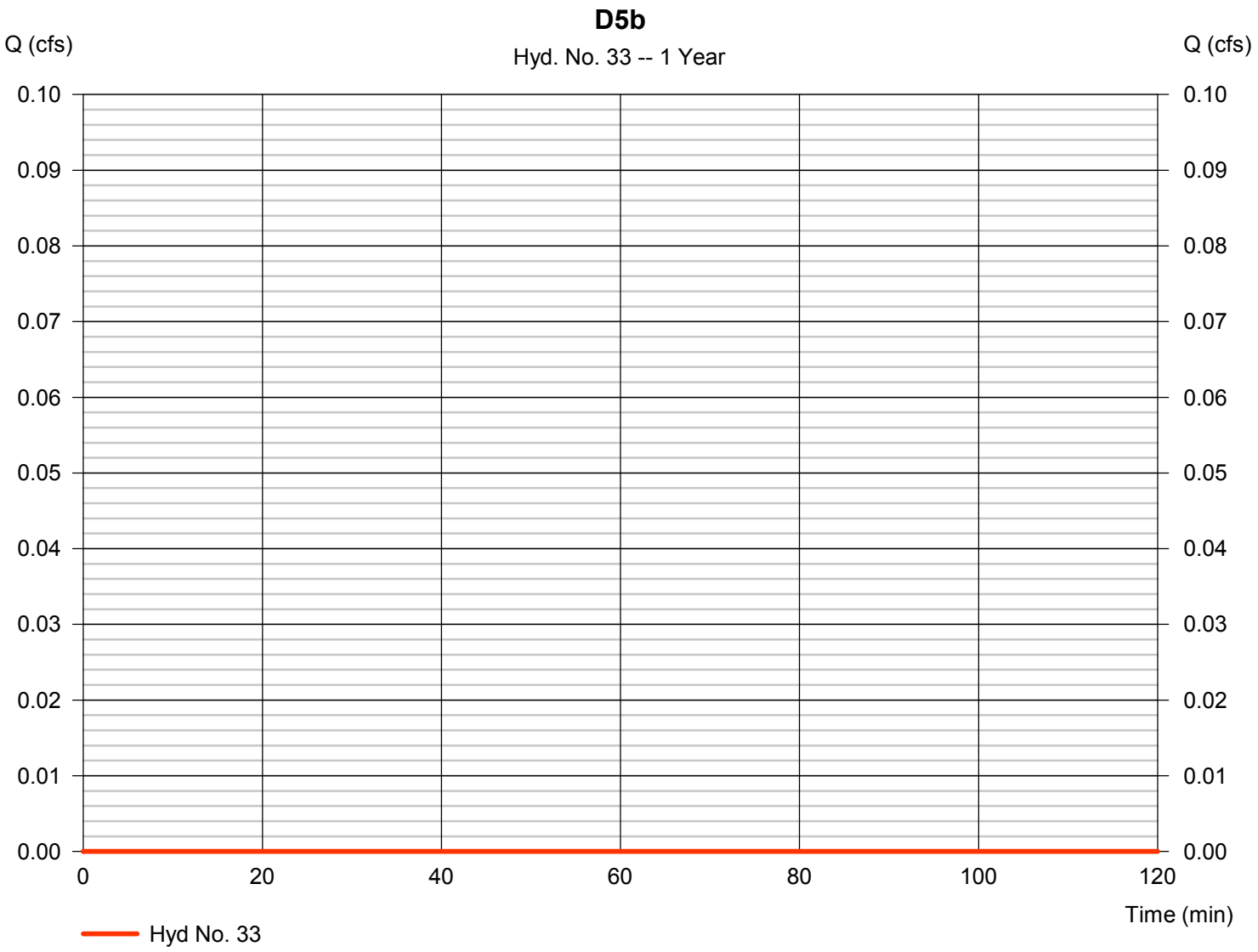
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 33

D5b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.010 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



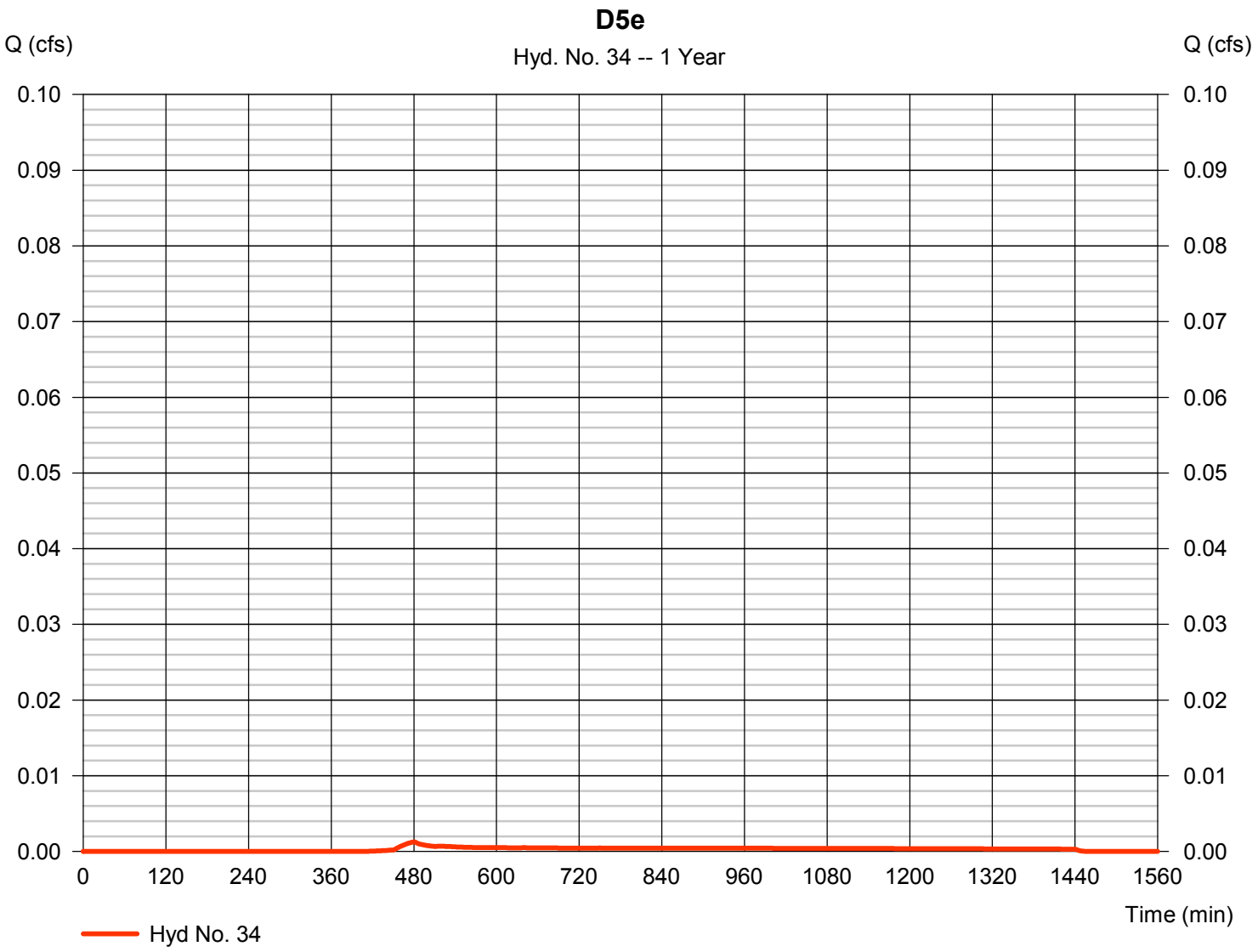
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 34

D5e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 27 cuft
Drainage area	= 0.026 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



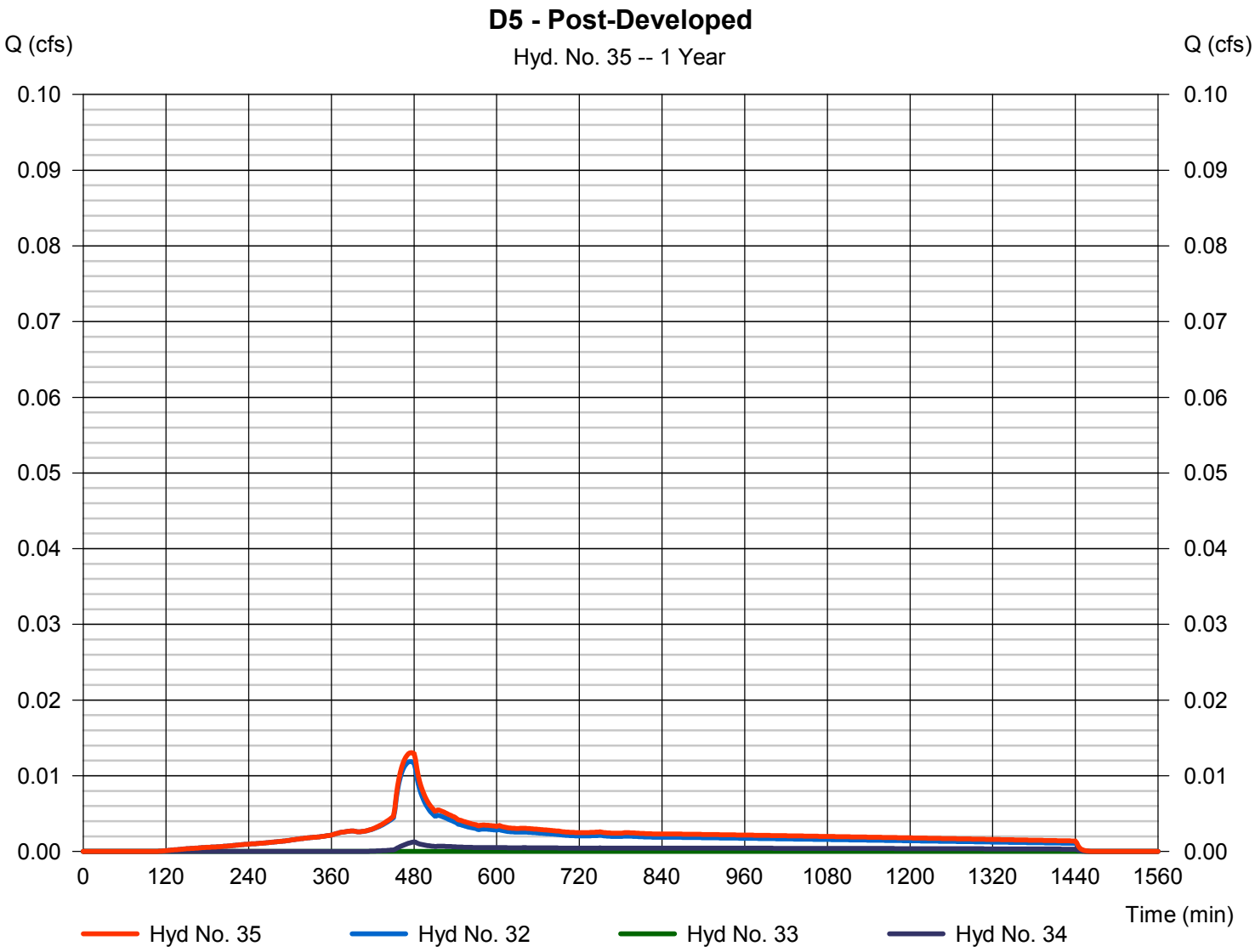
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 35

D5 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.013 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 193 cuft
Inflow hyds.	= 32, 33, 34	Contrib. drain. area	= 0.094 ac



Hydrograph Report

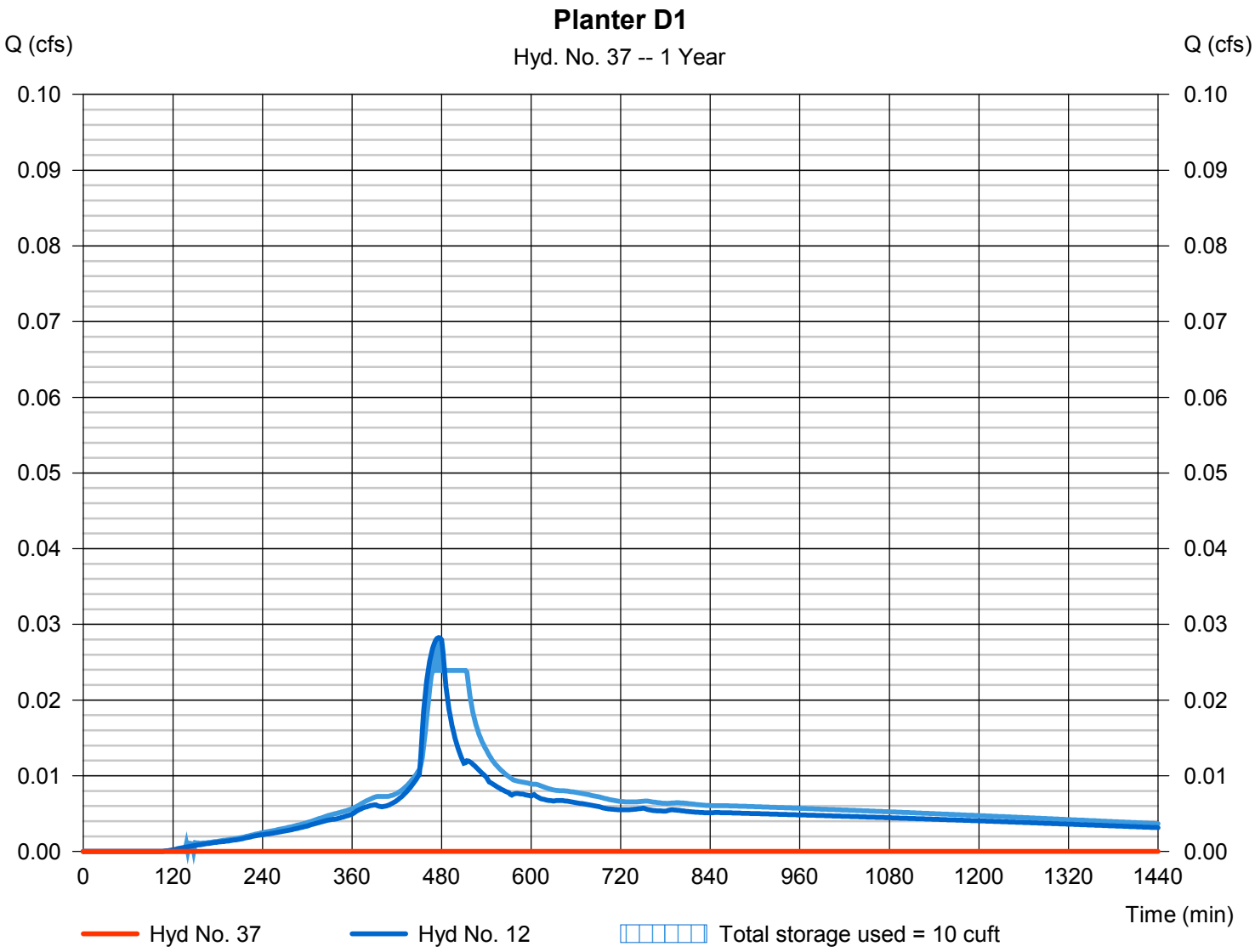
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 37

Planter D1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 486 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 12 - D1 - Post Developed	Max. Elevation	= 97.52 ft
Reservoir name	= Planter D1	Max. Storage	= 10 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

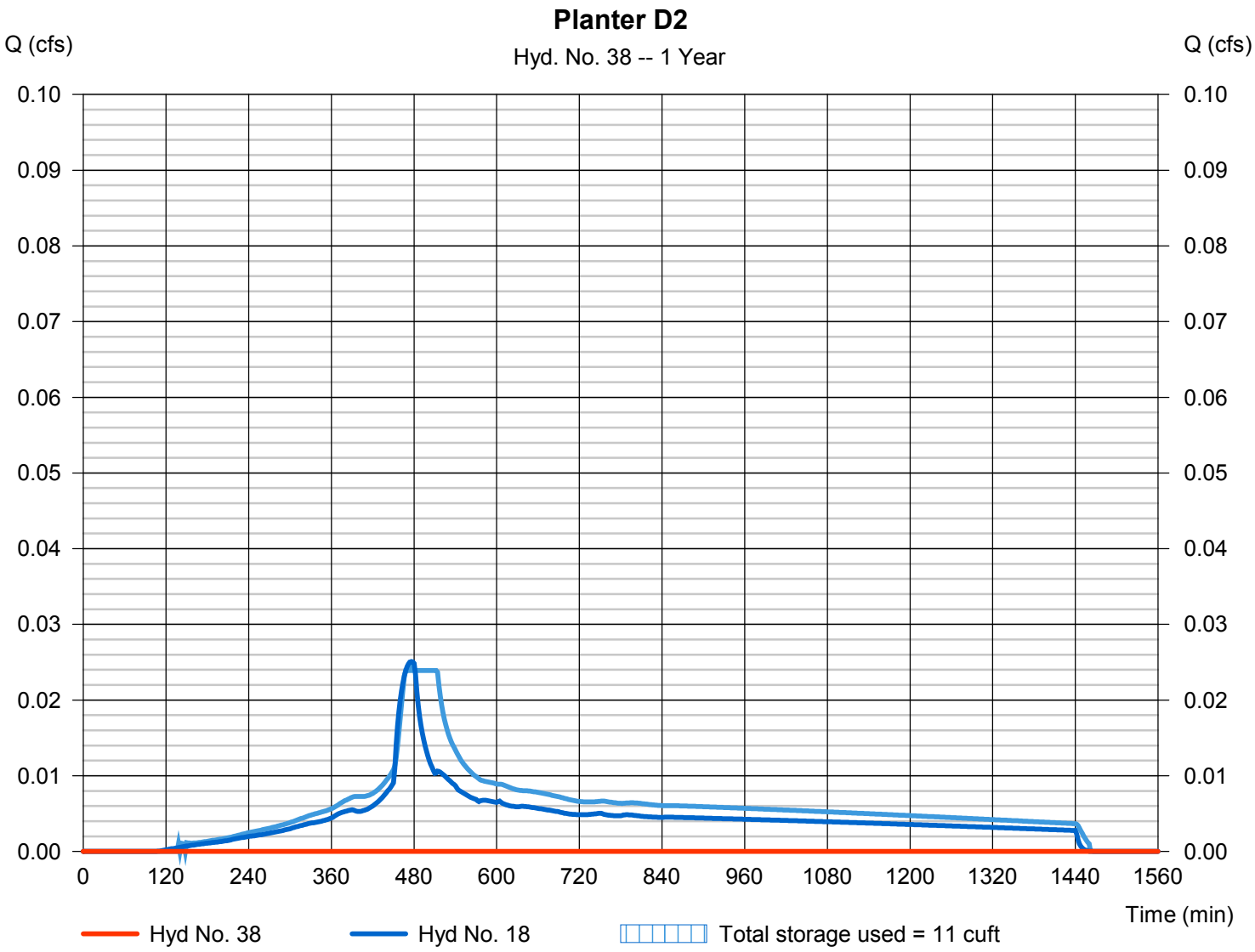
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 38

Planter D2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 460 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - D2 - Post-Developed	Max. Elevation	= 97.52 ft
Reservoir name	= Planter D2	Max. Storage	= 11 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

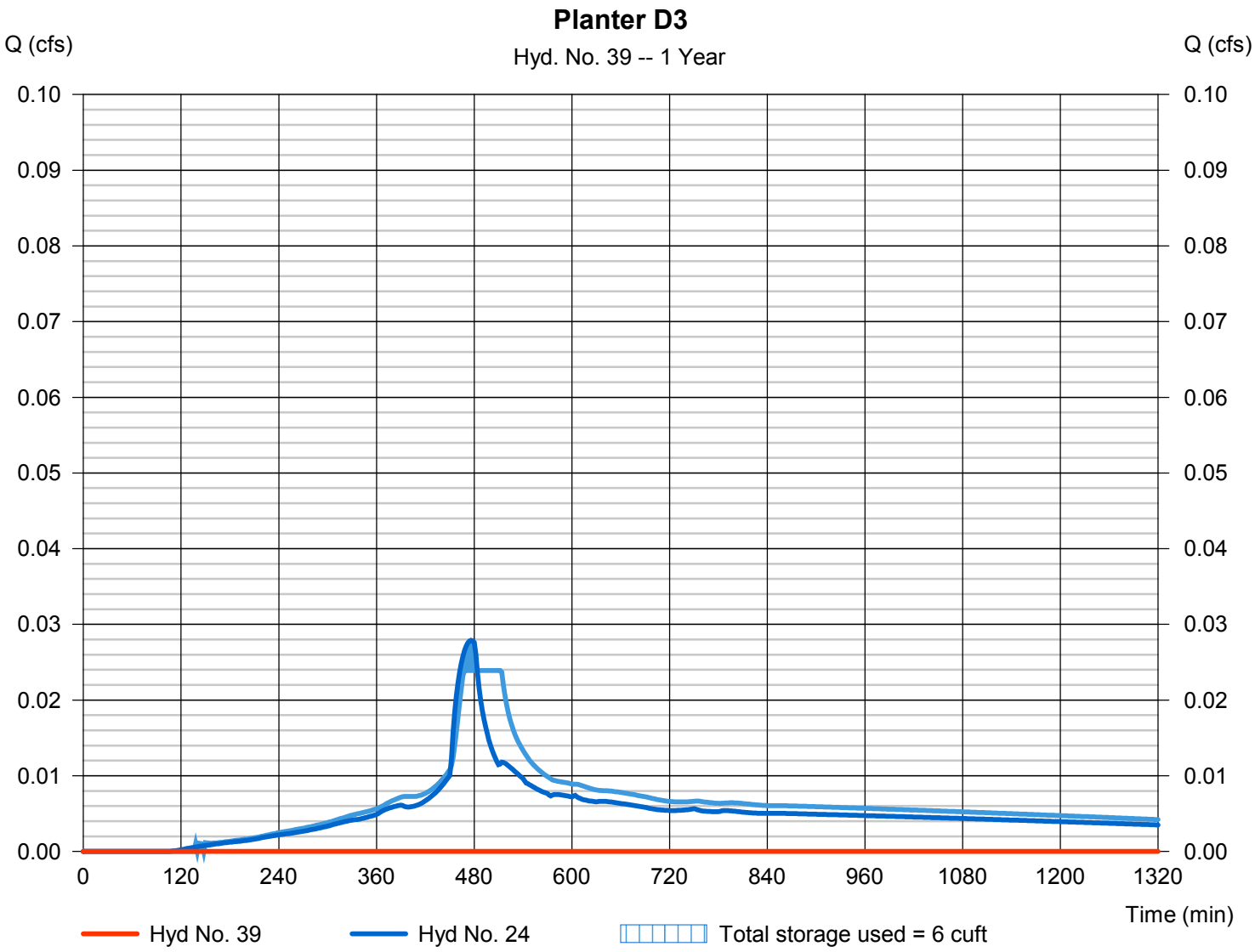
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 39

Planter D3

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 448 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 24 - D3 - Post-Developed	Max. Elevation	= 97.47 ft
Reservoir name	= Planter D3	Max. Storage	= 6 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

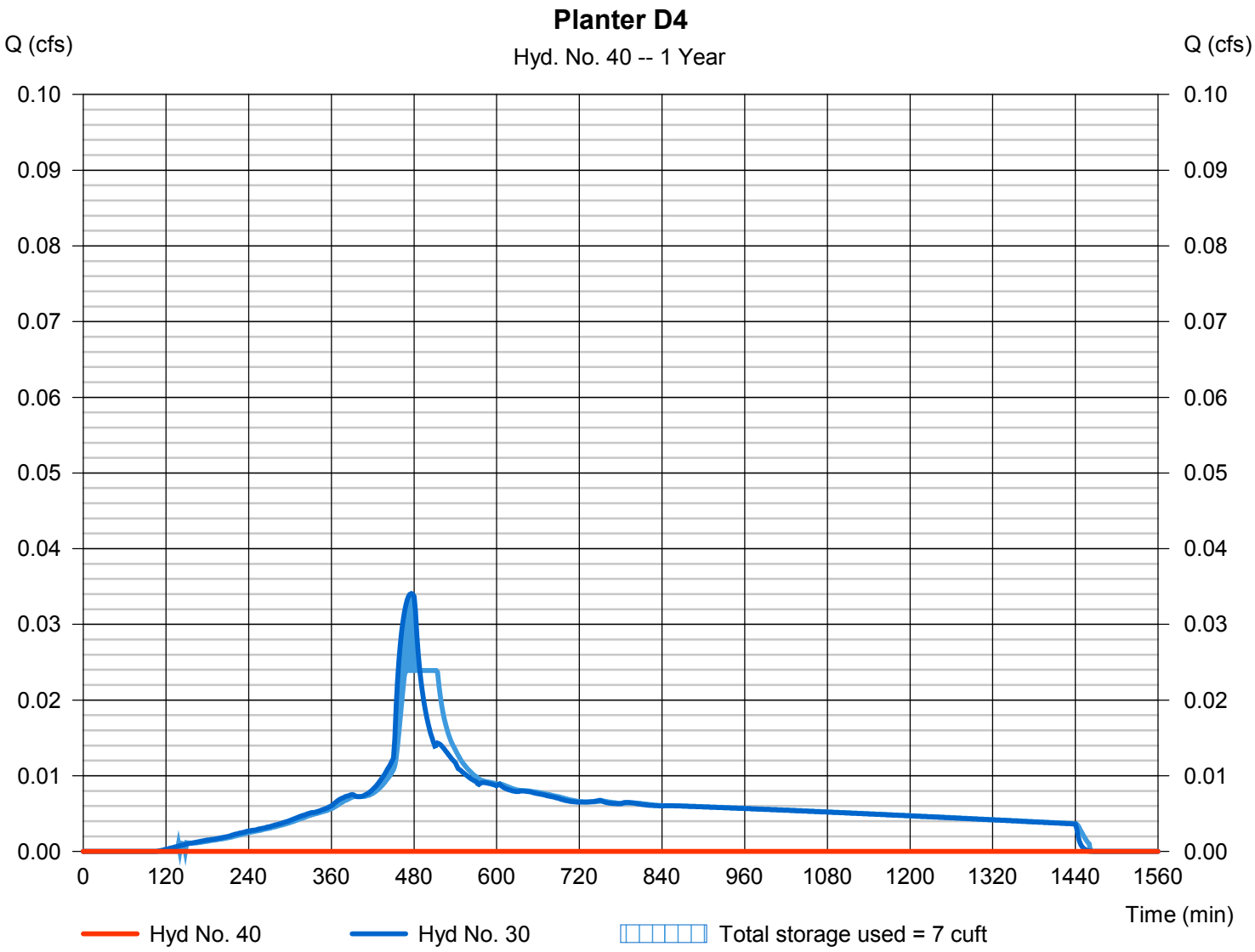
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 40

Planter D4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 630 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - D4 - Post-Developed	Max. Elevation	= 97.48 ft
Reservoir name	= Planter D4	Max. Storage	= 7 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

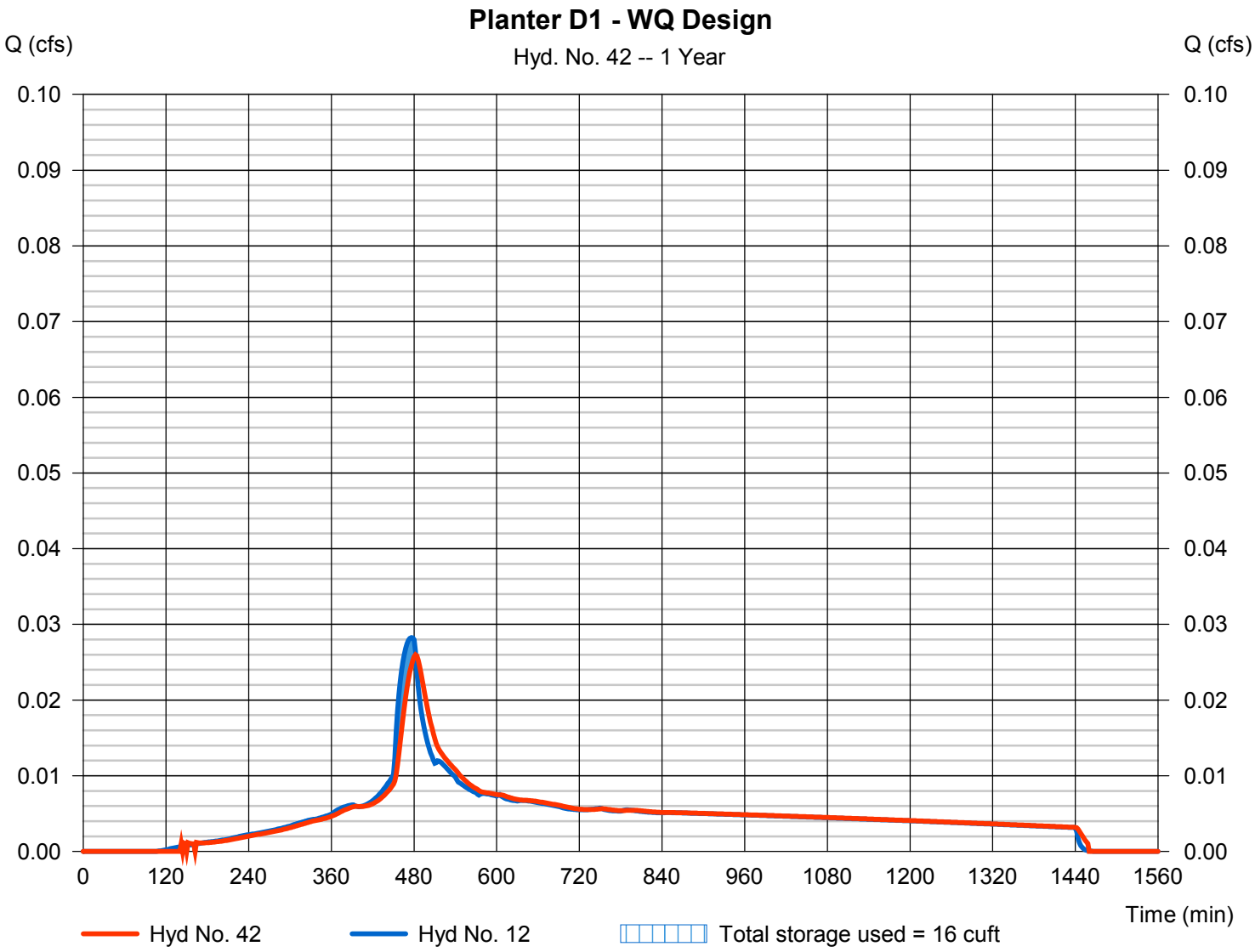
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 42

Planter D1 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.026 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 429 cuft
Inflow hyd. No.	= 12 - D1 - Post Developed	Max. Elevation	= 100.08 ft
Reservoir name	= Planter D1 - WQ	Max. Storage	= 16 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 12 - Planter D1 - WQ

Pond Data

Trapezoid -Bottom L x W = 50.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	200	0	0
0.08	100.08	200	17	17
0.17	100.17	200	17	33
0.25	100.25	200	17	50
0.33	100.33	200	17	66
0.41	100.42	200	17	83
0.50	100.50	200	17	100
0.58	100.58	200	17	116
0.66	100.66	200	17	133
0.75	100.75	200	17	149
0.83	100.83	200	17	166

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	17	100.08	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.17	33	100.17	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.25	50	100.25	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.33	66	100.33	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.41	83	100.42	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.50	100	100.50	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.58	116	100.58	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.66	133	100.66	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.75	149	100.75	0.00	0.00	---	---	0.00	---	---	---	0.028	---	0.028
0.83	166	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.028	---	0.383

Hydrograph Report

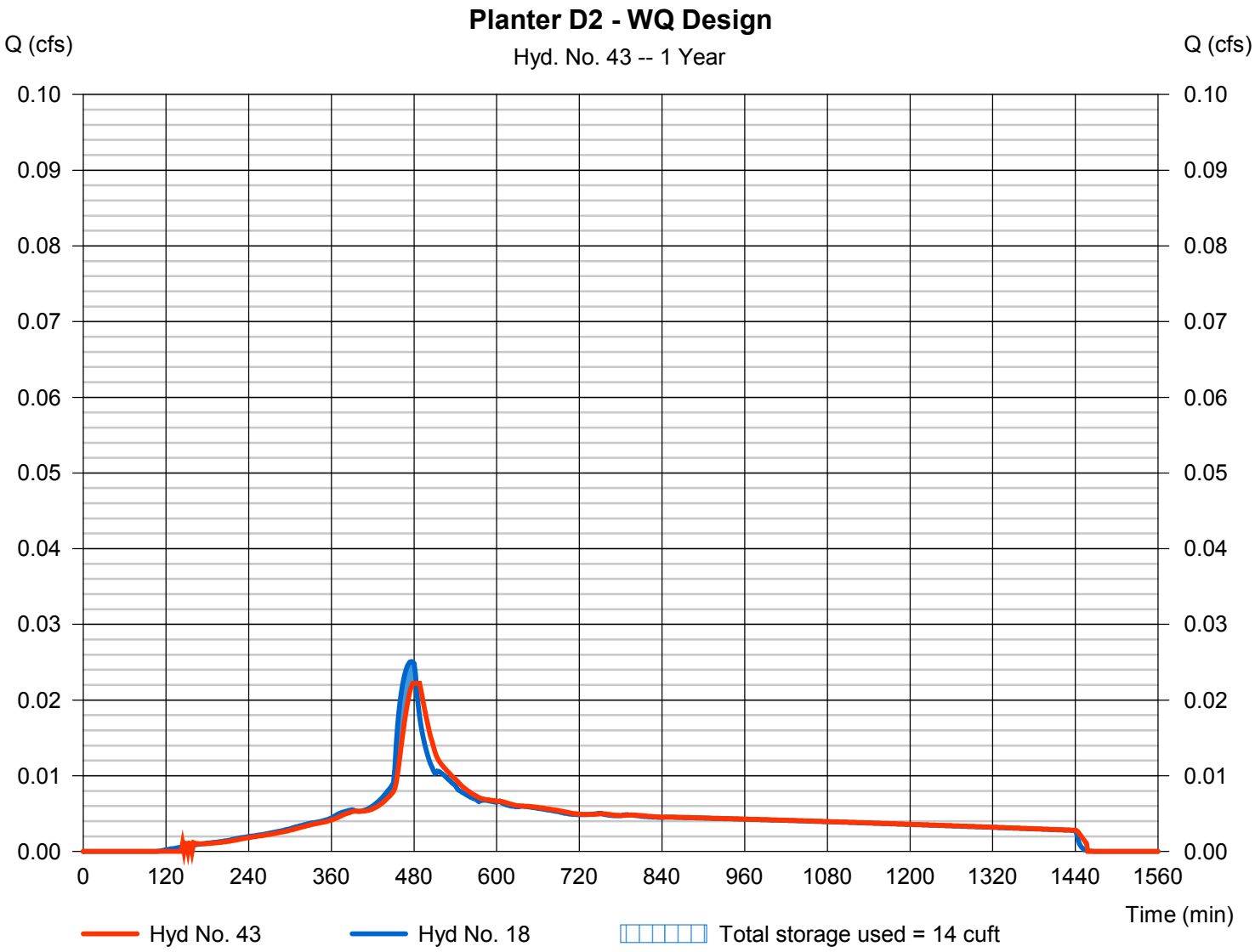
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 43

Planter D2 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.022 cfs
Storm frequency	= 1 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 380 cuft
Inflow hyd. No.	= 18 - D2 - Post-Developed	Max. Elevation	= 100.08 ft
Reservoir name	= Planter D2 - WQ	Max. Storage	= 14 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 6 - Planter D2 - WQ

Pond Data

Trapezoid -Bottom L x W = 40.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	160	0	0
0.08	100.08	160	13	13
0.17	100.17	160	13	27
0.25	100.25	160	13	40
0.33	100.33	160	13	53
0.41	100.42	160	13	66
0.50	100.50	160	13	80
0.58	100.58	160	13	93
0.66	100.66	160	13	106
0.75	100.75	160	13	120
0.83	100.83	160	13	133

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Contour) ← not extracted from model. Soil media design infiltration rate

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	13	100.08	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.17	27	100.17	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.25	40	100.25	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.33	53	100.33	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.41	66	100.42	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.50	80	100.50	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.58	93	100.58	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.66	106	100.66	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.75	120	100.75	0.00	0.00	---	---	0.00	---	---	---	0.022	---	0.022
0.83	133	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.022	---	0.377

Hydrograph Report

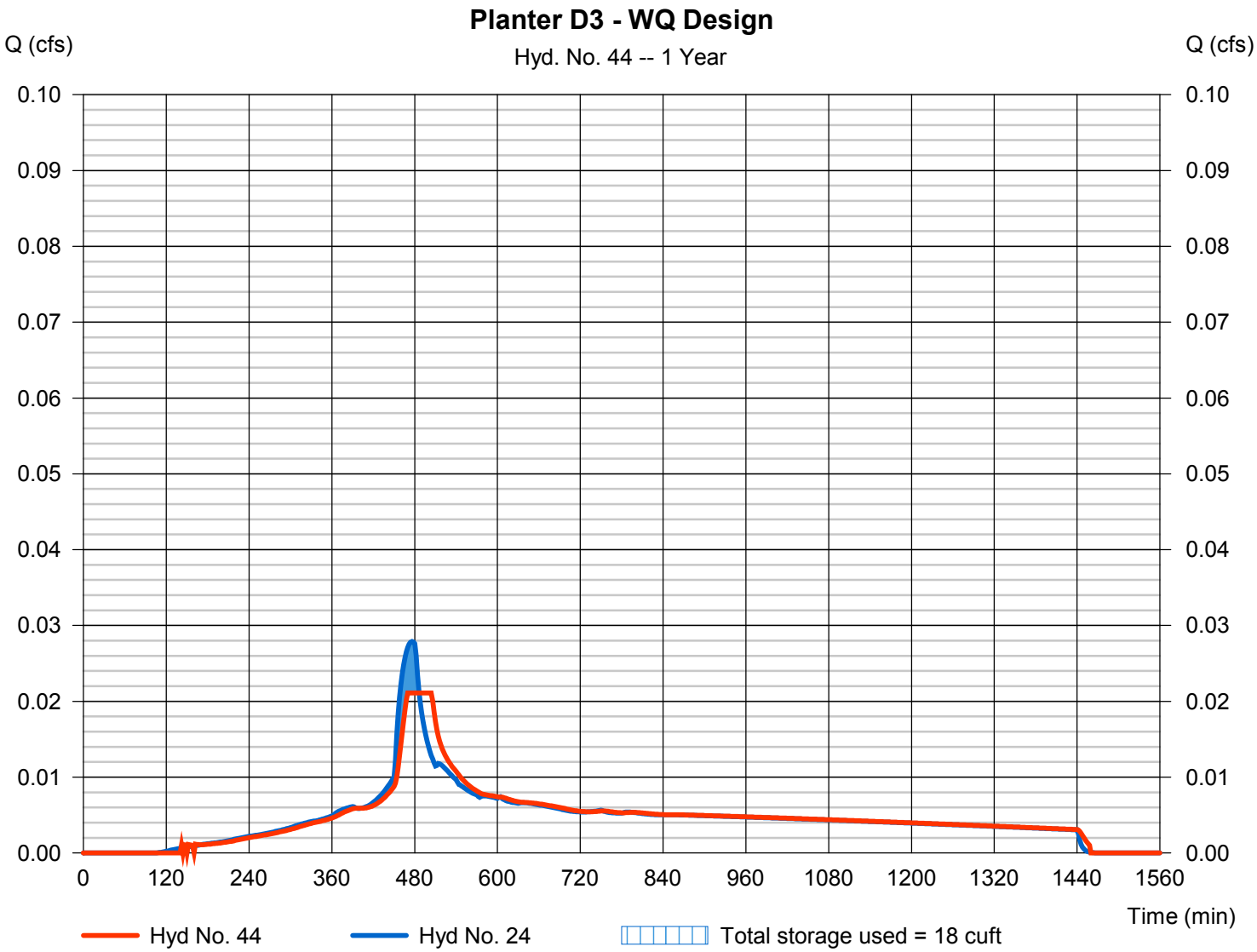
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 44

Planter D3 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 422 cuft
Inflow hyd. No.	= 24 - D3 - Post-Developed	Max. Elevation	= 100.10 ft
Reservoir name	= Planter D3 - WQ	Max. Storage	= 18 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 8 - Planter D3 - WQ

Pond Data

Trapezoid -Bottom L x W = 38.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	152	0	0
0.08	100.08	152	13	13
0.17	100.17	152	13	25
0.25	100.25	152	13	38
0.33	100.33	152	13	50
0.41	100.42	152	13	63
0.50	100.50	152	13	76
0.58	100.58	152	13	88
0.66	100.66	152	13	101
0.75	100.75	152	13	114
0.83	100.83	152	13	126

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	13	100.08	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.17	25	100.17	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.25	38	100.25	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.33	50	100.33	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.41	63	100.42	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.50	76	100.50	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.58	88	100.58	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.66	101	100.66	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.75	114	100.75	0.00	0.00	---	---	0.00	---	---	---	0.021	---	0.021
0.83	126	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.021	---	0.376

Hydrograph Report

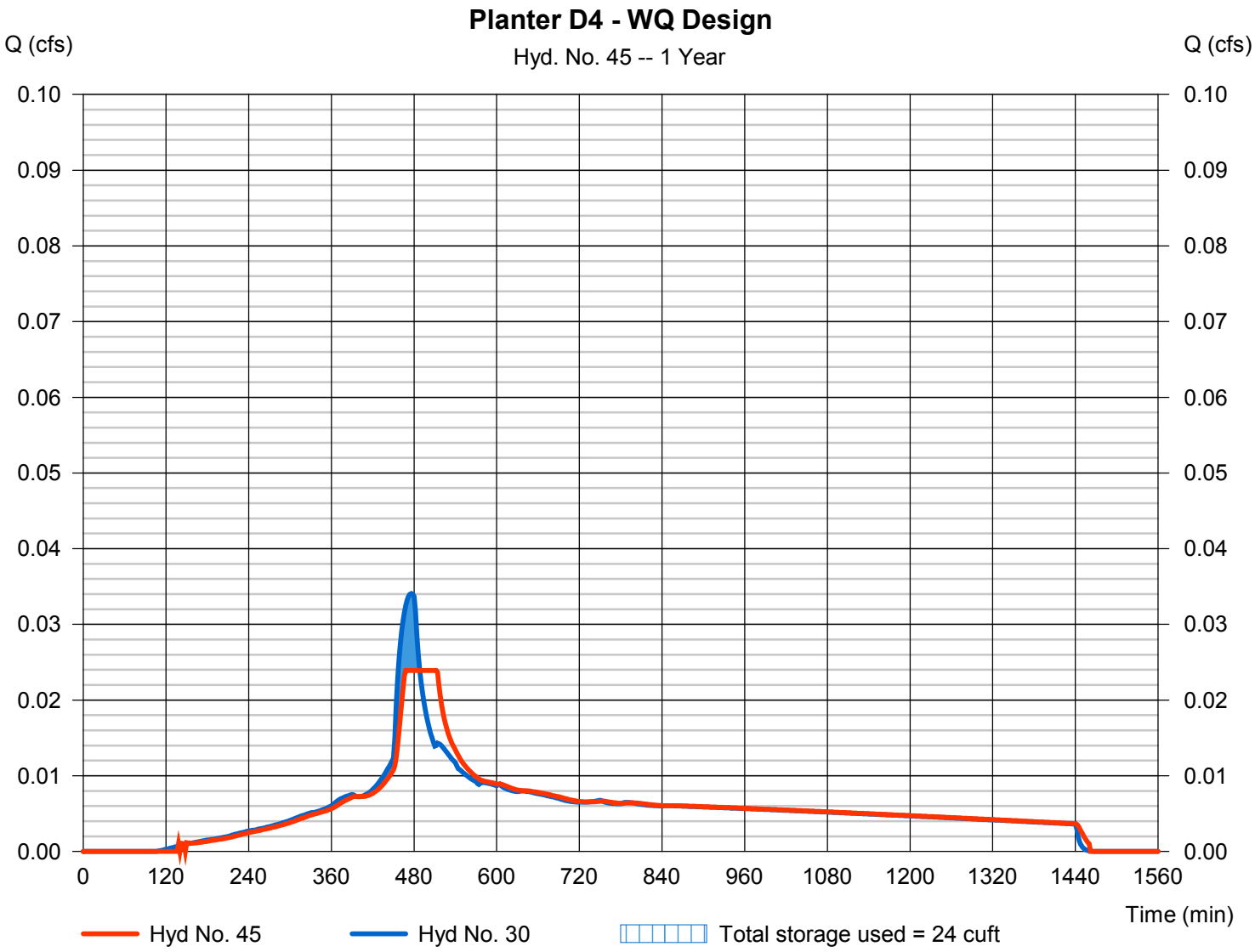
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 45

Planter D4 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 468 min
Time interval	= 2 min	Hyd. volume	= 510 cuft
Inflow hyd. No.	= 30 - D4 - Post-Developed	Max. Elevation	= 100.08 ft
Reservoir name	= Planter D4 - WQ	Max. Storage	= 24 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 10 - Planter D4 - WQ

Pond Data

Trapezoid -Bottom L x W = 43.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	172	0	0
0.08	100.08	172	14	14
0.17	100.17	172	14	29
0.25	100.25	172	14	43
0.33	100.33	172	14	57
0.41	100.42	172	14	71
0.50	100.50	172	14	86
0.58	100.58	172	14	100
0.66	100.66	172	14	114
0.75	100.75	172	14	128
0.83	100.83	172	14	143

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Contour)

not extracted from model. Soil media design infiltration rate

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	14	100.08	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.17	29	100.17	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.25	43	100.25	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.33	57	100.33	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.41	71	100.42	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.50	86	100.50	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.58	100	100.58	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.66	114	100.66	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.75	128	100.75	0.00	0.00	---	---	0.00	---	---	---	0.024	---	0.024
0.83	143	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.024	---	0.379

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.081	2	478	1,246	------	------	------	exDa
2	SBUH Runoff	0.074	2	478	1,136	------	------	------	exDb
3	SBUH Runoff	0.062	2	478	918	------	------	------	exDe
4	SBUH Runoff	0.201	2	474	2,882	------	------	------	exDd (Overlay)
5	Combine	0.416	2	476	6,182	1, 2, 3, 4	------	------	exD - Pre-Developed
7	SBUH Runoff	0.028	2	474	404	------	------	------	D1a
8	SBUH Runoff	0.002	2	480	44	------	------	------	D1b
9	SBUH Runoff	0.020	2	478	308	------	------	------	D1c
10	SBUH Runoff	0.051	2	474	731	------	------	------	D1d
11	SBUH Runoff	0.002	2	478	22	------	------	------	D1e
12	Combine	0.102	2	476	1,510	7, 8, 9, 10, 11	------	------	D1 - Post Developed
14	SBUH Runoff	0.026	2	474	370	------	------	------	D2a
15	SBUH Runoff	0.001	2	480	40	------	------	------	D2b
16	SBUH Runoff	0.018	2	478	274	------	------	------	D2c
17	SBUH Runoff	0.045	2	474	645	------	------	------	D2d
18	Combine	0.089	2	474	1,330	14, 15, 16, 17	------	------	D2 - Post-Developed
20	SBUH Runoff	0.028	2	474	404	------	------	------	D3a
21	SBUH Runoff	0.000	2	1196	11	------	------	------	D3b
22	SBUH Runoff	0.020	2	478	313	------	------	------	D3c
23	SBUH Runoff	0.050	2	474	723	------	------	------	D3d
24	Combine	0.099	2	474	1,451	20, 21, 22, 23	------	------	D3 - Post-Developed
26	SBUH Runoff	0.042	2	474	602	------	------	------	D4a
27	SBUH Runoff	0.000	2	1196	14	------	------	------	D4b
28	SBUH Runoff	0.021	2	478	322	------	------	------	D4c
29	SBUH Runoff	0.055	2	474	783	------	------	------	D4d
30	Combine	0.117	2	474	1,722	26, 27, 28, 29	------	------	D4 - Post-Developed
32	SBUH Runoff	0.035	2	474	499	------	------	------	D5a
33	SBUH Runoff	0.000	2	1196	6	------	------	------	D5b
34	SBUH Runoff	0.010	2	478	146	------	------	------	D5e
35	Combine	0.045	2	474	650	32, 33, 34	------	------	D5 - Post-Developed
37	Reservoir	0.039	2	490	195	12	99.94	97.0	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.044	2	486	195	18	99.73	71.4	Planter D2
39	Reservoir	0.036	2	486	125	24	99.71	67.2	Planter D3
40	Reservoir	0.046	2	486	160	30	99.85	80.6	Planter D4
42	Reservoir	0.067	2	490	1,510	12	100.77	154	Planter D1 - WQ Design
43	Reservoir	0.081	2	484	1,329	18	100.77	124	Planter D2 - WQ Design
44	Reservoir	0.107	2	476	1,450	24	100.78	119	Planter D3 - WQ Design
45	Reservoir	0.122	2	474	1,721	30	100.78	135	Planter D4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.000	2	1294	16	------	------	------	exDa
2	SBUH Runoff	0.000	2	1294	14	------	------	------	exDb
3	SBUH Runoff	0.001	2	1126	26	------	------	------	exDe
4	SBUH Runoff	0.027	2	476	387	------	------	------	exDd (Overlay)
5	Combine	0.027	2	476	442	1, 2, 3, 4	------	------	exD - Pre-Developed
7	SBUH Runoff	0.004	2	476	54	------	------	------	D1a
8	SBUH Runoff	0.000	2	n/a	0	------	------	------	D1b
9	SBUH Runoff	0.000	2	1294	4	------	------	------	D1c
10	SBUH Runoff	0.007	2	476	98	------	------	------	D1d
11	SBUH Runoff	0.000	2	1126	1	------	------	------	D1e
12	Combine	0.011	2	476	157	7, 8, 9, 10, 11	------	------	D1 - Post Developed
14	SBUH Runoff	0.003	2	476	50	------	------	------	D2a
15	SBUH Runoff	0.000	2	n/a	0	------	------	------	D2b
16	SBUH Runoff	0.000	2	1294	3	------	------	------	D2c
17	SBUH Runoff	0.006	2	476	87	------	------	------	D2d
18	Combine	0.009	2	476	140	14, 15, 16, 17	------	------	D2 - Post-Developed
20	SBUH Runoff	0.004	2	476	54	------	------	------	D3a
21	SBUH Runoff	0.000	2	n/a	0	------	------	------	D3b
22	SBUH Runoff	0.000	2	1294	4	------	------	------	D3c
23	SBUH Runoff	0.007	2	476	97	------	------	------	D3d
24	Combine	0.010	2	476	155	20, 21, 22, 23	------	------	D3 - Post-Developed
26	SBUH Runoff	0.006	2	476	81	------	------	------	D4a
27	SBUH Runoff	0.000	2	n/a	0	------	------	------	D4b
28	SBUH Runoff	0.000	2	1294	4	------	------	------	D4c
29	SBUH Runoff	0.007	2	476	105	------	------	------	D4d
30	Combine	0.013	2	476	190	26, 27, 28, 29	------	------	D4 - Post-Developed
32	SBUH Runoff	0.005	2	476	67	------	------	------	D5a
33	SBUH Runoff	0.000	2	n/a	0	------	------	------	D5b
34	SBUH Runoff	0.000	2	1126	4	------	------	------	D5e
35	Combine	0.005	2	476	71	32, 33, 34	------	------	D5 - Post-Developed
37	Reservoir	0.000	2	548	0	12	97.36	3.79	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.000	2	462	0	18	97.37	3.39	Planter D2
39	Reservoir	0.000	2	494	0	24	97.33	2.21	Planter D3
40	Reservoir	0.000	2	456	0	30	97.34	2.71	Planter D4
42	Reservoir	0.010	2	482	156	12	100.03	5.77	Planter D1 - WQ Design
43	Reservoir	0.009	2	482	139	18	100.03	5.16	Planter D2 - WQ Design
44	Reservoir	0.010	2	482	155	24	100.04	5.72	Planter D3 - WQ Design
45	Reservoir	0.012	2	482	189	30	100.04	7.04	Planter D4 - WQ Design

Proposed Planter can fully infiltrate 0.5 inch storm

Infiltration Event - 0.5" Storm

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.165	2	476	2,394	------	------	------	exDa
2	SBUH Runoff	0.151	2	476	2,181	------	------	------	exDb
3	SBUH Runoff	0.119	2	476	1,681	------	------	------	exDe
4	SBUH Runoff	0.315	2	474	4,579	------	------	------	exDd (Overlay)
5	Combine	0.748	2	476	10,835	1, 2, 3, 4	------	------	exD - Pre-Developed
7	SBUH Runoff	0.044	2	474	642	------	------	------	D1a
8	SBUH Runoff	0.006	2	480	111	------	------	------	D1b
9	SBUH Runoff	0.041	2	476	592	------	------	------	D1c
10	SBUH Runoff	0.080	2	474	1,162	------	------	------	D1d
11	SBUH Runoff	0.003	2	476	41	------	------	------	D1e
12	Combine	0.174	2	474	2,548	7, 8, 9, 10, 11	------	------	D1 - Post Developed
14	SBUH Runoff	0.040	2	474	588	------	------	------	D2a
15	SBUH Runoff	0.006	2	480	101	------	------	------	D2b
16	SBUH Runoff	0.036	2	476	527	------	------	------	D2c
17	SBUH Runoff	0.071	2	474	1,025	------	------	------	D2d
18	Combine	0.152	2	474	2,240	14, 15, 16, 17	------	------	D2 - Post-Developed
20	SBUH Runoff	0.044	2	474	642	------	------	------	D3a
21	SBUH Runoff	0.001	2	526	46	------	------	------	D3b
22	SBUH Runoff	0.042	2	476	601	------	------	------	D3c
23	SBUH Runoff	0.079	2	474	1,148	------	------	------	D3d
24	Combine	0.165	2	474	2,437	20, 21, 22, 23	------	------	D3 - Post-Developed
26	SBUH Runoff	0.066	2	474	957	------	------	------	D4a
27	SBUH Runoff	0.001	2	526	60	------	------	------	D4b
28	SBUH Runoff	0.043	2	476	619	------	------	------	D4c
29	SBUH Runoff	0.086	2	474	1,244	------	------	------	D4d
30	Combine	0.194	2	474	2,880	26, 27, 28, 29	------	------	D4 - Post-Developed
32	SBUH Runoff	0.055	2	474	793	------	------	------	D5a
33	SBUH Runoff	0.000	2	526	24	------	------	------	D5b
34	SBUH Runoff	0.019	2	476	266	------	------	------	D5e
35	Combine	0.073	2	474	1,083	32, 33, 34	------	------	D5 - Post-Developed
37	Reservoir	0.060	2	500	681	12	100.76	252	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.058	2	498	683	18	100.75	186	Planter D2
39	Reservoir	0.050	2	498	417	24	100.75	191	Planter D3
40	Reservoir	0.081	2	492	523	30	100.76	218	Planter D4
42	Reservoir	0.173	2	476	2,547	12	100.79	159	Planter D1 - WQ Design
43	Reservoir	0.152	2	476	2,240	18	100.79	127	Planter D2 - WQ Design
44	Reservoir	0.165	2	474	2,436	24	100.79	121	Planter D3 - WQ Design
45	Reservoir	0.194	2	474	2,879	30	100.80	137	Planter D4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.216	2	476	3,084	------	------	------	exDa
2	SBUH Runoff	0.197	2	476	2,811	------	------	------	exDb
3	SBUH Runoff	0.151	2	476	2,132	------	------	------	exDe
4	SBUH Runoff	0.380	2	474	5,549	------	------	------	exDd (Overlay)
5	Combine	0.943	2	474	13,576	1, 2, 3, 4	------	------	exD - Pre-Developed
7	SBUH Runoff	0.053	2	474	779	------	------	------	D1a
8	SBUH Runoff	0.009	2	480	156	------	------	------	D1b
9	SBUH Runoff	0.053	2	476	762	------	------	------	D1c
10	SBUH Runoff	0.096	2	474	1,408	------	------	------	D1d
11	SBUH Runoff	0.004	2	476	52	------	------	------	D1e
12	Combine	0.216	2	474	3,157	7, 8, 9, 10, 11	------	------	D1 - Post Developed
14	SBUH Runoff	0.049	2	474	712	------	------	------	D2a
15	SBUH Runoff	0.009	2	480	141	------	------	------	D2b
16	SBUH Runoff	0.048	2	476	679	------	------	------	D2c
17	SBUH Runoff	0.085	2	474	1,242	------	------	------	D2d
18	Combine	0.189	2	474	2,775	14, 15, 16, 17	------	------	D2 - Post-Developed
20	SBUH Runoff	0.053	2	474	779	------	------	------	D3a
21	SBUH Runoff	0.003	2	480	73	------	------	------	D3b
22	SBUH Runoff	0.054	2	476	774	------	------	------	D3c
23	SBUH Runoff	0.095	2	474	1,392	------	------	------	D3d
24	Combine	0.205	2	474	3,017	20, 21, 22, 23	------	------	D3 - Post-Developed
26	SBUH Runoff	0.079	2	474	1,160	------	------	------	D4a
27	SBUH Runoff	0.003	2	480	96	------	------	------	D4b
28	SBUH Runoff	0.056	2	476	798	------	------	------	D4c
29	SBUH Runoff	0.103	2	474	1,507	------	------	------	D4d
30	Combine	0.241	2	474	3,561	26, 27, 28, 29	------	------	D4 - Post-Developed
32	SBUH Runoff	0.066	2	474	961	------	------	------	D5a
33	SBUH Runoff	0.001	2	480	38	------	------	------	D5b
34	SBUH Runoff	0.024	2	476	338	------	------	------	D5e
35	Combine	0.091	2	474	1,337	32, 33, 34	------	------	D5 - Post-Developed
37	Reservoir	0.192	2	480	1,126	12	100.79	259	Planter D1

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.189	2	478	1,108	18	100.79	191	Planter D2
39	Reservoir	0.181	2	478	685	24	100.79	197	Planter D3
40	Reservoir	0.216	2	478	852	30	100.80	224	Planter D4
42	Reservoir	0.215	2	474	3,156	12	100.80	160	Planter D1 - WQ Design
43	Reservoir	0.189	2	474	2,774	18	100.80	128	Planter D2 - WQ Design
44	Reservoir	0.205	2	474	3,017	24	100.80	122	Planter D3 - WQ Design
45	Reservoir	0.241	2	474	3,561	30	100.81	139	Planter D4 - WQ Design

Proposed Planters capable of conveying 100 Year storm flows

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

BASIN E PLANTERS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 11 - Planter E1

Pond Data

Contours -User defined. Contour area = 45.5 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Compute vol. -Beta defined. Cone slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 cuft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	182	0	0
0.27	97.52	182	9	9
0.55	97.80	182	9	18
0.82	98.07	182	9	27
1.10	98.35	182	9	36
1.37	98.62	182	9	45
1.64	98.89	182	9	54
1.92	99.17	182	9	63
2.19	99.44	182	9	72
2.47	99.72	182	9	81
2.74	99.99	182	9	90
2.75	100.00	182	2	92
3.00	100.25	182	45	137
3.25	100.50	182	45	183
3.50	100.75	182	45	228
3.58	100.83	182	15	243

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.50	0.00	0.00
Span (in)	= 12.00	0.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.300 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	9	97.52	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.55	18	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.027	---	0.028
0.82	27	98.07	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.027	---	0.030
1.10	36	98.35	0.01 ic	0.00 ic	---	---	0.00	---	---	---	0.027	---	0.032
1.37	45	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.033
1.64	54	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.033
1.92	63	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.034
2.19	72	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.035
2.47	81	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.036
2.74	90	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.036
2.75	92	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.036
3.00	137	100.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.037
3.25	183	100.50	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.037
3.50	228	100.75	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.027	---	0.038
3.58	243	100.83	0.37 ic	0.01 ic	---	---	0.35	---	---	---	0.027	---	0.393

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 5 - Planter E2

Pond Data

Contours -User defined Contour area = 56.5 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	234	0	0
0.27	97.52	234	12	12
0.55	97.80	234	12	23
0.82	98.07	234	12	35
1.10	98.35	234	12	46
1.37	98.62	234	12	58
1.64	98.89	234	12	69
1.92	99.17	234	12	81
2.19	99.44	234	12	92
2.47	99.72	234	12	104
2.74	99.99	234	12	115
2.75	100.00	234	2	118
3.00	100.25	234	58	176
3.25	100.50	234	58	235
3.50	100.75	234	58	293
3.58	100.83	234	19	312

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.60	0.00	0.00
Span (in)	= 12.00	0.60	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.300 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	12	97.52	0.00	0.00	---	---	0.00	---	---	---	0.034	---	0.034
0.55	23	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.034	---	0.036
0.82	35	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.039
1.10	46	98.35	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.041
1.37	58	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.043
1.64	69	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.044
1.92	81	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.045
2.19	92	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.046
2.47	104	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.047
2.74	115	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.048
2.75	118	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.048
3.00	176	100.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.034	---	0.049
3.25	235	100.50	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.034	---	0.050
3.50	293	100.75	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.034	---	0.050
3.58	312	100.83	0.37 ic	0.02 ic	---	---	0.35	---	---	---	0.034	---	0.406

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 3 - Planter E3

Pond Data

Contours -User defined. Top area = 128 sqft, Bottom area = 128 sqft, Total volume = 171 cuft

Top of Dam = 100.99 ft, Bottom elev = 97.25 ft, Depth = 3.74 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	128	0	0
0.27	97.52	128	6	6
0.55	97.80	128	6	13
0.82	98.07	128	6	19
1.10	98.35	128	6	25
1.37	98.62	128	6	32
1.64	98.89	128	6	38
1.92	99.17	128	6	44
2.19	99.44	128	6	51
2.47	99.72	128	6	57
2.74	99.99	128	6	63
2.75	100.00	128	1	64
3.25	100.50	128	64	128
3.50	100.75	128	32	160
3.58	100.83	128	10	171

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.00	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.550 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	6	97.52	0.00	0.00	---	---	0.00	---	---	---	0.005	---	0.005
0.55	13	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.005	---	0.007
0.82	19	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.018
1.10	25	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.005	---	0.024
1.37	32	98.62	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.005	---	0.028
1.64	38	98.89	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.005	---	0.032
1.92	44	99.17	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.005	---	0.035
2.19	51	99.44	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.005	---	0.038
2.47	57	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.005	---	0.041
2.74	63	99.99	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.005	---	0.044
2.75	64	100.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.005	---	0.044
3.25	128	100.50	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.005	---	0.048
3.50	160	100.75	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.005	---	0.050
3.58	171	100.83	0.40 ic	0.05 ic	---	---	0.35	---	---	---	0.005	---	0.405

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 7 - Planter E4

Pond Data

Contours -User defined Contour area, Conic sloped Used for Volume calculation, Begin at Elevation = 97.25 ft, Void ratio = 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	302	0	0
0.27	97.52	302	15	15
0.55	97.80	302	15	30
0.82	98.07	302	15	45
1.10	98.35	302	15	59
1.37	98.62	302	15	74
1.64	98.89	302	15	89
1.92	99.17	302	15	104
2.19	99.44	302	15	119
2.47	99.72	302	15	134
2.74	99.99	302	15	149
2.75	100.00	302	3	152
3.00	100.25	302	75	227
3.25	100.50	302	75	303
3.50	100.75	302	75	378
3.58	100.83	302	24	402

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.50	0.00	0.00
Span (in)	= 12.00	0.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr)	= 1.550 (by Contour)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	15	97.52	0.00	0.00	---	---	0.00	---	---	---	0.011	---	0.011
0.55	30	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.011	---	0.012
0.82	45	98.07	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.011	---	0.014
1.10	59	98.35	0.01 ic	0.00 ic	---	---	0.00	---	---	---	0.011	---	0.016
1.37	74	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.017
1.64	89	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.018
1.92	104	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.019
2.19	119	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.019
2.47	134	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.020
2.74	149	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.021
2.75	152	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.021
3.00	227	100.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.021
3.25	303	100.50	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.022
3.50	378	100.75	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.011	---	0.022
3.58	402	100.83	0.37 ic	0.01 ic	---	---	0.35	---	---	---	0.011	---	0.377

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 9 - Planter E5

Pond Data

Contours -User defined contour area: 49.5 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Compute vol. for preliminary purposes only. Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 cuft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	198	0	0
0.27	97.52	198	10	10
0.55	97.80	198	10	20
0.82	98.07	198	10	29
1.10	98.35	198	10	39
1.37	98.62	198	10	49
1.64	98.89	198	10	59
1.92	99.17	198	10	68
2.19	99.44	198	10	78
2.47	99.72	198	10	88
2.74	99.99	198	10	98
2.75	100.00	198	2	100
3.00	100.25	198	49	149
3.25	100.50	198	49	199
3.50	100.75	198	49	248
3.58	100.83	198	16	264

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.40	0.00	0.00
Span (in)	= 12.00	1.40	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.550 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	10	97.52	0.00	0.00	---	---	0.00	---	---	---	0.007	---	0.007
0.55	20	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.007	---	0.010
0.82	29	98.07	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.007	---	0.034
1.10	39	98.35	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.007	---	0.045
1.37	49	98.62	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.007	---	0.053
1.64	59	98.89	0.06 ic	0.05 ic	---	---	0.00	---	---	---	0.007	---	0.061
1.92	68	99.17	0.06 ic	0.06 ic	---	---	0.00	---	---	---	0.007	---	0.067
2.19	78	99.44	0.07 ic	0.07 ic	---	---	0.00	---	---	---	0.007	---	0.073
2.47	88	99.72	0.07 ic	0.07 ic	---	---	0.00	---	---	---	0.007	---	0.078
2.74	98	99.99	0.08 ic	0.08 ic	---	---	0.00	---	---	---	0.007	---	0.083
2.75	100	100.00	0.08 ic	0.08 ic	---	---	0.00	---	---	---	0.007	---	0.083
3.00	149	100.25	0.08 ic	0.08 ic	---	---	0.00	---	---	---	0.007	---	0.088
3.25	199	100.50	0.08 ic	0.08 ic	---	---	0.00	---	---	---	0.007	---	0.092
3.50	248	100.75	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.007	---	0.095
3.58	264	100.83	0.46 ic	0.09 ic	---	---	0.35	---	---	---	0.007	---	0.451

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 13 - Planter E6

Pond Data

Contours -User defined. Top area = 140 sqft, Bottom area = 140 sqft, Total depth = 2.74 ft, Volume = 100.99 cuft

Contour interval = 0.01 ft, Bottom elev. = 97.25 ft, Side slope = 0.00:1, Bottom length = 140.00 ft, Bottom width = 1.00 ft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	140	0	0
0.27	97.52	140	7	7
0.55	97.80	140	7	14
0.82	98.07	140	7	21
1.10	98.35	140	7	28
1.37	98.62	140	7	35
1.64	98.89	140	7	41
1.92	99.17	140	7	48
2.19	99.44	140	7	55
2.47	99.72	140	7	62
2.74	99.99	140	7	69
2.75	100.00	140	1	70
3.25	100.50	140	70	140
3.50	100.75	140	35	175
3.58	100.83	140	11	187

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.60	0.00	0.00
Span (in)	= 12.00	0.60	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.550 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	7	97.52	0.00	0.00	---	---	0.00	---	---	---	0.005	---	0.005
0.55	14	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.005	---	0.006
0.82	21	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.010
1.10	28	98.35	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.012
1.37	35	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.014
1.64	41	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.015
1.92	48	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.016
2.19	55	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.017
2.47	62	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.018
2.74	69	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.019
2.75	70	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.005	---	0.019
3.25	140	100.50	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.005	---	0.021
3.50	175	100.75	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.005	---	0.021
3.58	187	100.83	0.37 ic	0.02 ic	---	---	0.35	---	---	---	0.005	---	0.376

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 2 - Planter E7

Pond Data

Contours -User defined Contour area = 180 sqft, Top elev = 100.00 ft, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 180 cuft

Contours -User defined Contour area = 180 sqft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, = 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	180	0	0
0.27	97.52	180	9	9
0.55	97.80	180	9	18
0.82	98.07	180	9	27
1.10	98.35	180	9	36
1.37	98.62	180	9	44
1.64	98.89	180	9	53
1.92	99.17	180	9	62
2.19	99.44	180	9	71
2.47	99.72	180	9	80
2.74	99.99	180	9	89
2.75	100.00	180	2	91
3.00	100.25	180	45	136
3.25	100.50	180	45	181
3.50	100.75	180	45	226
3.58	100.83	180	14	240

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.60	0.00	0.00
Span (in)	= 12.00	0.60	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr)	= 6.300 (by Contour)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	9	97.52	0.00	0.00	---	---	0.00	---	---	---	0.026	---	0.026
0.55	18	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.026	---	0.028
0.82	27	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.031
1.10	36	98.35	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.033
1.37	44	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.035
1.64	53	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.036
1.92	62	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.037
2.19	71	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.038
2.47	80	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.039
2.74	89	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.040
2.75	91	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.040
3.00	136	100.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.026	---	0.041
3.25	181	100.50	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.026	---	0.042
3.50	226	100.75	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.026	---	0.043
3.58	240	100.83	0.37 ic	0.02 ic	---	---	0.35	---	---	---	0.026	---	0.398

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	0.014	0.216	0.001	-------	-------	0.443	-------	0.580	exEa
2	SBUH Runoff	------	0.007	0.108	0.001	-------	-------	0.222	-------	0.291	exEb
3	SBUH Runoff	------	0.007	0.058	0.001	-------	-------	0.110	-------	0.140	exEe
4	SBUH Runoff	------	0.163	0.479	0.064	-------	-------	0.750	-------	0.904	exEd (Overlay)
5	Combine	1, 2, 3, 4	0.189	0.858	0.064	-------	-------	1.522	-------	1.913	exE - Pre-Developed
7	SBUH Runoff	------	0.009	0.026	0.003	-------	-------	0.040	-------	0.049	E1a
8	SBUH Runoff	------	0.000	0.001	0.000	-------	-------	0.004	-------	0.006	E1b
9	SBUH Runoff	------	0.001	0.012	0.000	-------	-------	0.024	-------	0.031	E1c
10	SBUH Runoff	------	0.011	0.033	0.004	-------	-------	0.052	-------	0.062	E1d
11	Combine	7, 8, 9, 10	0.021	0.071	0.008	-------	-------	0.119	-------	0.147	E1 - Post Developed
13	SBUH Runoff	------	0.010	0.029	0.004	-------	-------	0.045	-------	0.054	E2a
14	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.007	-------	0.010	E2b
15	SBUH Runoff	------	0.001	0.017	0.000	-------	-------	0.034	-------	0.045	E2c
16	SBUH Runoff	------	0.015	0.045	0.006	-------	-------	0.071	-------	0.085	E2d
17	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.001	-------	0.001	E2e
18	Combine	13, 14, 15, 16, 17	0.026	0.092	0.010	-------	-------	0.157	-------	0.195	E2 - Post-Developed
20	SBUH Runoff	------	0.007	0.020	0.003	-------	-------	0.031	-------	0.037	E3a
21	SBUH Runoff	------	0.000	0.001	0.000	-------	-------	0.003	-------	0.004	E3b
22	SBUH Runoff	------	0.001	0.011	0.000	-------	-------	0.023	-------	0.030	E3c
23	SBUH Runoff	------	0.011	0.032	0.004	-------	-------	0.050	-------	0.060	E3d
24	Combine	20, 21, 22, 23	0.018	0.063	0.007	-------	-------	0.107	-------	0.132	E3 - Post-Developed
26	SBUH Runoff	------	0.006	0.017	0.002	-------	-------	0.027	-------	0.033	E4a
27	SBUH Runoff	------	0.000	0.001	0.000	-------	-------	0.003	-------	0.004	E4b
28	SBUH Runoff	------	0.001	0.013	0.000	-------	-------	0.027	-------	0.036	E4c
29	SBUH Runoff	------	0.012	0.037	0.005	-------	-------	0.057	-------	0.069	E4d
30	Combine	26, 27, 28, 29	0.019	0.068	0.007	-------	-------	0.114	-------	0.142	E4 - Post-Developed
32	SBUH Runoff	------	0.015	0.043	0.006	-------	-------	0.068	-------	0.082	E5a
33	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.008	-------	0.013	E5b
34	SBUH Runoff	------	0.001	0.015	0.000	-------	-------	0.031	-------	0.041	E5c
35	SBUH Runoff	------	0.019	0.056	0.007	-------	-------	0.087	-------	0.105	E5d
36	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.004	-------	0.006	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
37	Combine	32, 33, 34, 35, 36	0.035	0.118	0.013	-------	-------	0.198	-------	0.245	E5 - Post-Developed
39	SBUH Runoff	------	0.003	0.010	0.001	-------	-------	0.016	-------	0.019	E6a
40	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.001	-------	0.002	E6b
41	SBUH Runoff	------	0.001	0.008	0.000	-------	-------	0.017	-------	0.023	E6c
42	SBUH Runoff	------	0.008	0.023	0.003	-------	-------	0.037	-------	0.044	E6d
43	Combine	39, 40, 41, 42	0.012	0.042	0.004	-------	-------	0.071	-------	0.088	E6 - Post-Developed
45	SBUH Runoff	------	0.011	0.032	0.004	-------	-------	0.051	-------	0.061	E7a
46	SBUH Runoff	------	0.000	0.000	0.000	-------	-------	0.002	-------	0.003	E7b
47	SBUH Runoff	------	0.001	0.010	0.000	-------	-------	0.020	-------	0.027	E7c
48	SBUH Runoff	------	0.012	0.035	0.005	-------	-------	0.055	-------	0.066	E7d
49	Combine	45, 46, 47, 48	0.023	0.077	0.009	-------	-------	0.127	-------	0.156	E7 - Post-Developed
51	SBUH Runoff	------	0.076	0.222	0.030	-------	-------	0.348	-------	0.419	E8a
52	SBUH Runoff	------	0.000	0.005	0.000	-------	-------	0.018	-------	0.028	E8b
53	SBUH Runoff	------	0.001	0.017	0.000	-------	-------	0.034	-------	0.045	E8c
54	SBUH Runoff	------	0.074	0.218	0.029	-------	-------	0.341	-------	0.411	E8d
55	Combine	51, 52, 53, 54	0.151	0.461	0.058	-------	-------	0.741	-------	0.902	E8 - Post-Developed
57	Reservoir	11	0.000	0.009	0.000	-------	-------	0.011	-------	0.103	Planter E1
58	Reservoir	18	0.000	0.013	0.000	-------	-------	0.016	-------	0.138	Planter E2
59	Reservoir	24	0.012	0.039	0.000	-------	-------	0.045	-------	0.128	Planter E3
60	Reservoir	30	0.000	0.010	0.000	-------	-------	0.021	-------	0.088	Planter E4
61	Reservoir	37	0.025	0.077	0.000	-------	-------	0.118	-------	0.246	Planter E5
62	Reservoir	43	0.003	0.014	0.000	-------	-------	0.016	-------	0.073	Planter E6
63	Reservoir	49	0.000	0.014	0.000	-------	-------	0.021	-------	0.130	Planter E7
65	Reservoir	11	0.019	0.025	0.007	-------	-------	0.120	-------	0.147	Planter E1 - WQ Design
66	Reservoir	18	0.024	0.032	0.009	-------	-------	0.157	-------	0.195	Planter E2 -WQ Design
67	Reservoir	24	0.017	0.040	0.006	-------	-------	0.106	-------	0.132	Planter E3- WQ Design
68	Reservoir	30	0.018	0.042	0.007	-------	-------	0.042	-------	0.069	Planter E4- WQ Design
69	Reservoir	37	0.027	0.118	0.012	-------	-------	0.198	-------	0.245	Planter E5- WQ Design
70	Reservoir	43	0.011	0.019	0.004	-------	-------	0.048	-------	0.089	Planter E6 - WQ Design
71	Reservoir	49	0.022	0.025	0.008	-------	-------	0.132	-------	0.156	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.014	2	482	498	------	------	------	exEa
2	SBUH Runoff	0.007	2	482	250	------	------	------	exEb
3	SBUH Runoff	0.007	2	480	157	------	------	------	exEe
4	SBUH Runoff	0.163	2	474	2,291	------	------	------	exEd (Overlay)
5	Combine	0.189	2	478	3,196	1, 2, 3, 4	------	------	exE - Pre-Developed
7	SBUH Runoff	0.009	2	474	123	------	------	------	E1a
8	SBUH Runoff	0.000	2	1436	1	------	------	------	E1b
9	SBUH Runoff	0.001	2	482	27	------	------	------	E1c
10	SBUH Runoff	0.011	2	474	158	------	------	------	E1d
11	Combine	0.021	2	476	308	7, 8, 9, 10	------	------	E1 - Post Developed
13	SBUH Runoff	0.010	2	474	138	------	------	------	E2a
14	SBUH Runoff	0.000	2	1436	1	------	------	------	E2b
15	SBUH Runoff	0.001	2	482	39	------	------	------	E2c
16	SBUH Runoff	0.015	2	474	215	------	------	------	E2d
17	SBUH Runoff	0.000	2	480	1	------	------	------	E2e
18	Combine	0.026	2	476	394	13, 14, 15, 16, 17	------	------	E2 - Post-Developed
20	SBUH Runoff	0.007	2	474	95	------	------	------	E3a
21	SBUH Runoff	0.000	2	1436	0	------	------	------	E3b
22	SBUH Runoff	0.001	2	482	26	------	------	------	E3c
23	SBUH Runoff	0.011	2	474	152	------	------	------	E3d
24	Combine	0.018	2	476	273	20, 21, 22, 23	------	------	E3 - Post-Developed
26	SBUH Runoff	0.006	2	474	83	------	------	------	E4a
27	SBUH Runoff	0.000	2	1436	0	------	------	------	E4b
28	SBUH Runoff	0.001	2	482	31	------	------	------	E4c
29	SBUH Runoff	0.012	2	474	175	------	------	------	E4d
30	Combine	0.019	2	476	290	26, 27, 28, 29	------	------	E4 - Post-Developed
32	SBUH Runoff	0.015	2	474	207	------	------	------	E5a
33	SBUH Runoff	0.000	2	1436	1	------	------	------	E5b
34	SBUH Runoff	0.001	2	482	35	------	------	------	E5c
35	SBUH Runoff	0.019	2	474	267	------	------	------	E5d
36	SBUH Runoff	0.000	2	480	6	------	------	------	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
37	Combine	0.035	2	476	516	32, 33, 34, 35, 36	------	------	E5 - Post-Developed
39	SBUH Runoff	0.003	2	474	49	------	------	------	E6a
40	SBUH Runoff	0.000	2	1436	0	------	------	------	E6b
41	SBUH Runoff	0.001	2	482	19	------	------	------	E6c
42	SBUH Runoff	0.008	2	474	112	------	------	------	E6d
43	Combine	0.012	2	476	180	39, 40, 41, 42	------	------	E6 - Post-Developed
45	SBUH Runoff	0.011	2	474	155	------	------	------	E7a
46	SBUH Runoff	0.000	2	1436	0	------	------	------	E7b
47	SBUH Runoff	0.001	2	482	23	------	------	------	E7c
48	SBUH Runoff	0.012	2	474	167	------	------	------	E7d
49	Combine	0.023	2	476	345	45, 46, 47, 48	------	------	E7 - Post-Developed
51	SBUH Runoff	0.076	2	474	1,062	------	------	------	E8a
52	SBUH Runoff	0.000	2	1436	3	------	------	------	E8b
53	SBUH Runoff	0.001	2	482	39	------	------	------	E8c
54	SBUH Runoff	0.074	2	474	1,042	------	------	------	E8d
55	Combine	0.151	2	474	2,146	51, 52, 53, 54	------	------	E8 - Post-Developed
57	Reservoir	0.000	2	492	0	11	97.46	6.81	Planter E1
58	Reservoir	0.000	2	496	0	18	97.45	8.60	Planter E2
59	Reservoir	0.012	2	482	33	24	97.99	17.1	Planter E3
60	Reservoir	0.000	2	986	0	30	97.52	23.3	Planter E4
61	Reservoir	0.025	2	482	88	37	98.05	28.6	Planter E5
62	Reservoir	0.003	2	490	5	43	97.86	15.3	Planter E6
63	Reservoir	0.000	2	368	0	49	97.49	7.73	Planter E7
65	Reservoir	0.019	2	482	308	11	100.06	11.4	Planter E1 - WQ Design
66	Reservoir	0.024	2	482	393	18	100.06	14.4	Planter E2 -WQ Design
67	Reservoir	0.017	2	482	273	24	100.08	10.0	Planter E3- WQ Design
68	Reservoir	0.018	2	482	289	30	100.03	10.5	Planter E4- WQ Design
69	Reservoir	0.027	2	478	516	37	100.10	21.6	Planter E5- WQ Design
70	Reservoir	0.011	2	482	180	43	100.05	6.55	Planter E6 - WQ Design
71	Reservoir	0.022	2	482	344	49	100.07	12.9	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

WQ planter will fully infiltrate through 18 inch soil media without reaching overflow

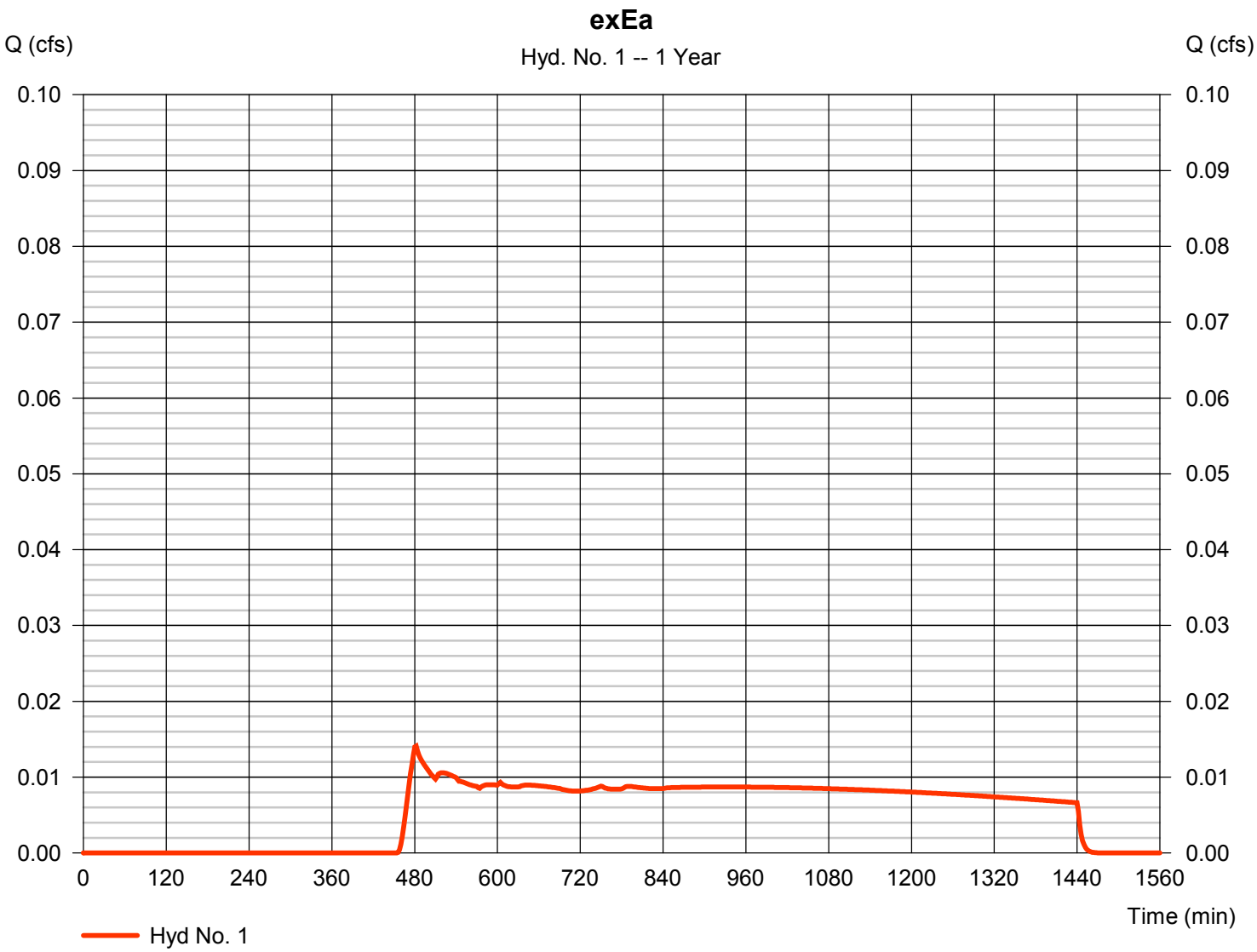
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 1

exEa

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 498 cuft
Drainage area	= 0.694 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



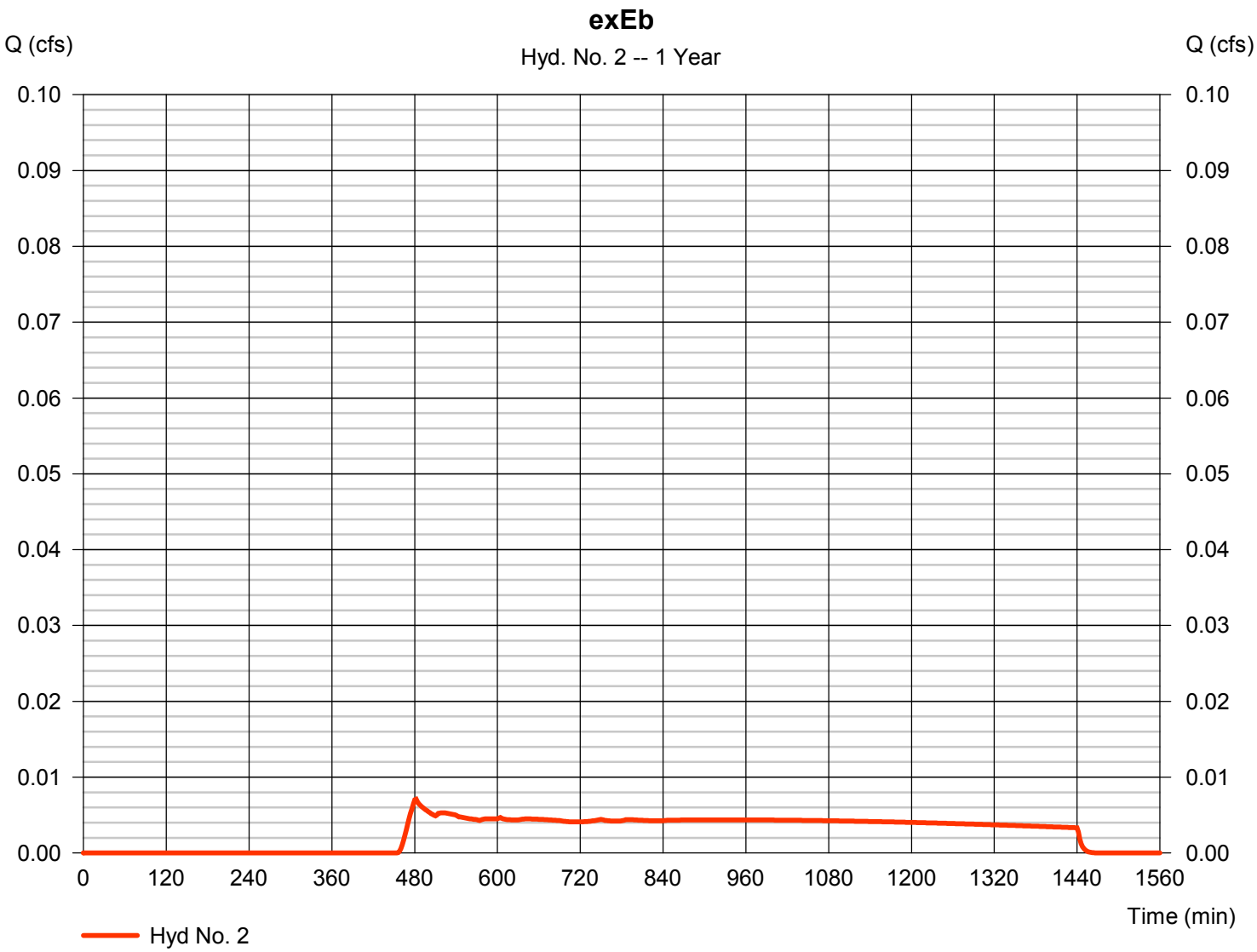
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 2

exEb

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 250 cuft
Drainage area	= 0.348 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



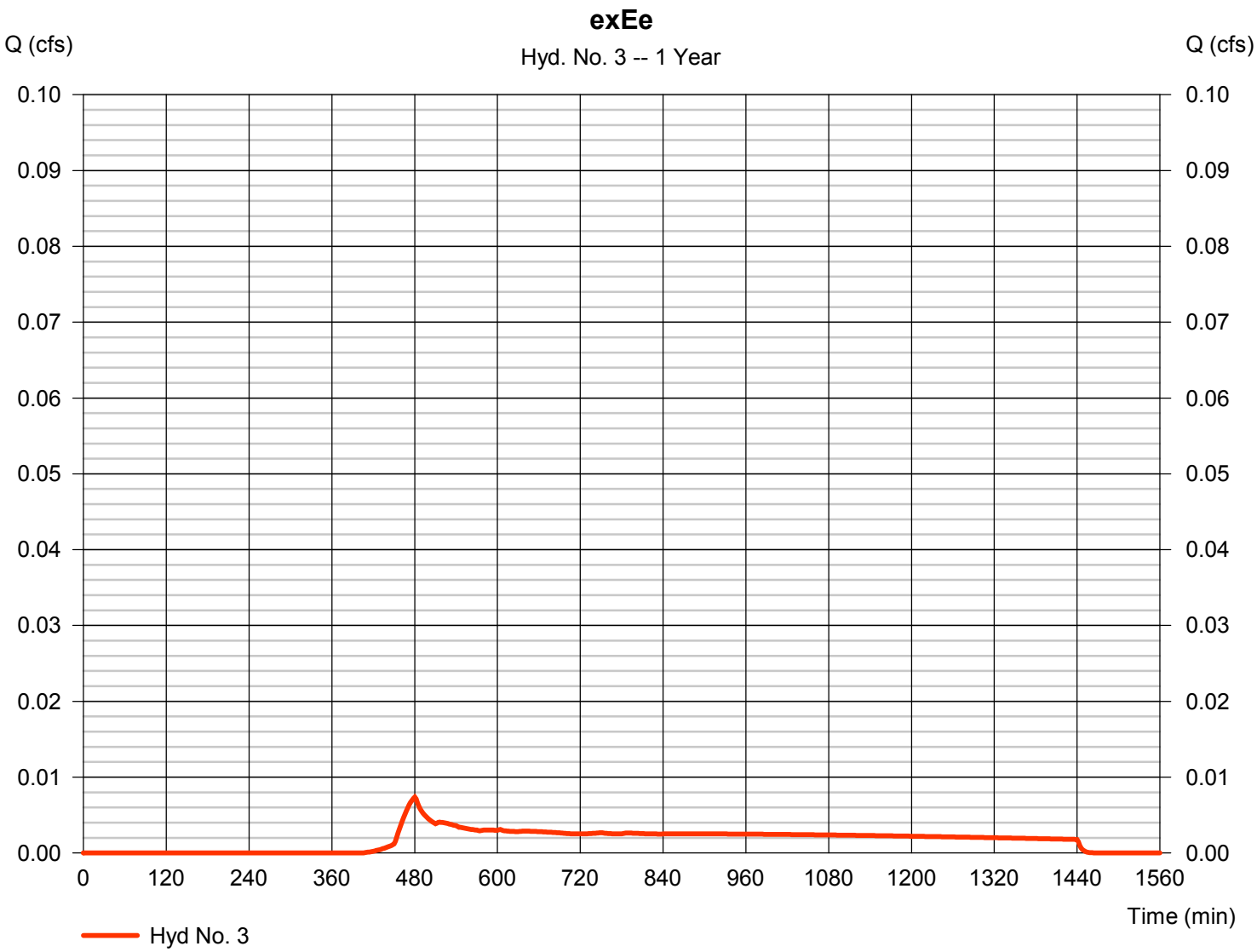
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 3

exEe

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 157 cuft
Drainage area	= 0.152 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



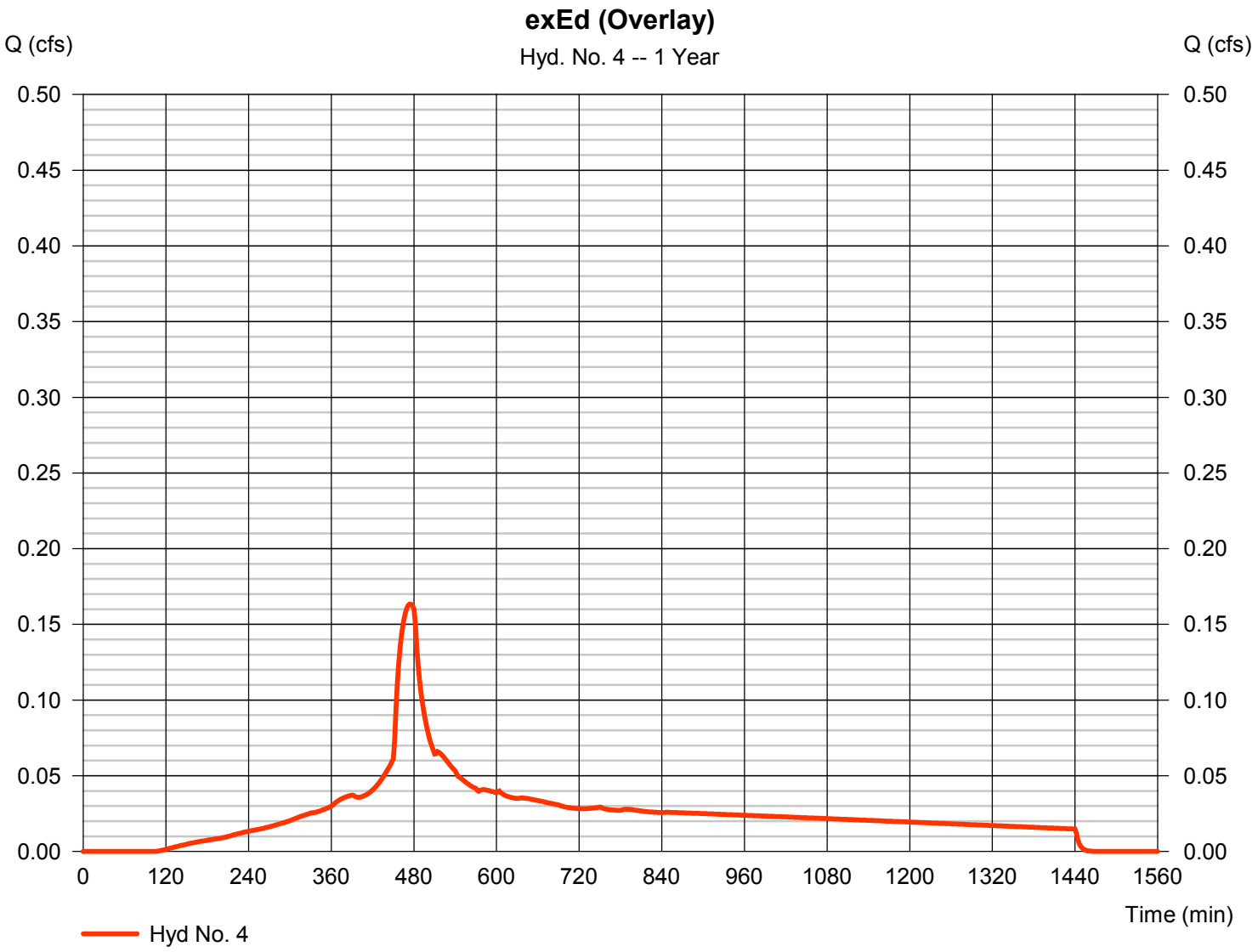
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 4

exEd (Overlay)

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.163 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 2,291 cuft
Drainage area	= 0.798 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



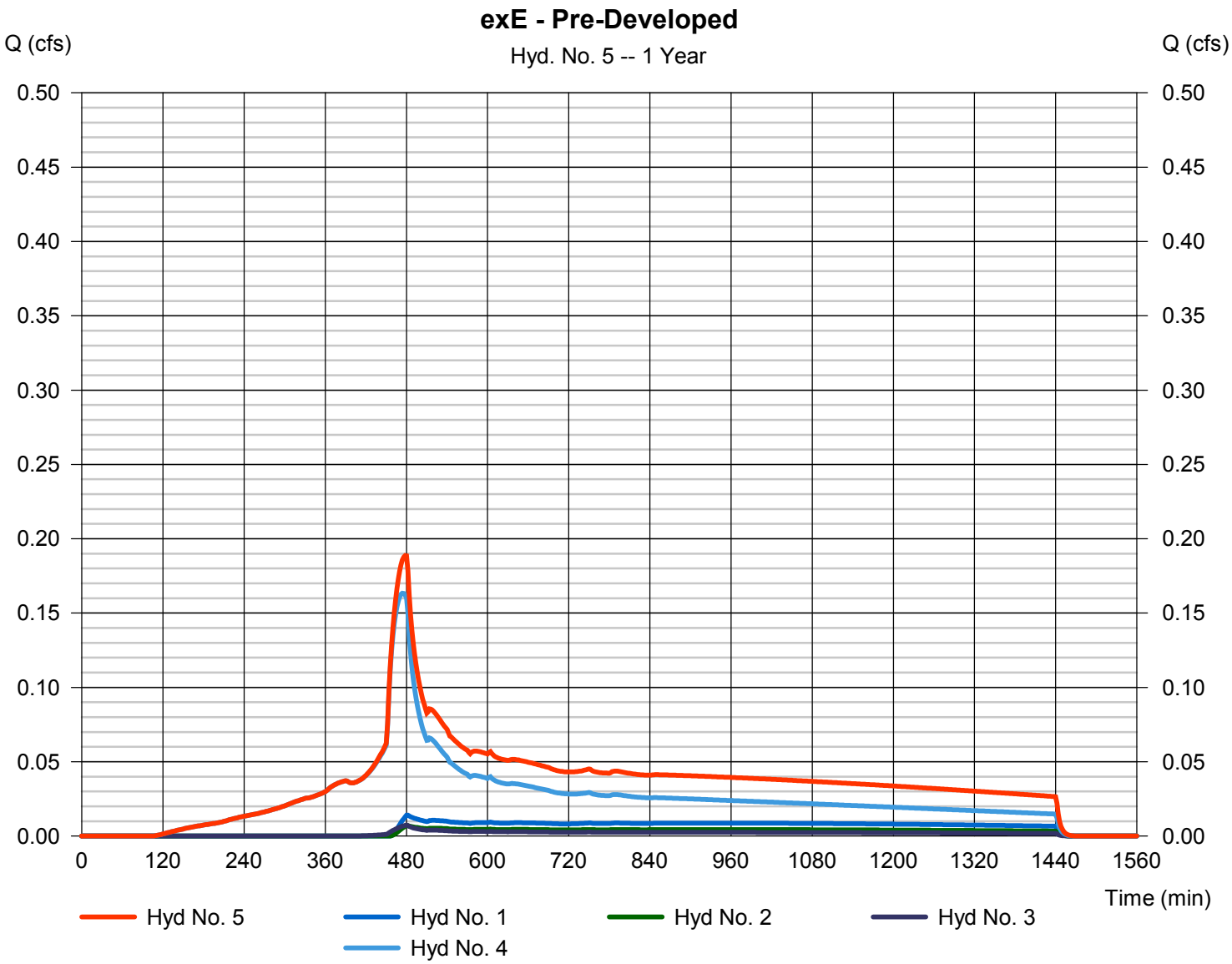
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 5

exE - Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 0.189 cfs
Storm frequency	= 1 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 3,196 cuft
Inflow hyds.	= 1, 2, 3, 4	Contrib. drain. area	= 1.992 ac



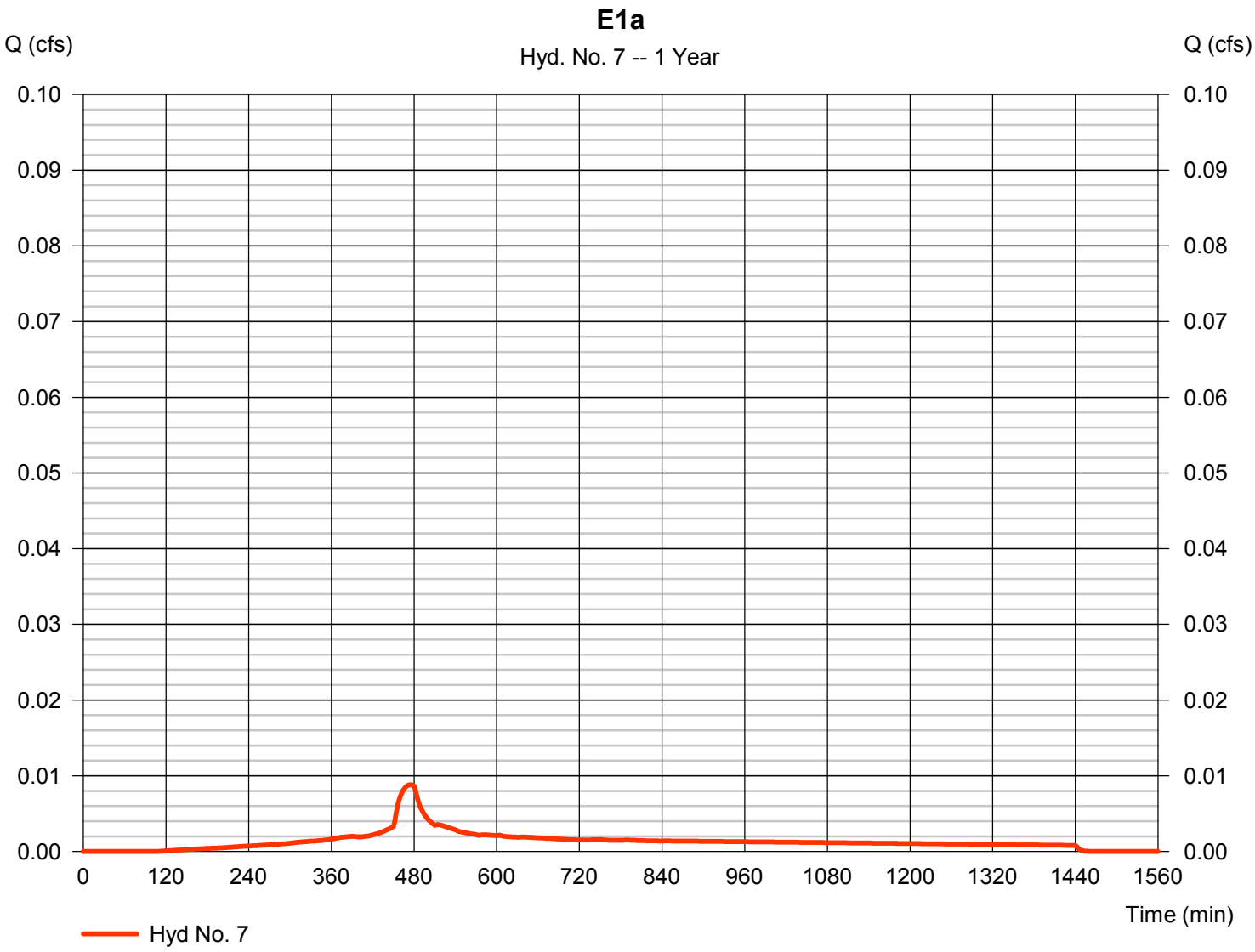
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 7

E1a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 123 cuft
Drainage area	= 0.043 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



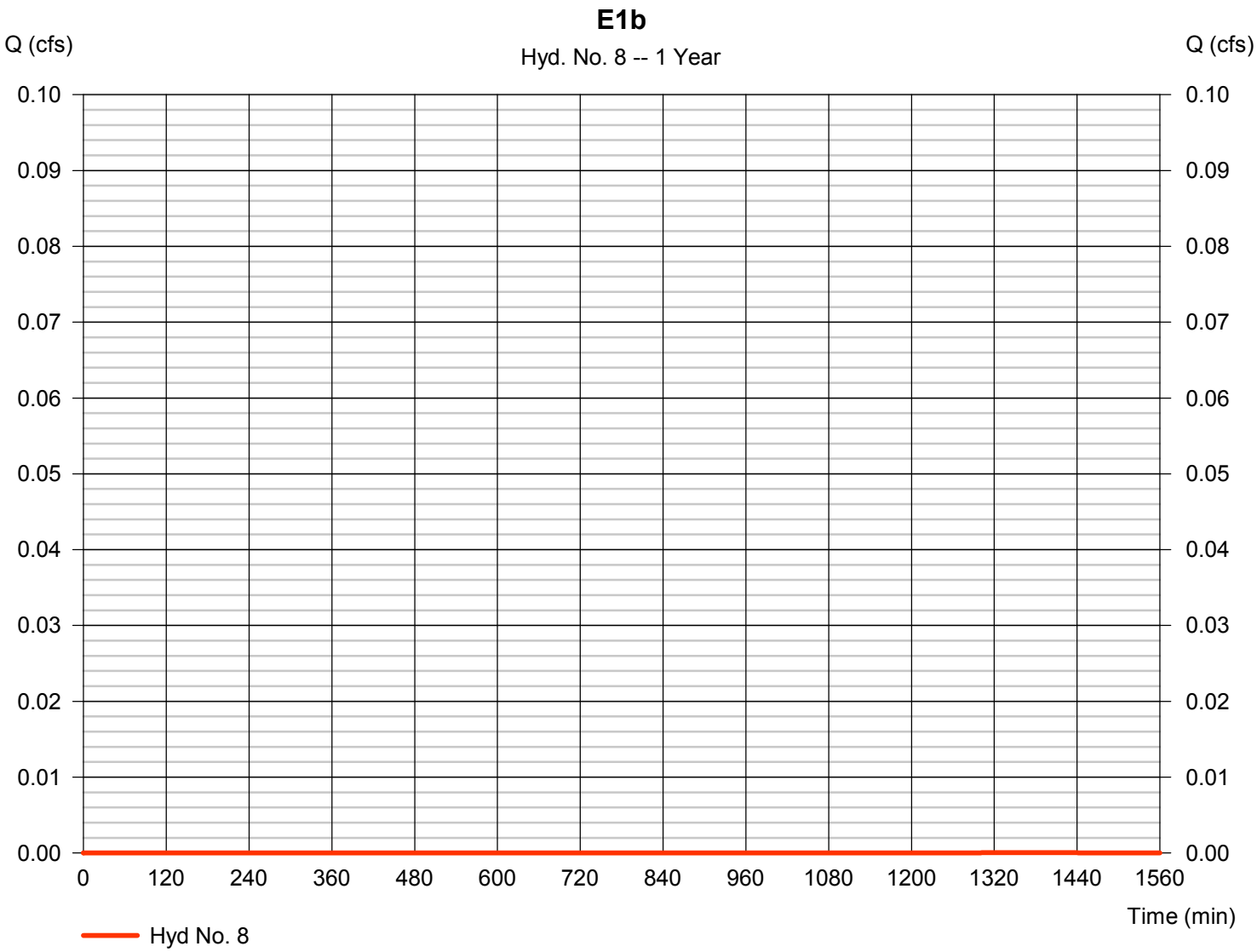
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 8

E1b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.013 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



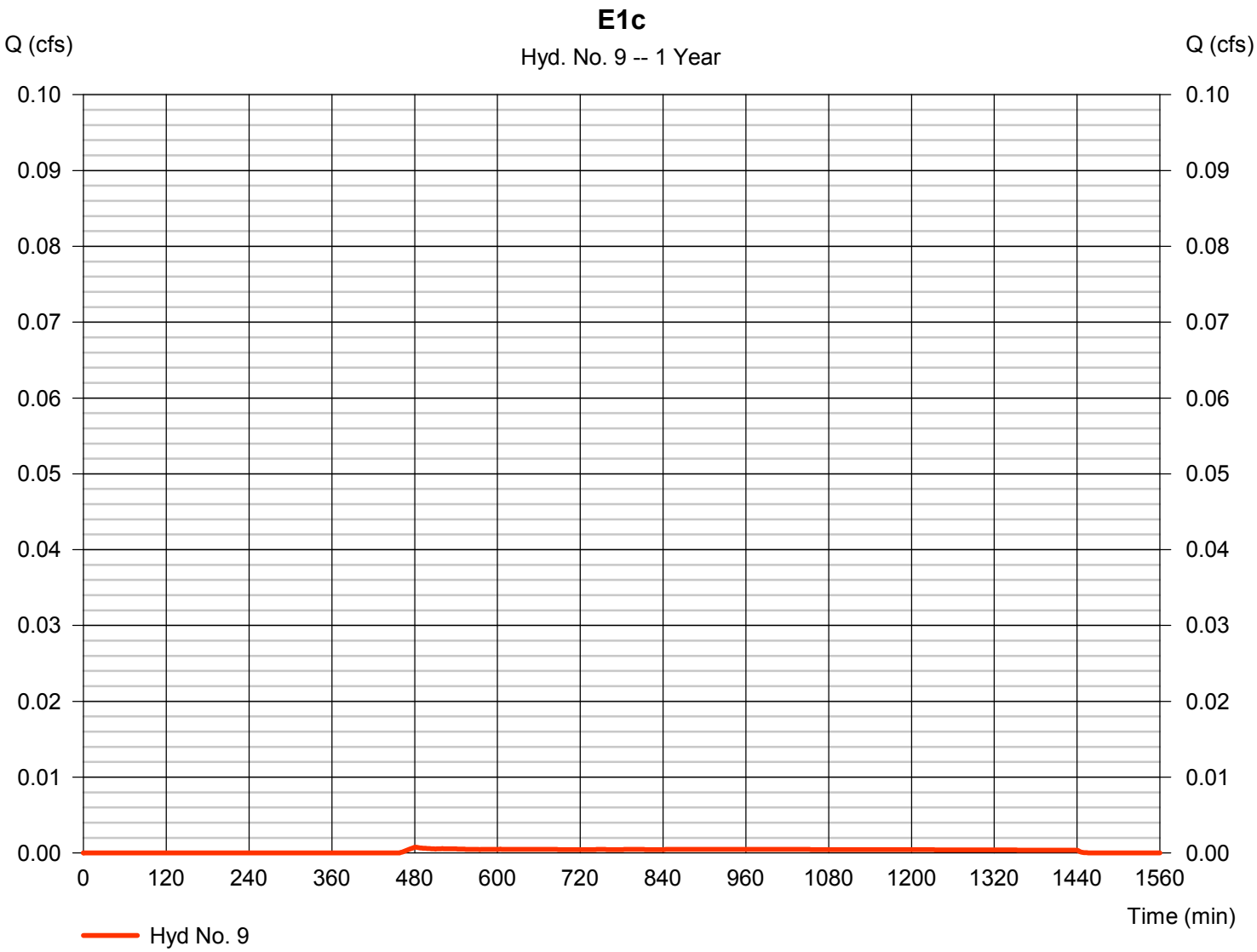
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 9

E1c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 27 cuft
Drainage area	= 0.037 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



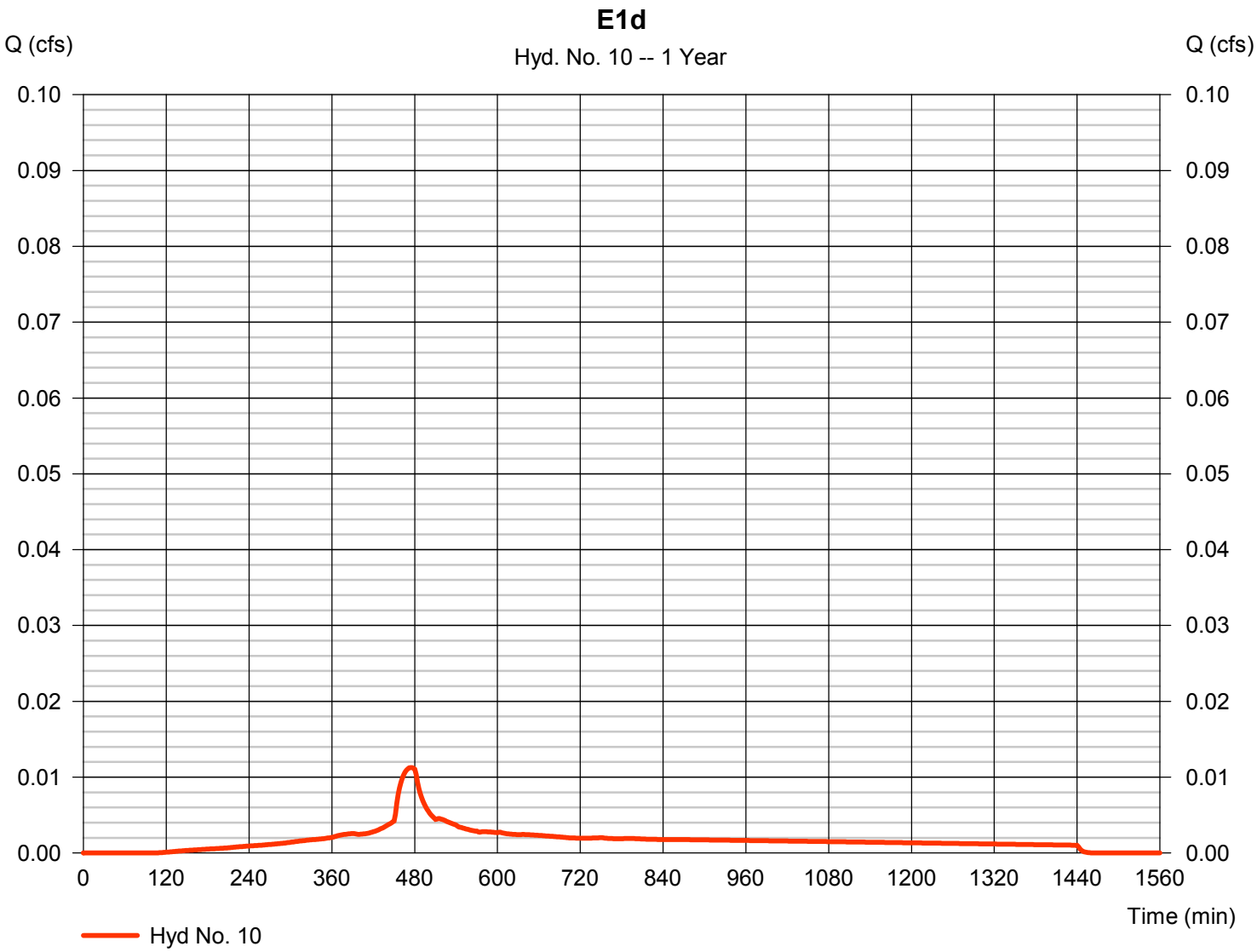
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 10

E1d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.011 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 158 cuft
Drainage area	= 0.055 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



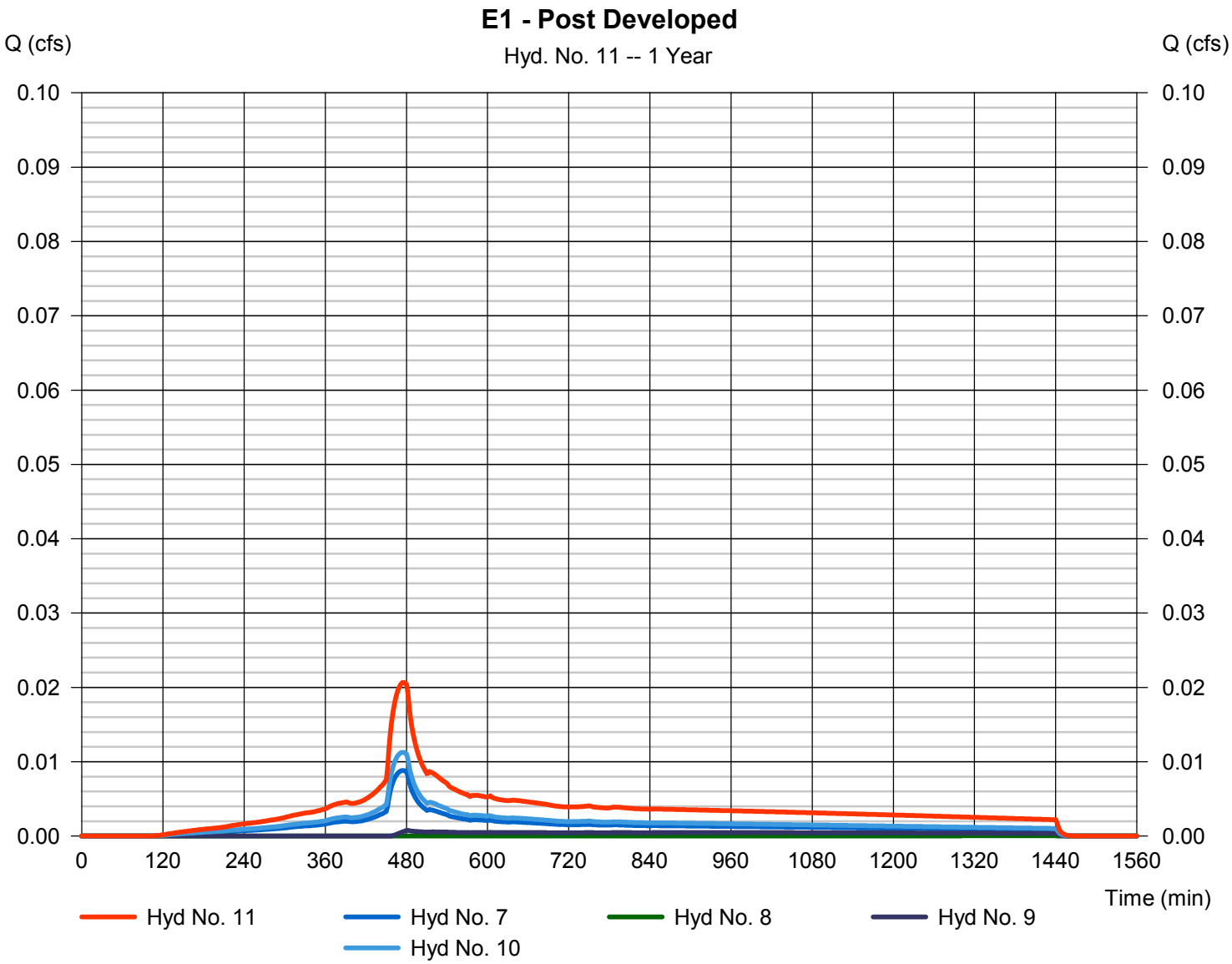
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 11

E1 - Post Developed

Hydrograph type	= Combine	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 308 cuft
Inflow hyds.	= 7, 8, 9, 10	Contrib. drain. area	= 0.148 ac



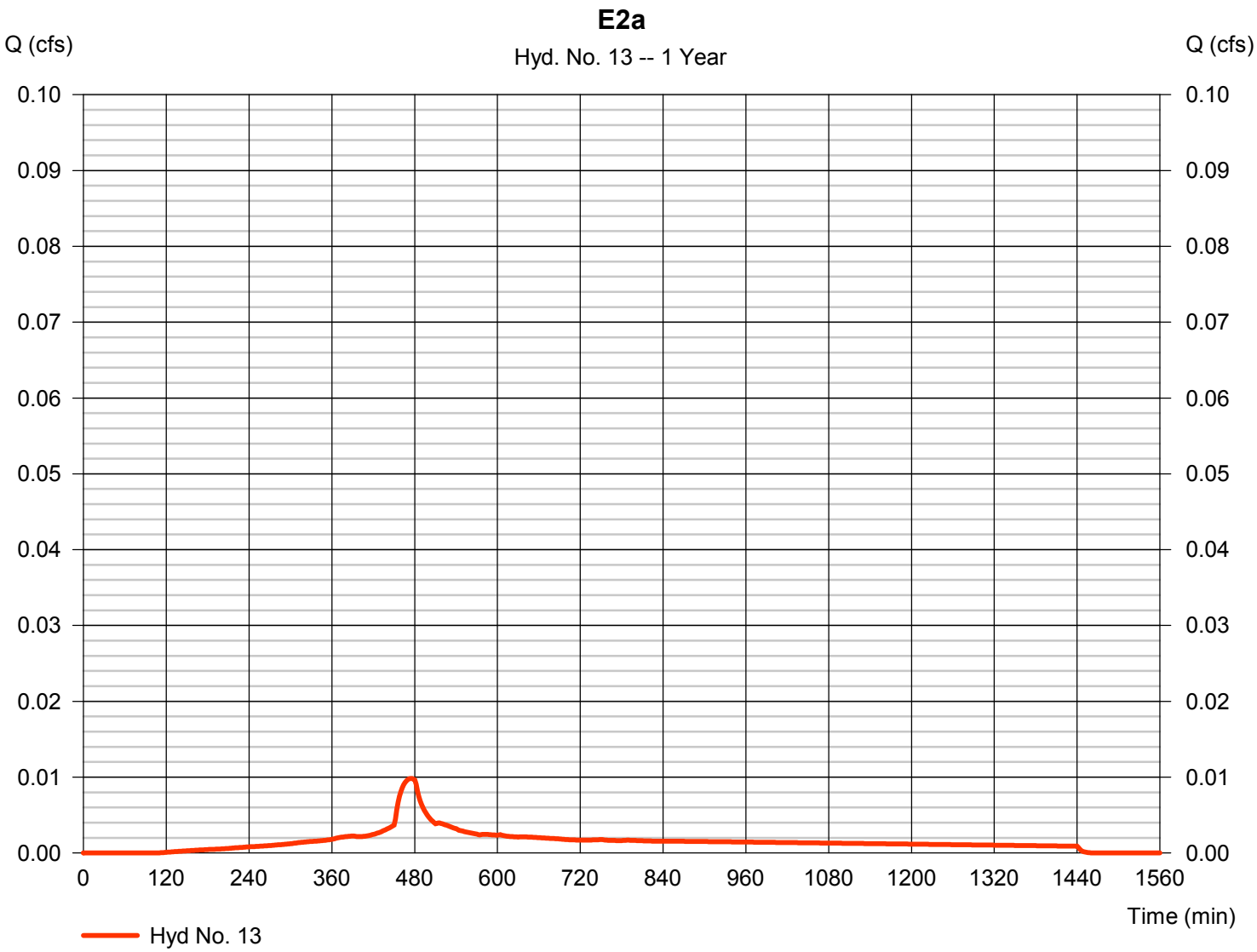
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 13

E2a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 138 cuft
Drainage area	= 0.048 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



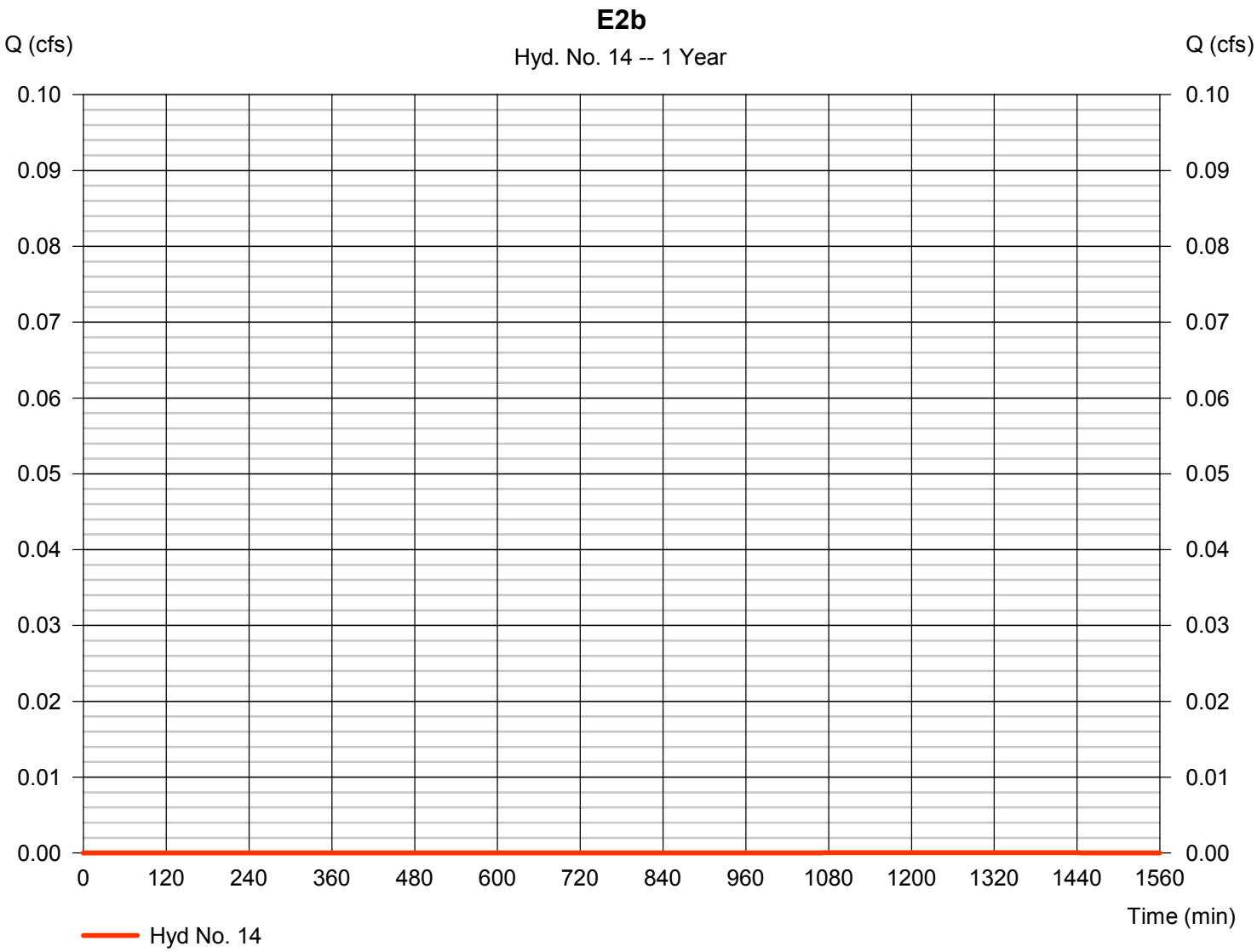
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 14

E2b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.023 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



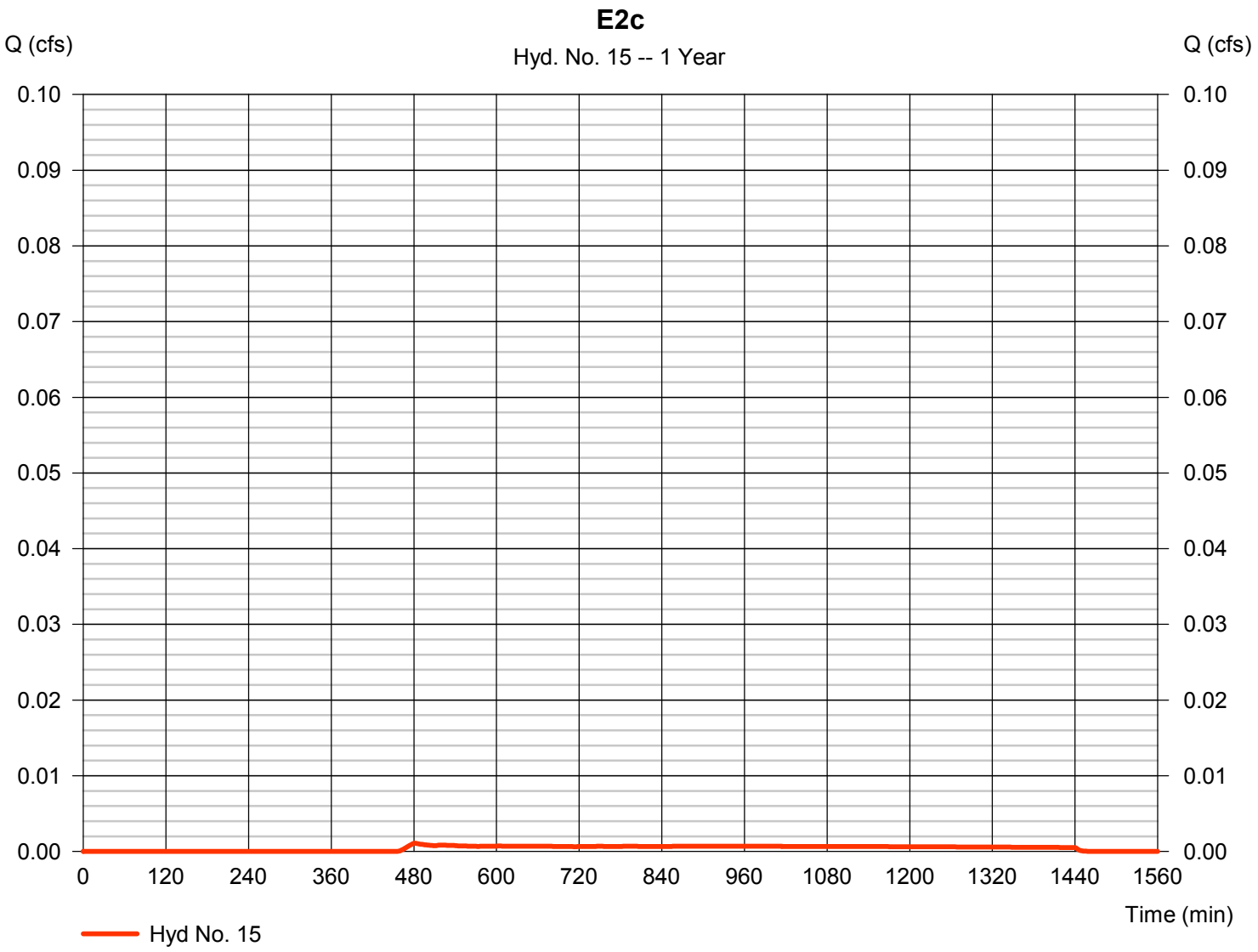
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 15

E2c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 39 cuft
Drainage area	= 0.054 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



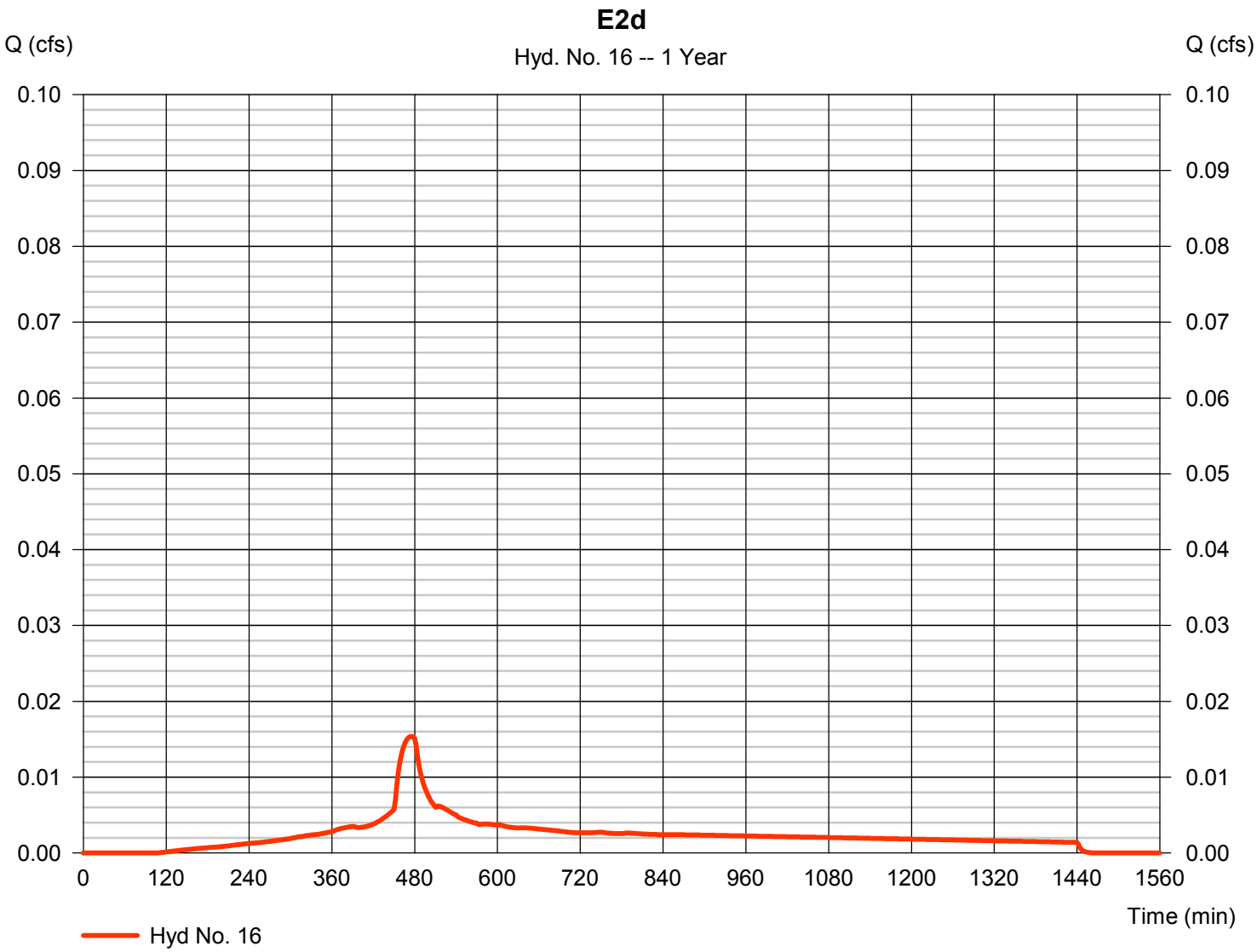
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 16

E2d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 215 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



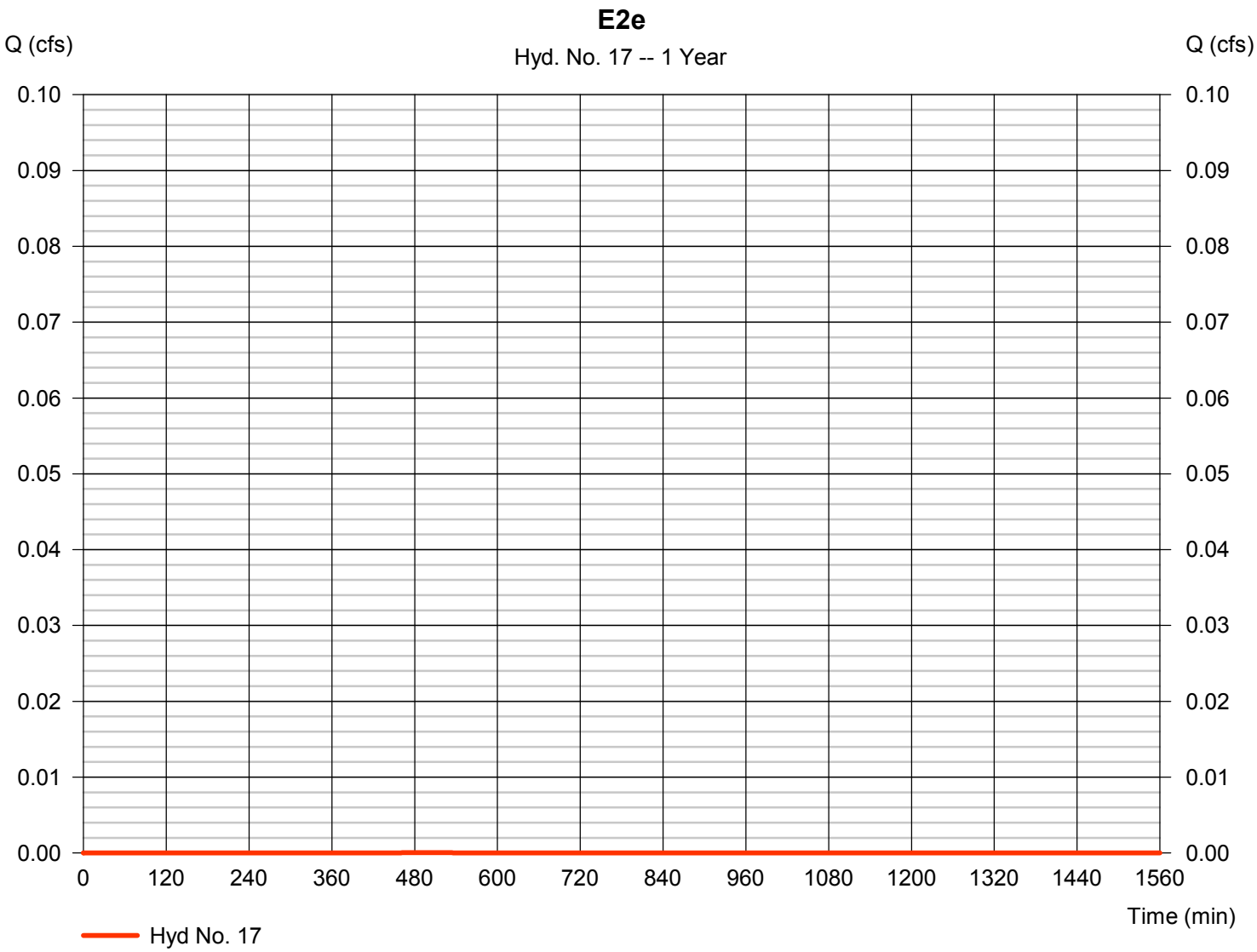
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 17

E2e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.001 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



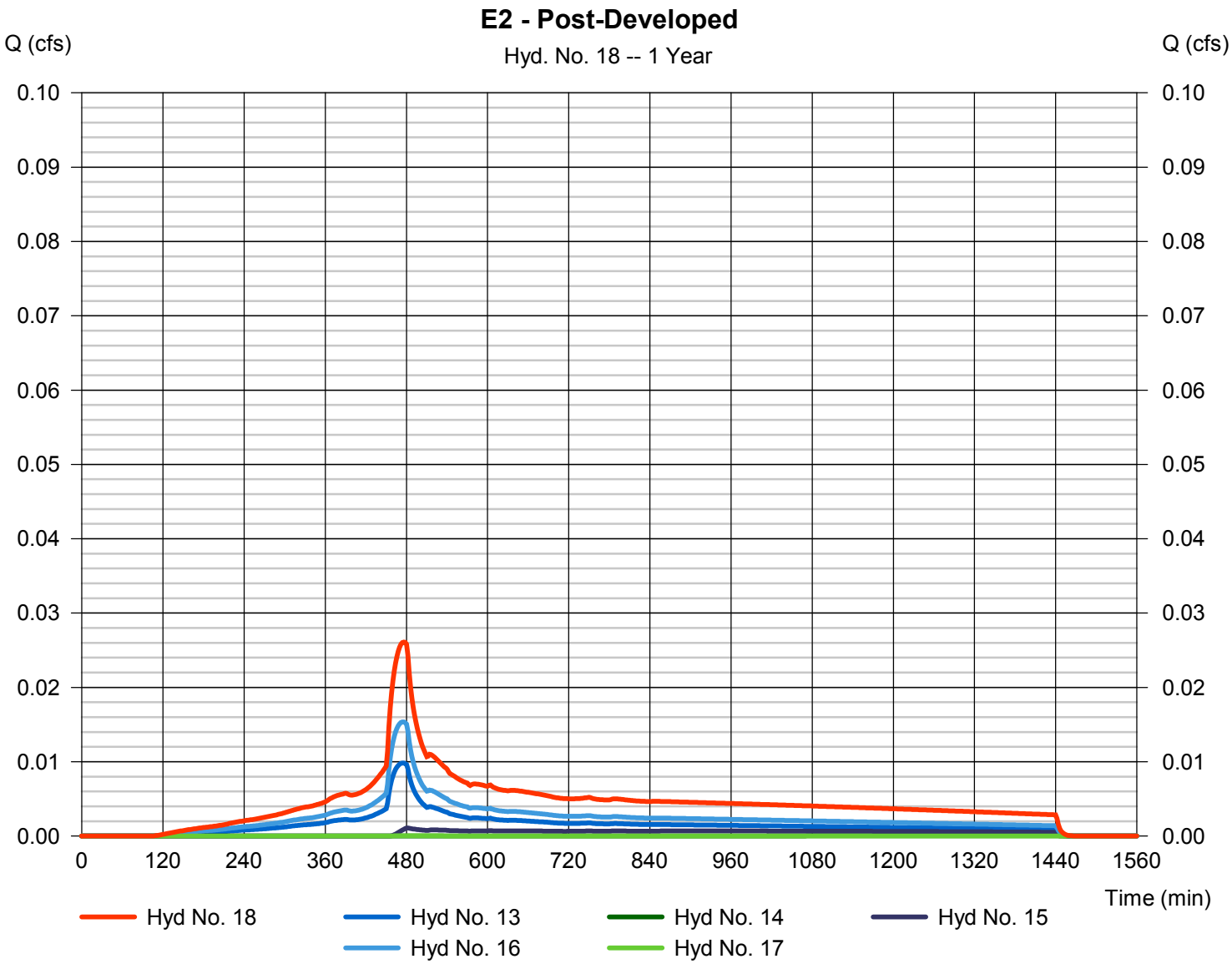
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 18

E2 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.026 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 394 cuft
Inflow hyds.	= 13, 14, 15, 16, 17	Contrib. drain. area	= 0.201 ac



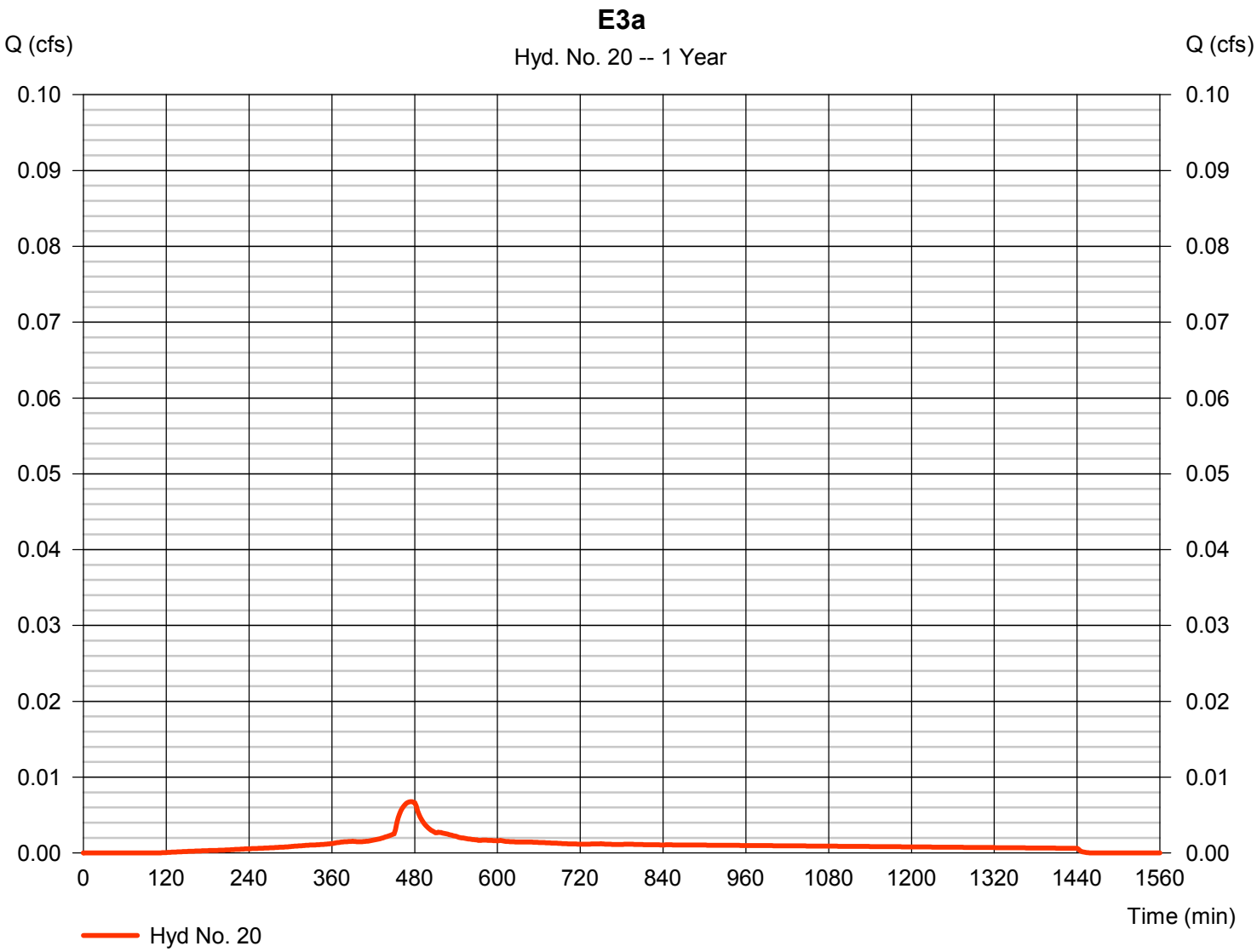
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 20

E3a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 95 cuft
Drainage area	= 0.033 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



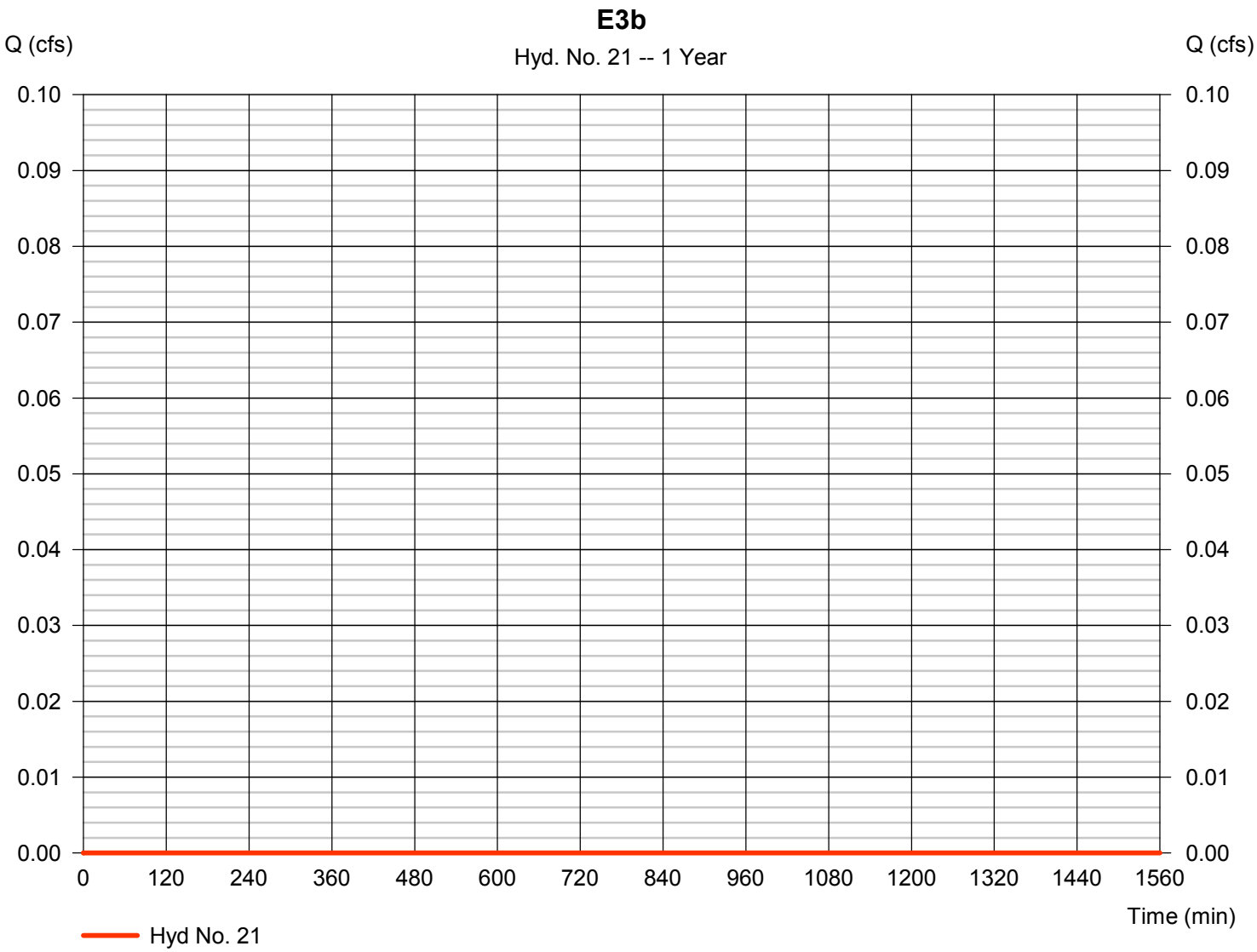
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 21

E3b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.010 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



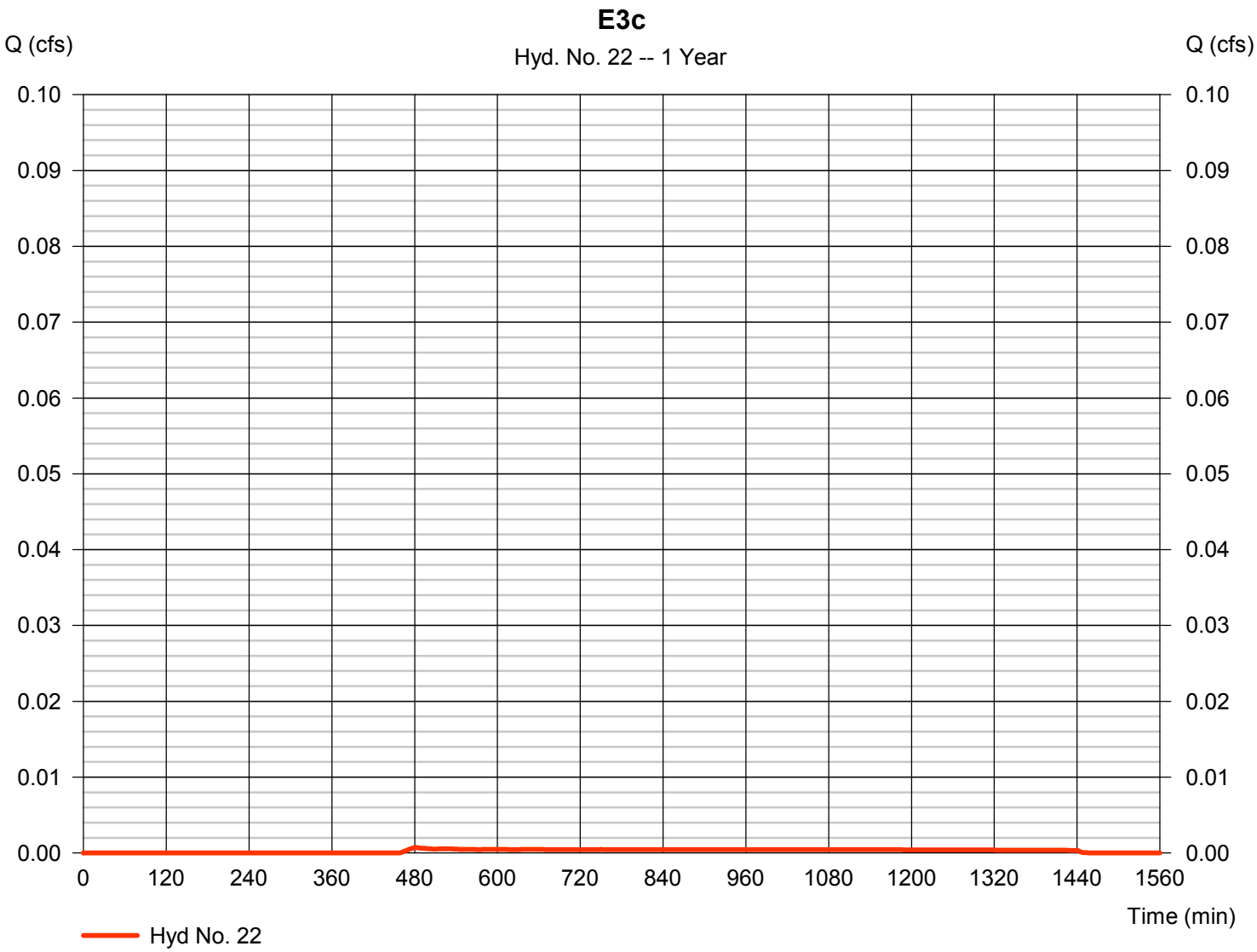
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 22

E3c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 26 cuft
Drainage area	= 0.036 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



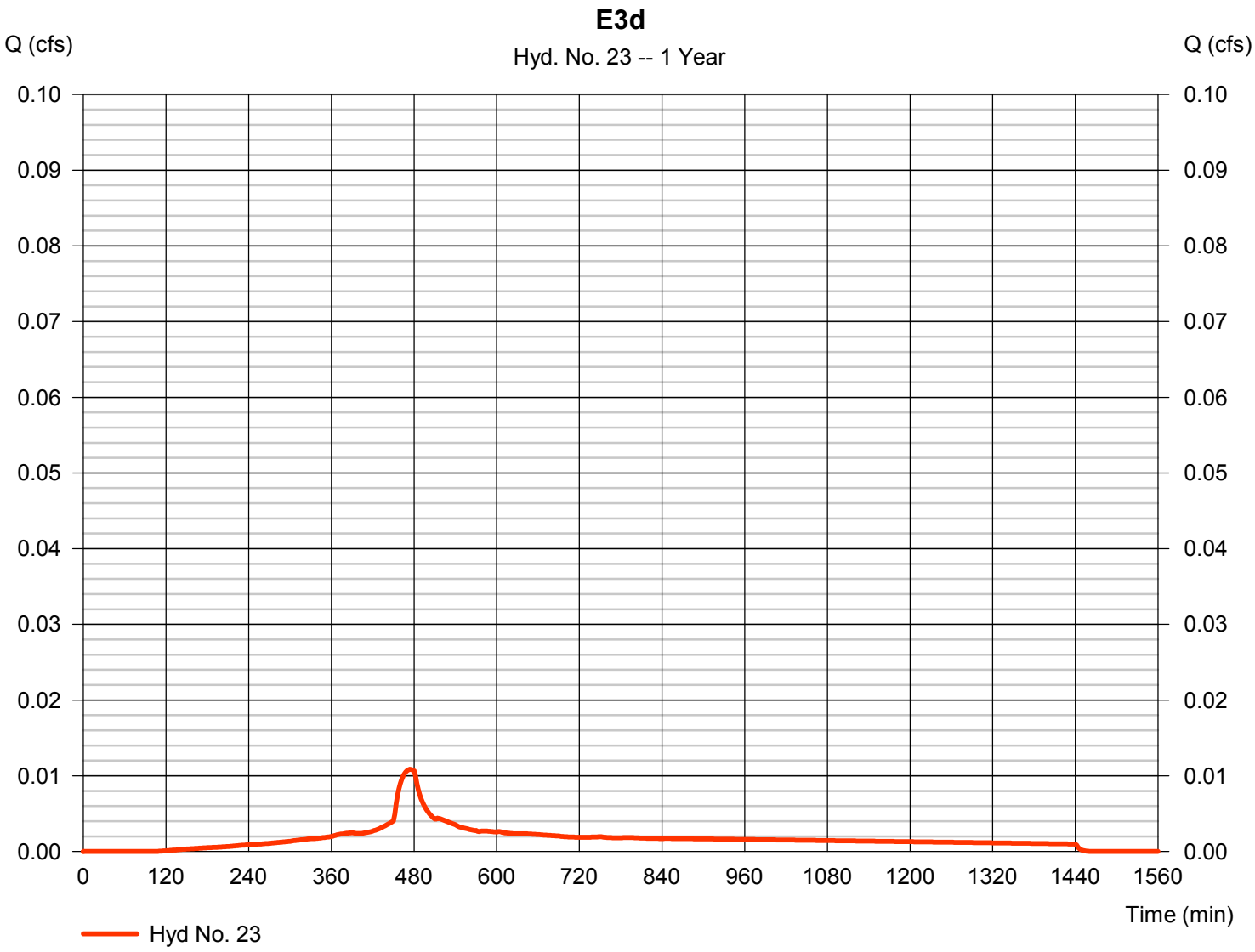
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 23

E3d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.011 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 152 cuft
Drainage area	= 0.053 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



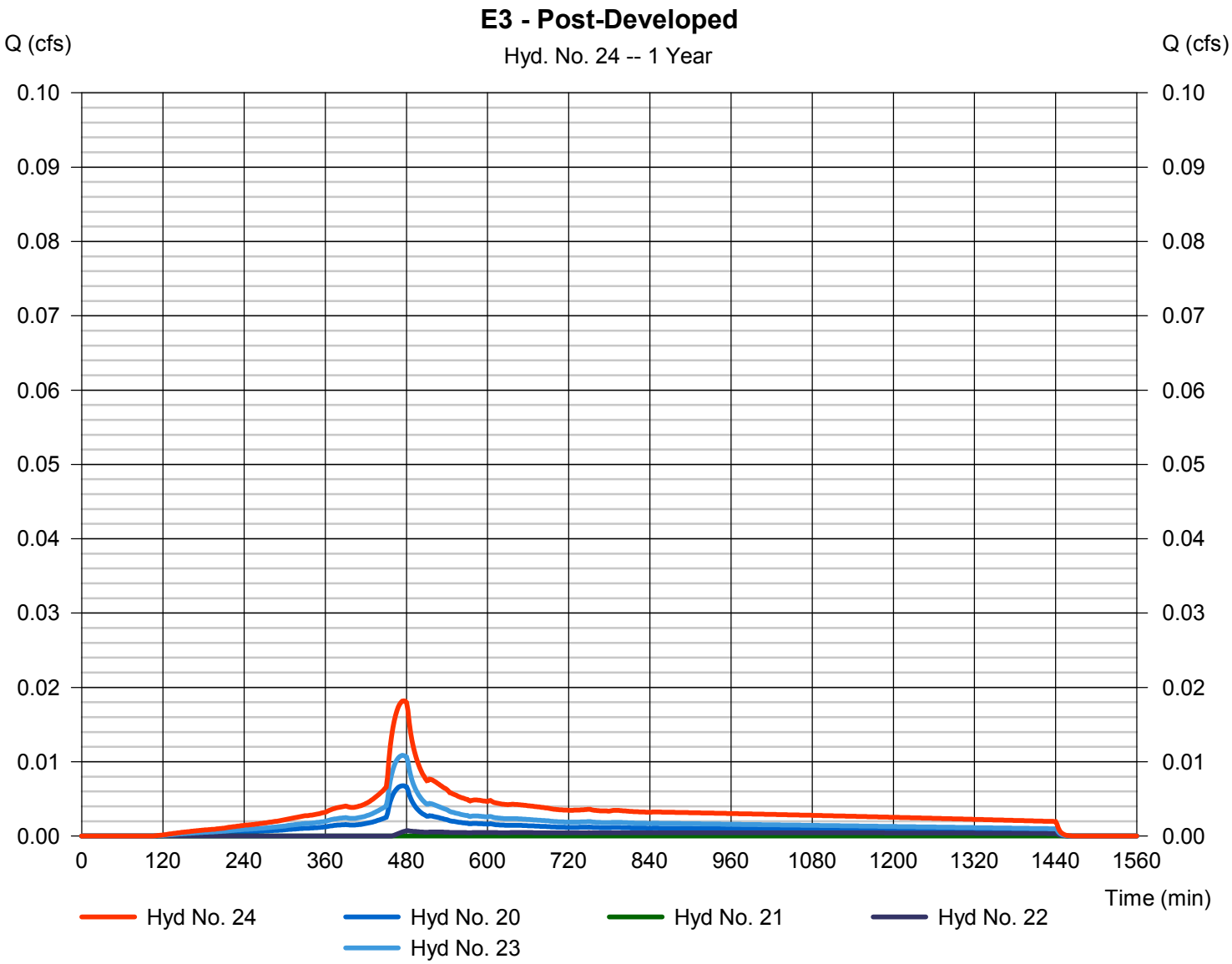
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 24

E3 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.018 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 273 cuft
Inflow hyds.	= 20, 21, 22, 23	Contrib. drain. area	= 0.132 ac



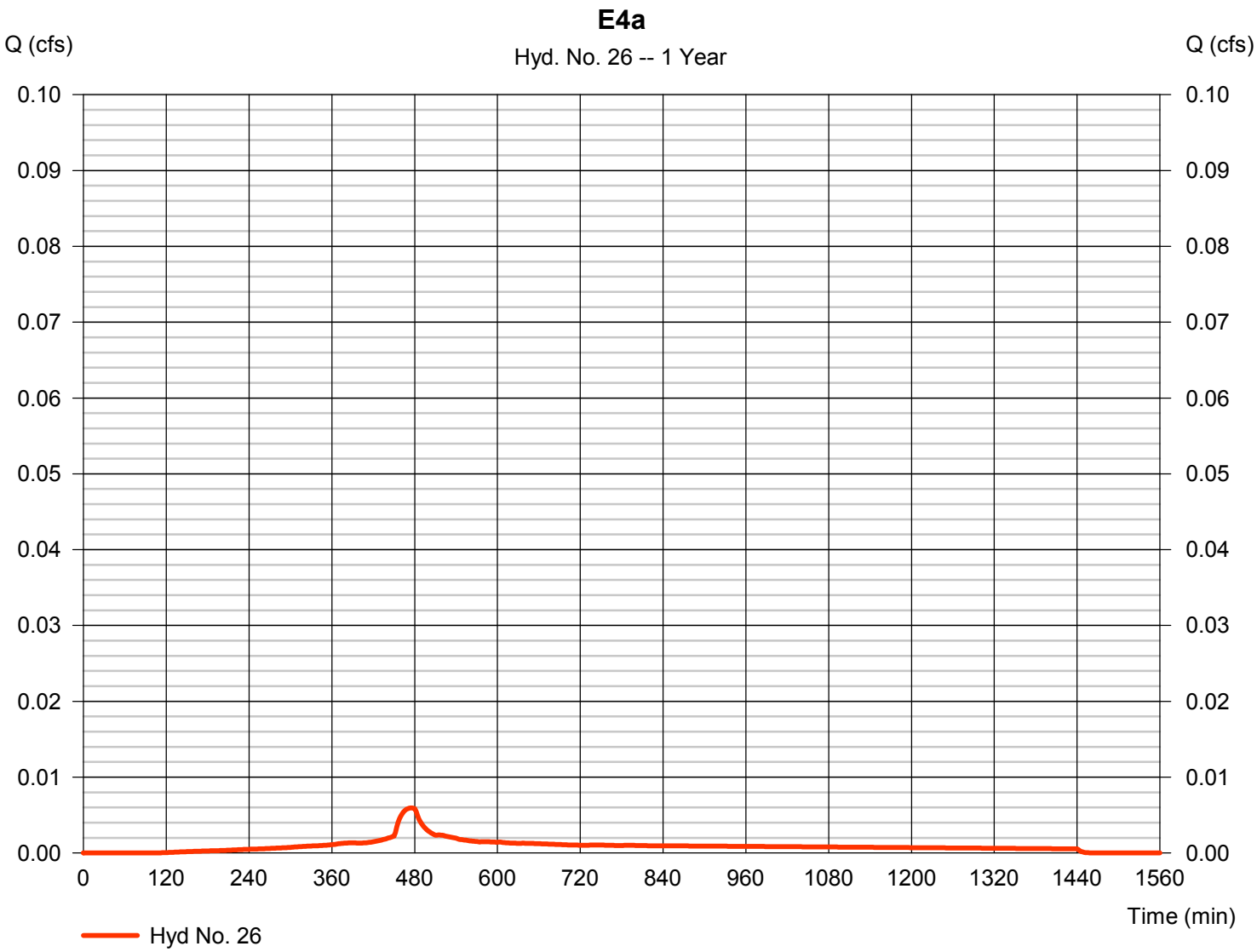
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 26

E4a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.006 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 83 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



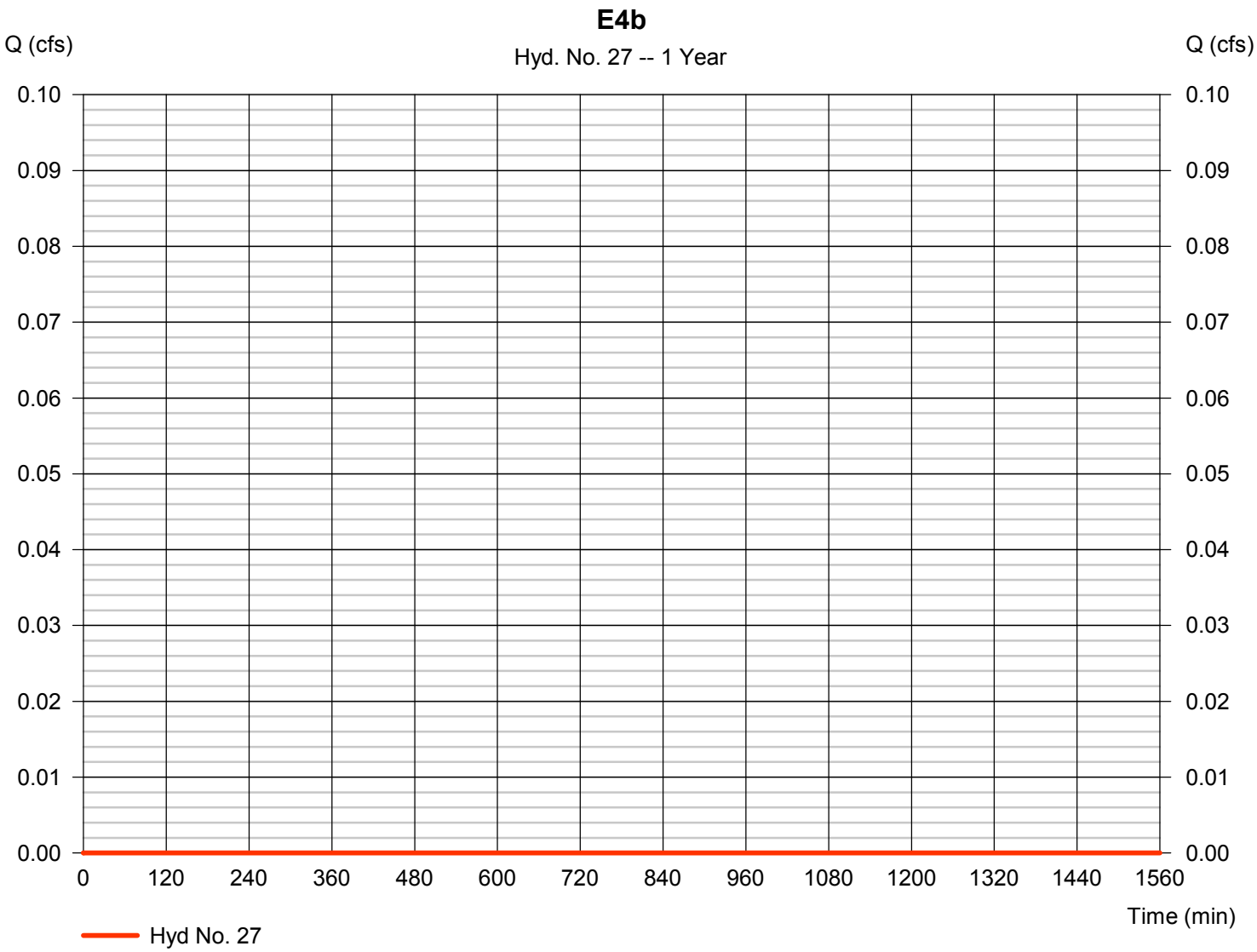
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 27

E4b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.009 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



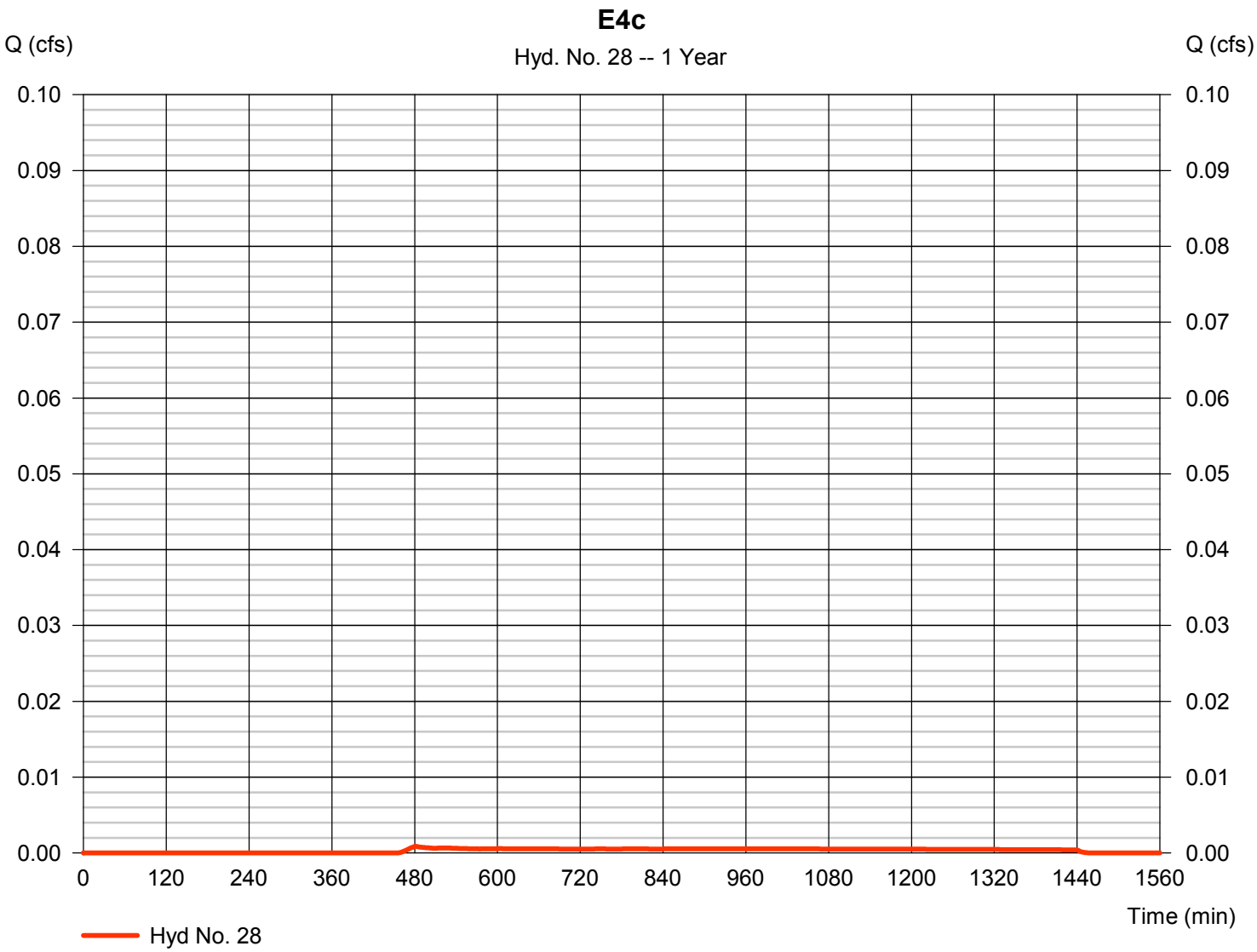
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 28

E4c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 31 cuft
Drainage area	= 0.043 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



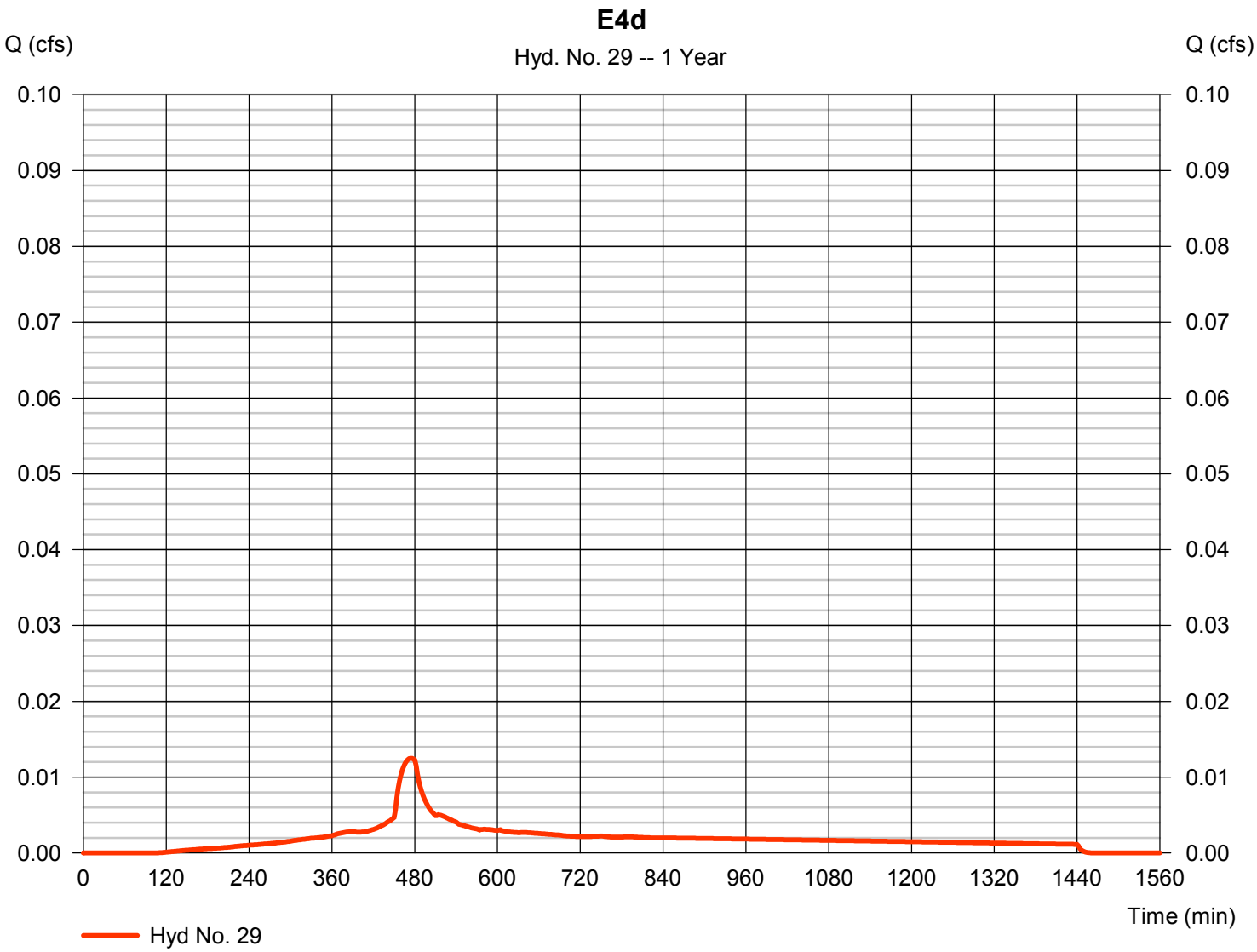
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 29

E4d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 175 cuft
Drainage area	= 0.061 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



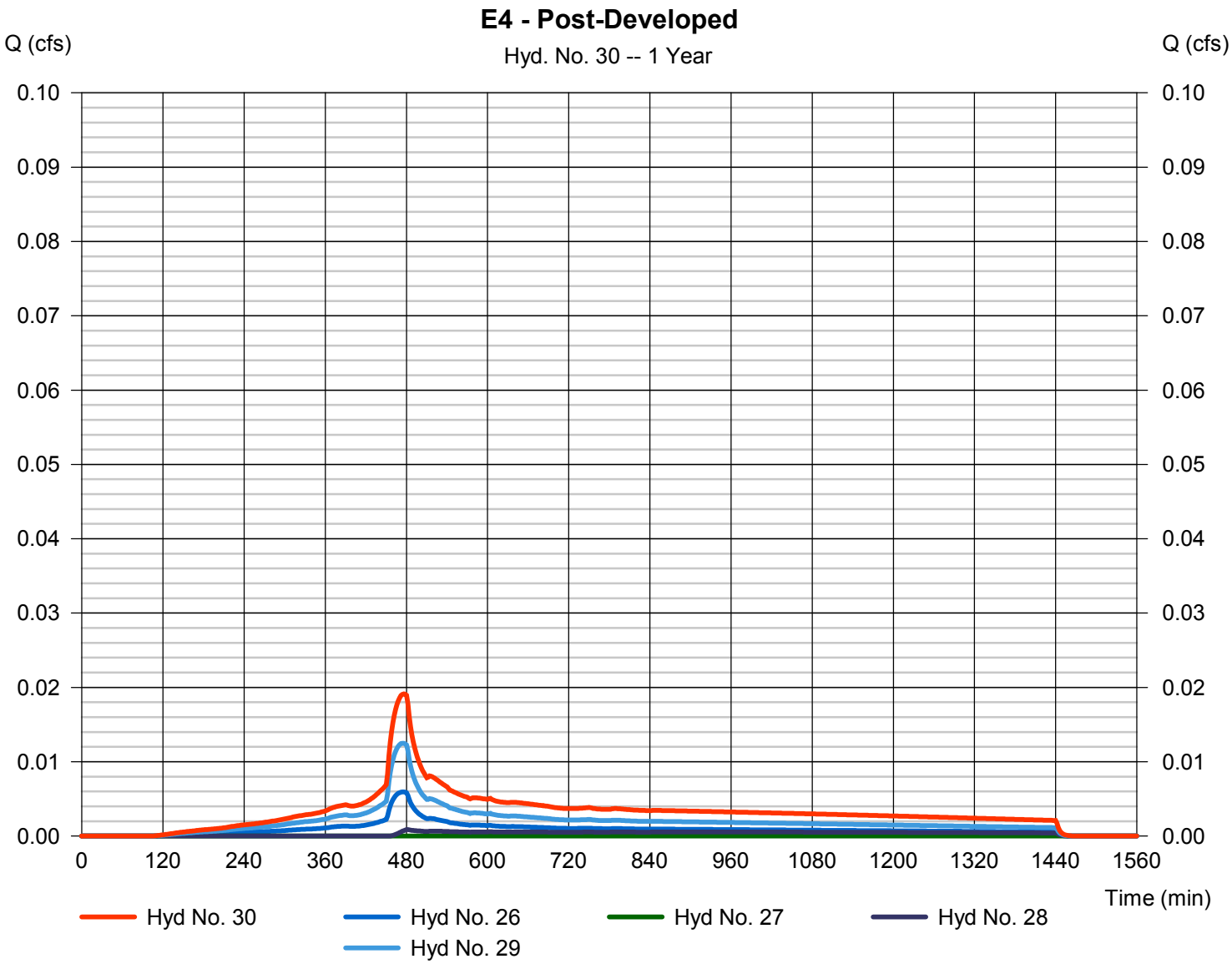
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 30

E4 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 290 cuft
Inflow hyds.	= 26, 27, 28, 29	Contrib. drain. area	= 0.142 ac



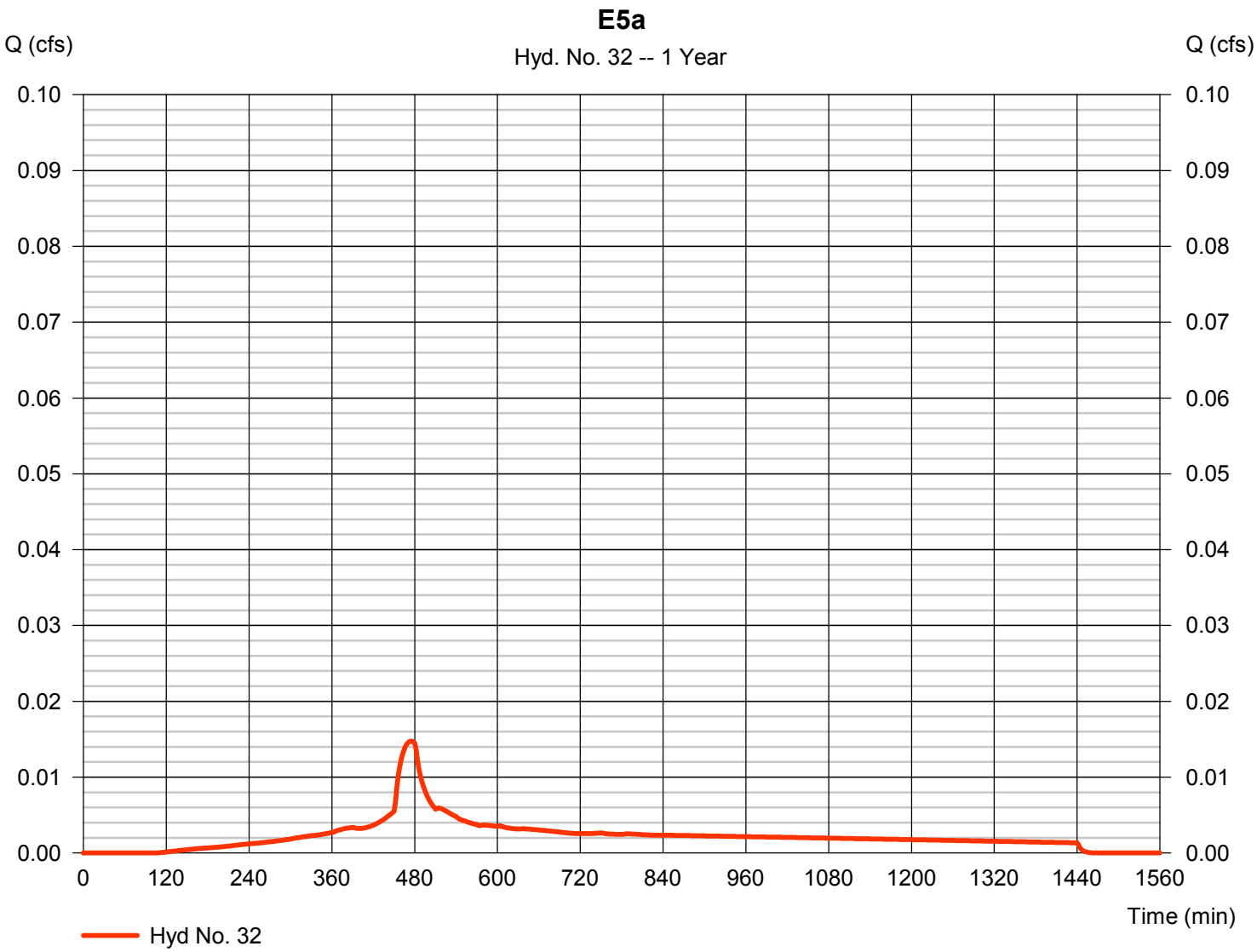
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 32

E5a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 207 cuft
Drainage area	= 0.072 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



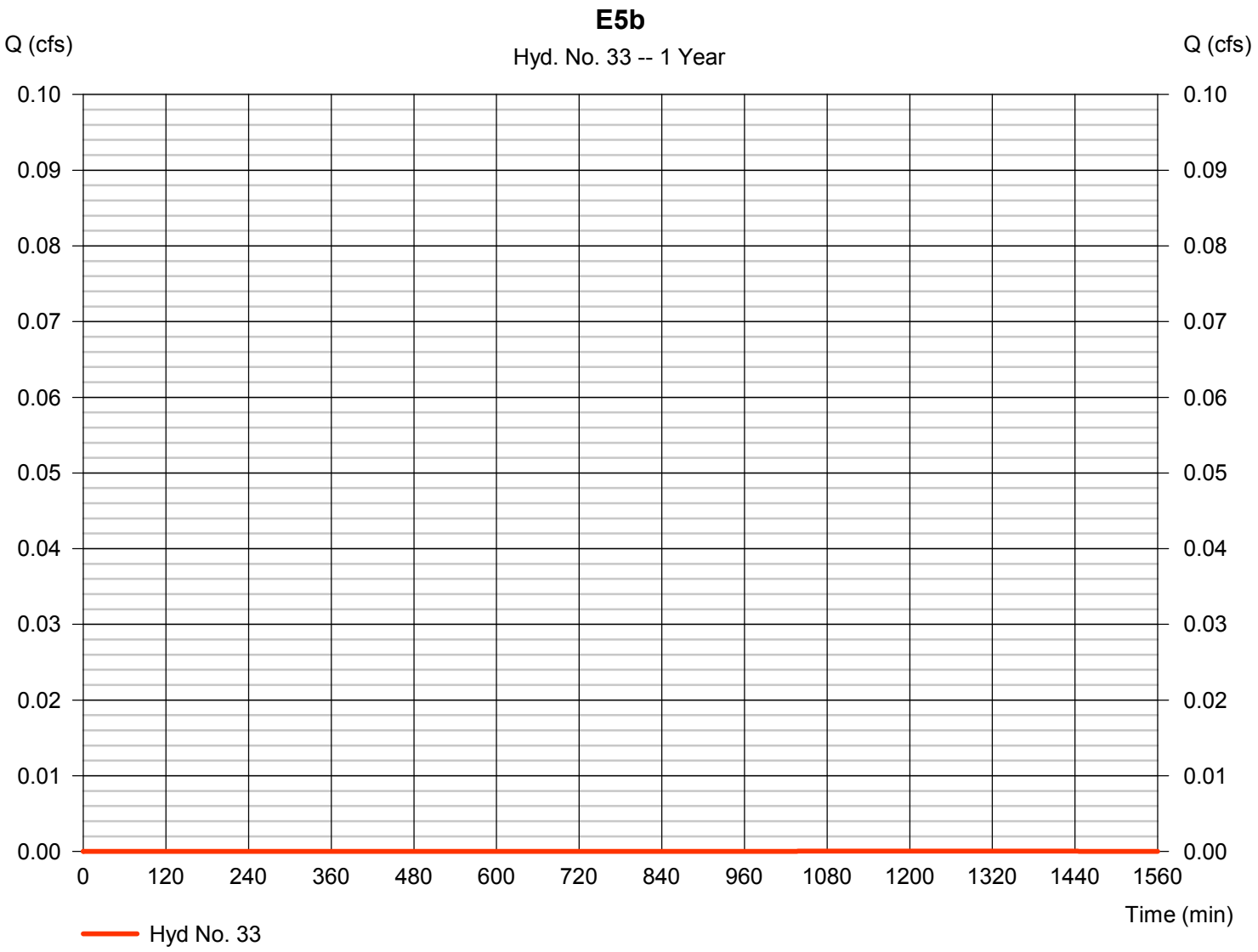
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 33

E5b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.028 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



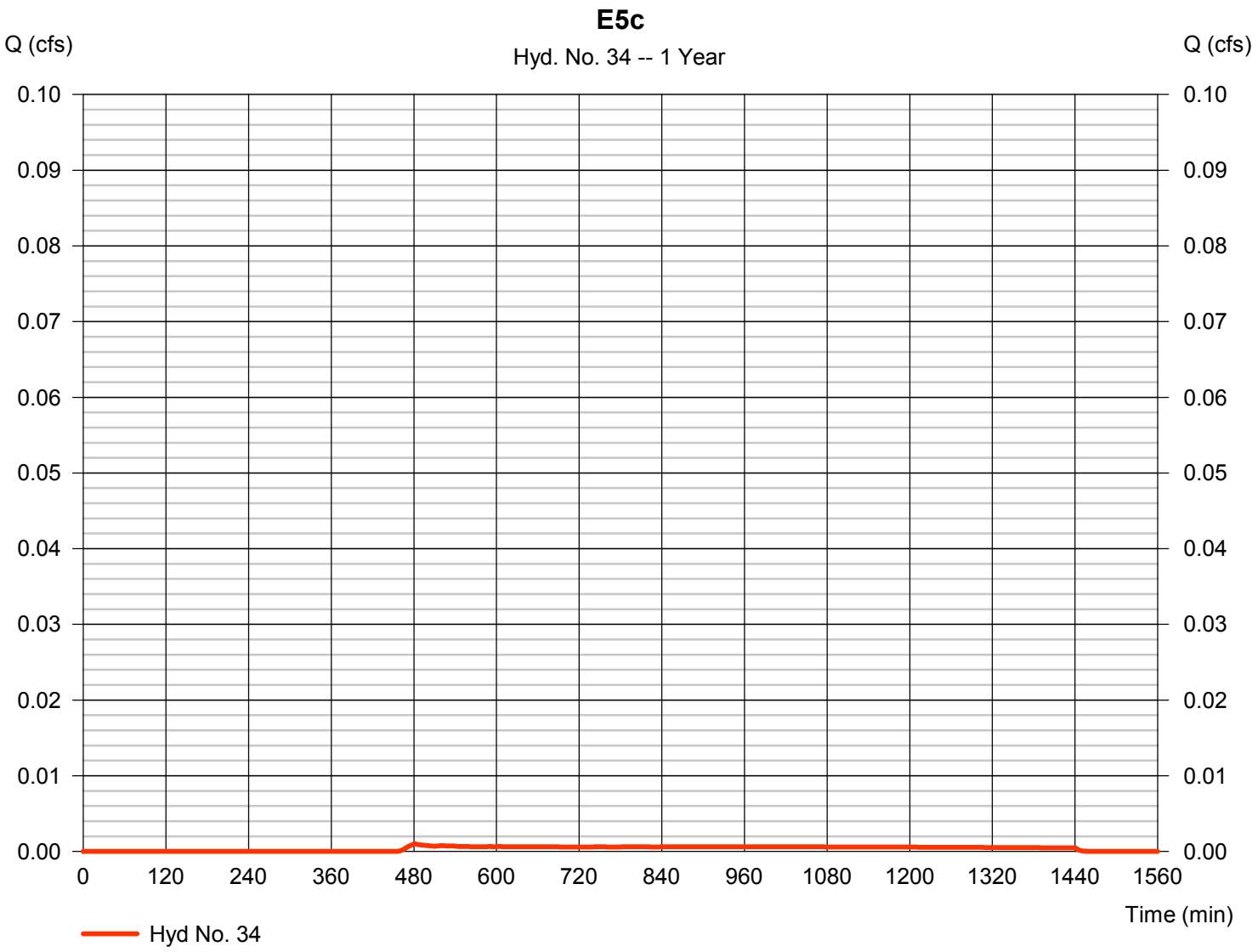
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 34

E5c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 35 cuft
Drainage area	= 0.049 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



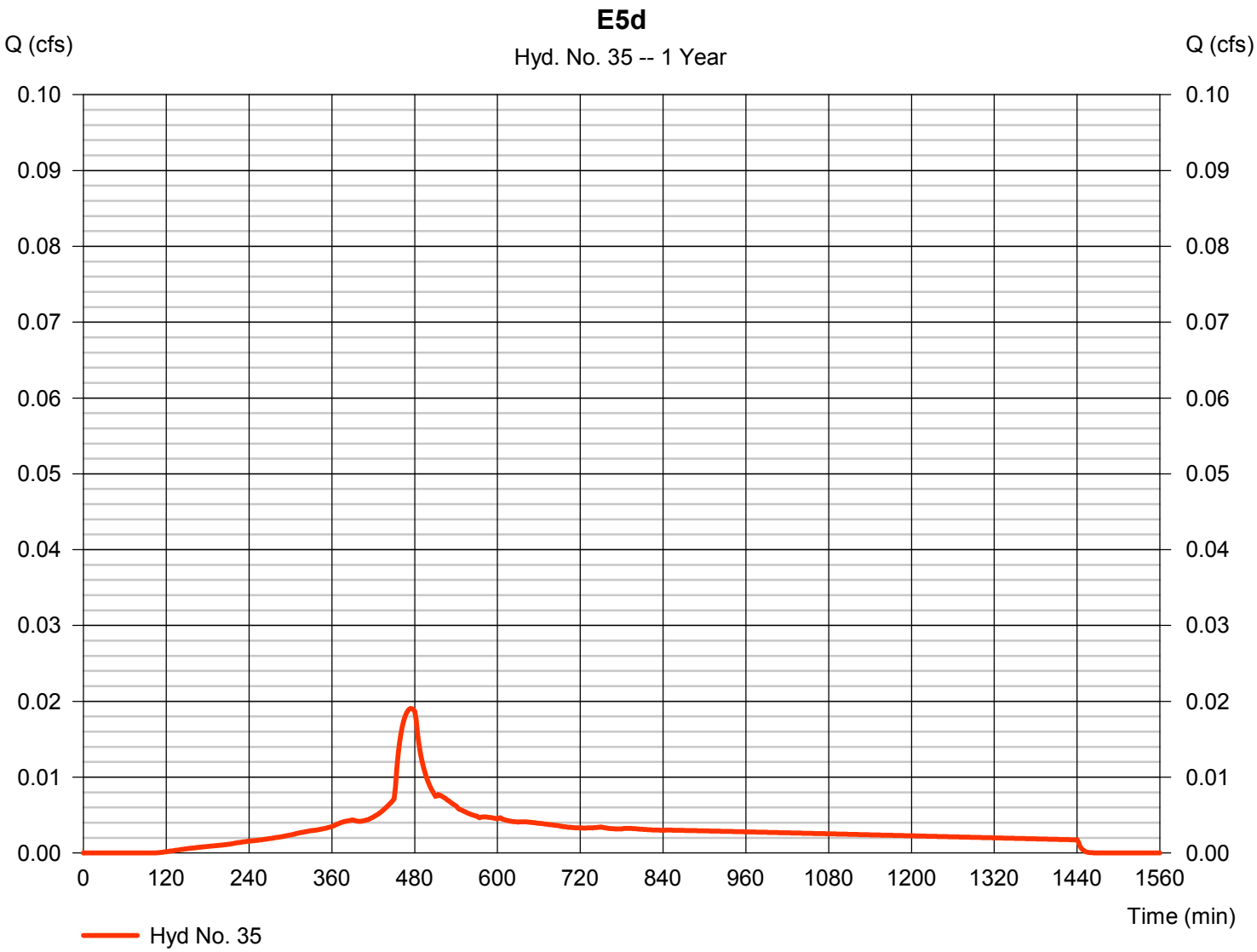
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 35

E5d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 267 cuft
Drainage area	= 0.093 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



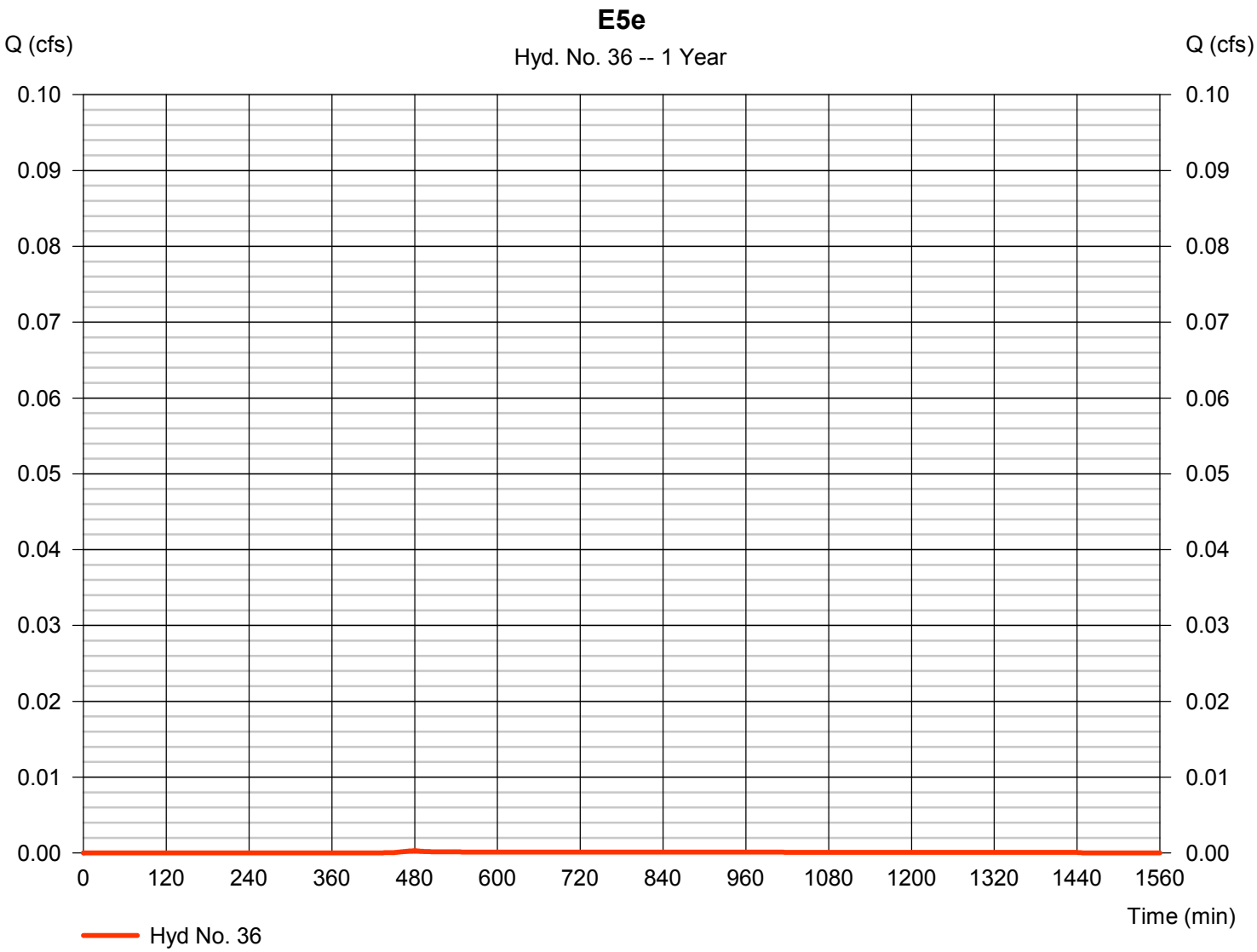
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 36

E5e

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 6 cuft
Drainage area	= 0.006 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



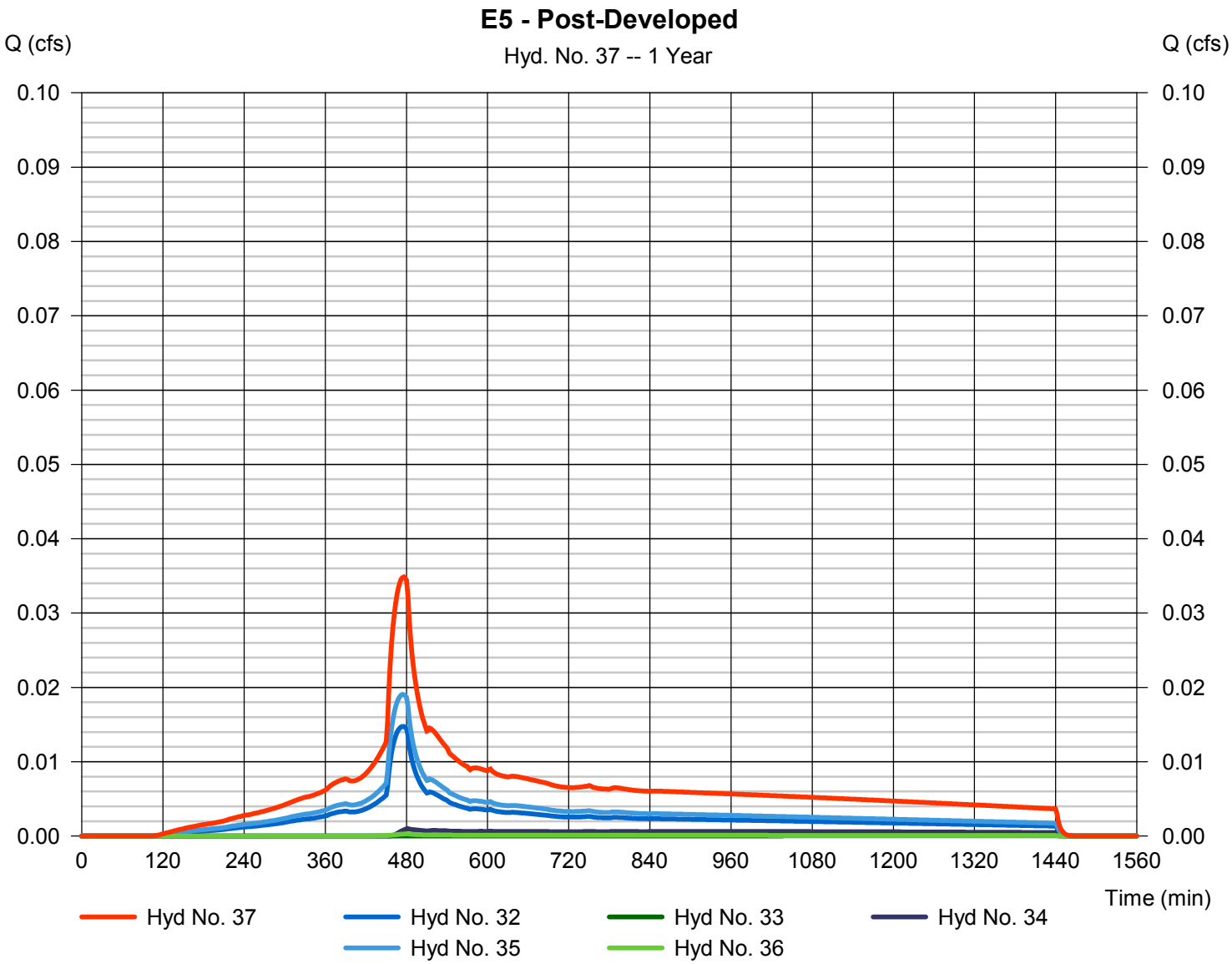
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 37

E5 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 516 cuft
Inflow hyds.	= 32, 33, 34, 35, 36	Contrib. drain. area	= 0.248 ac



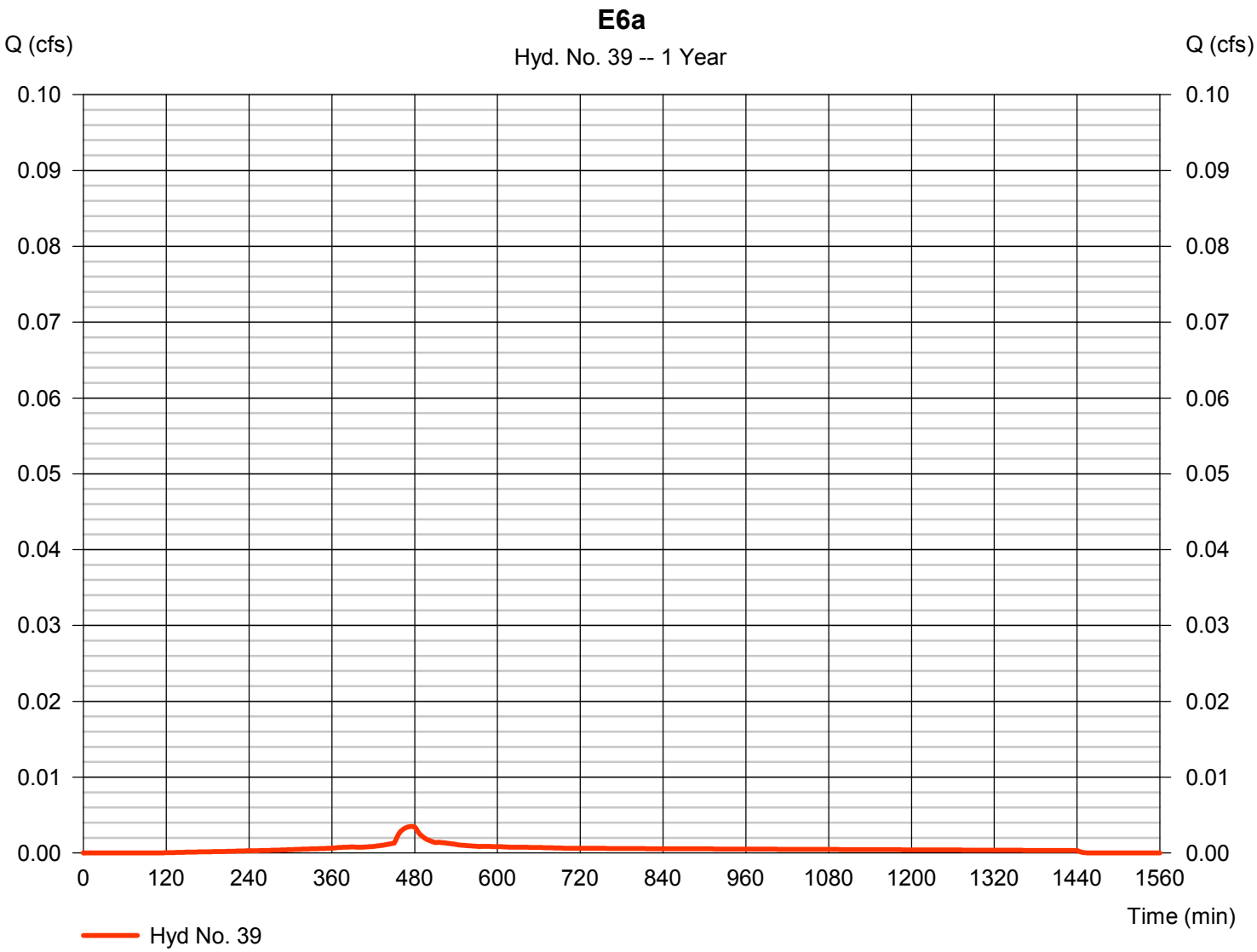
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 39

E6a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 49 cuft
Drainage area	= 0.017 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



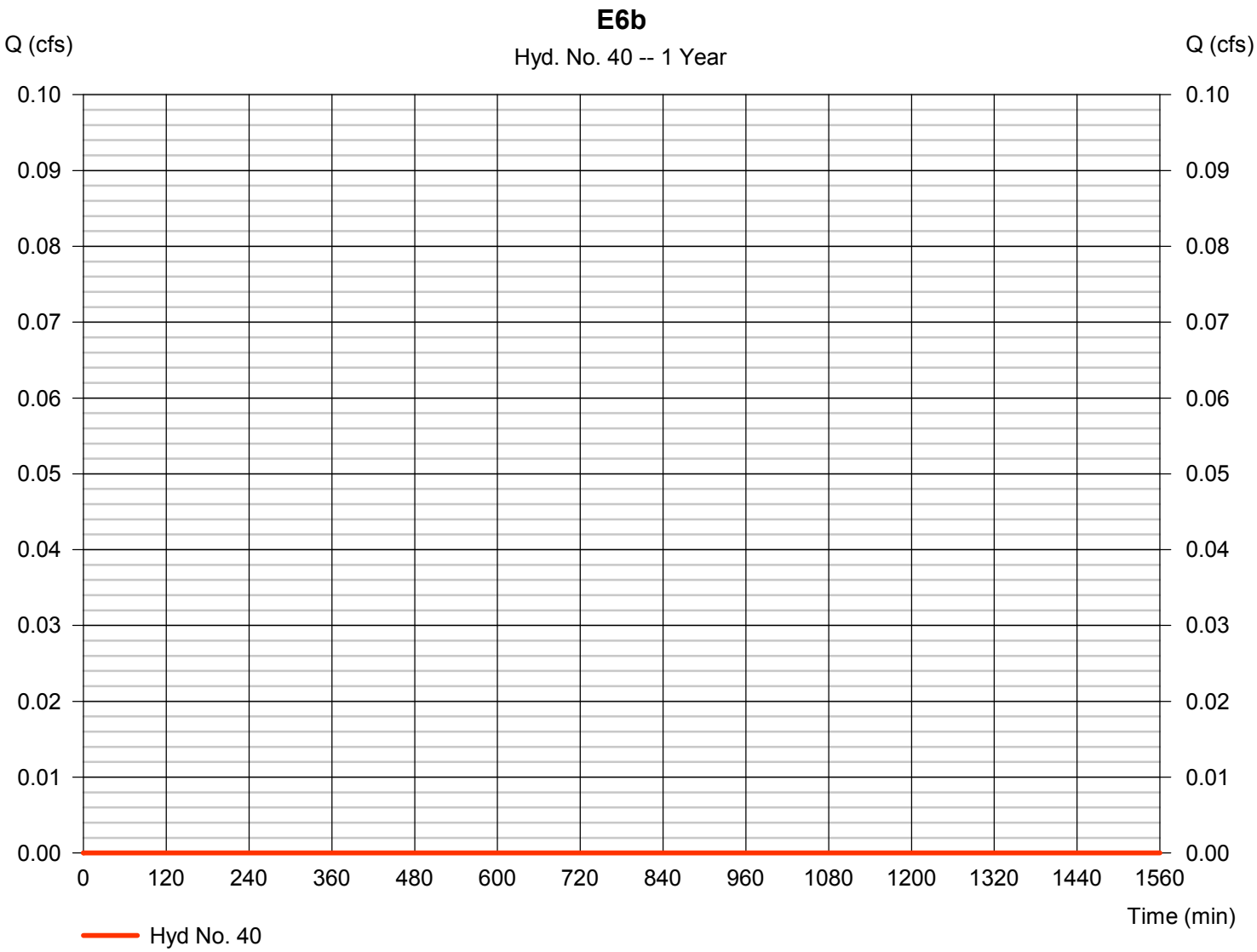
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 40

E6b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.004 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



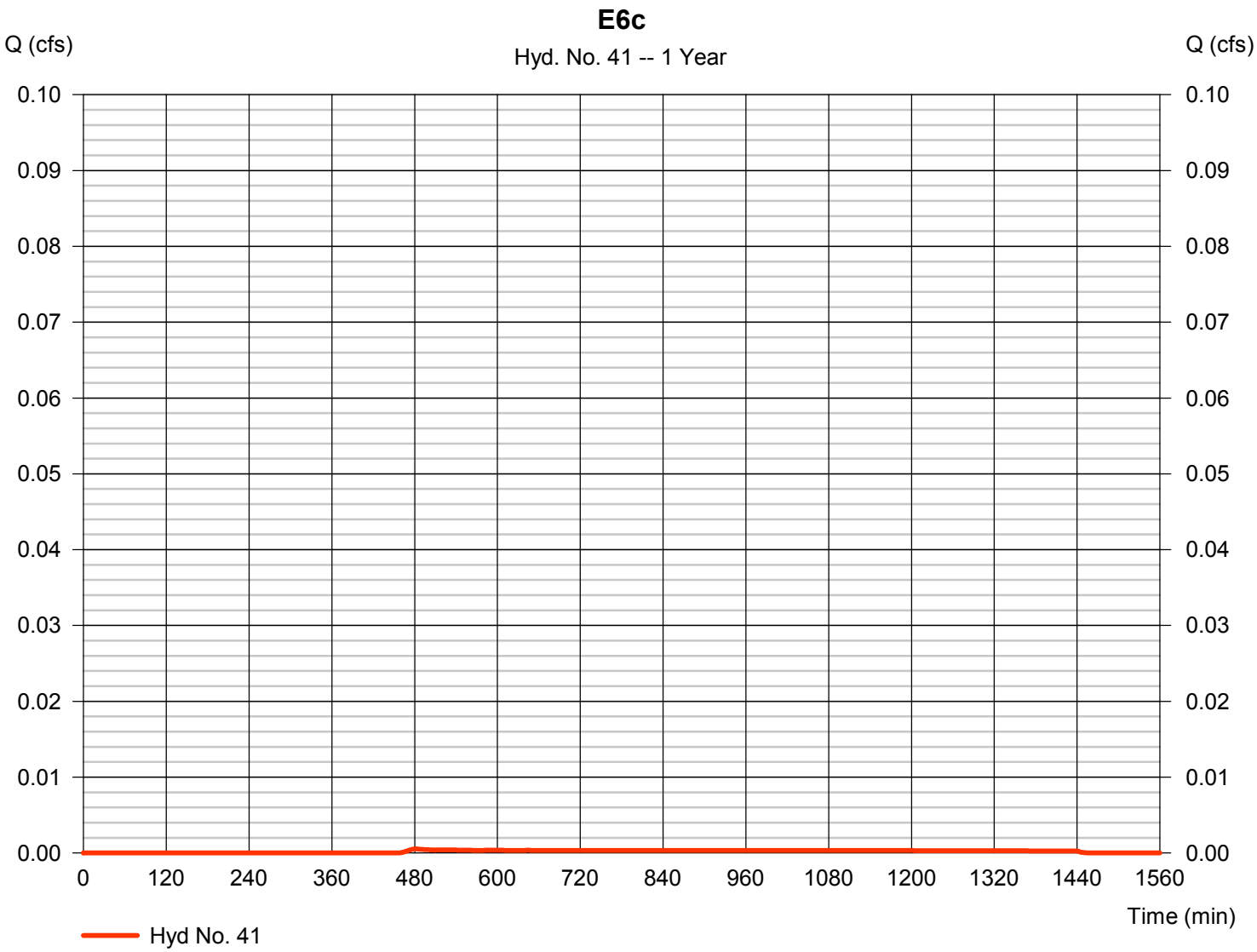
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 41

E6c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 19 cuft
Drainage area	= 0.027 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



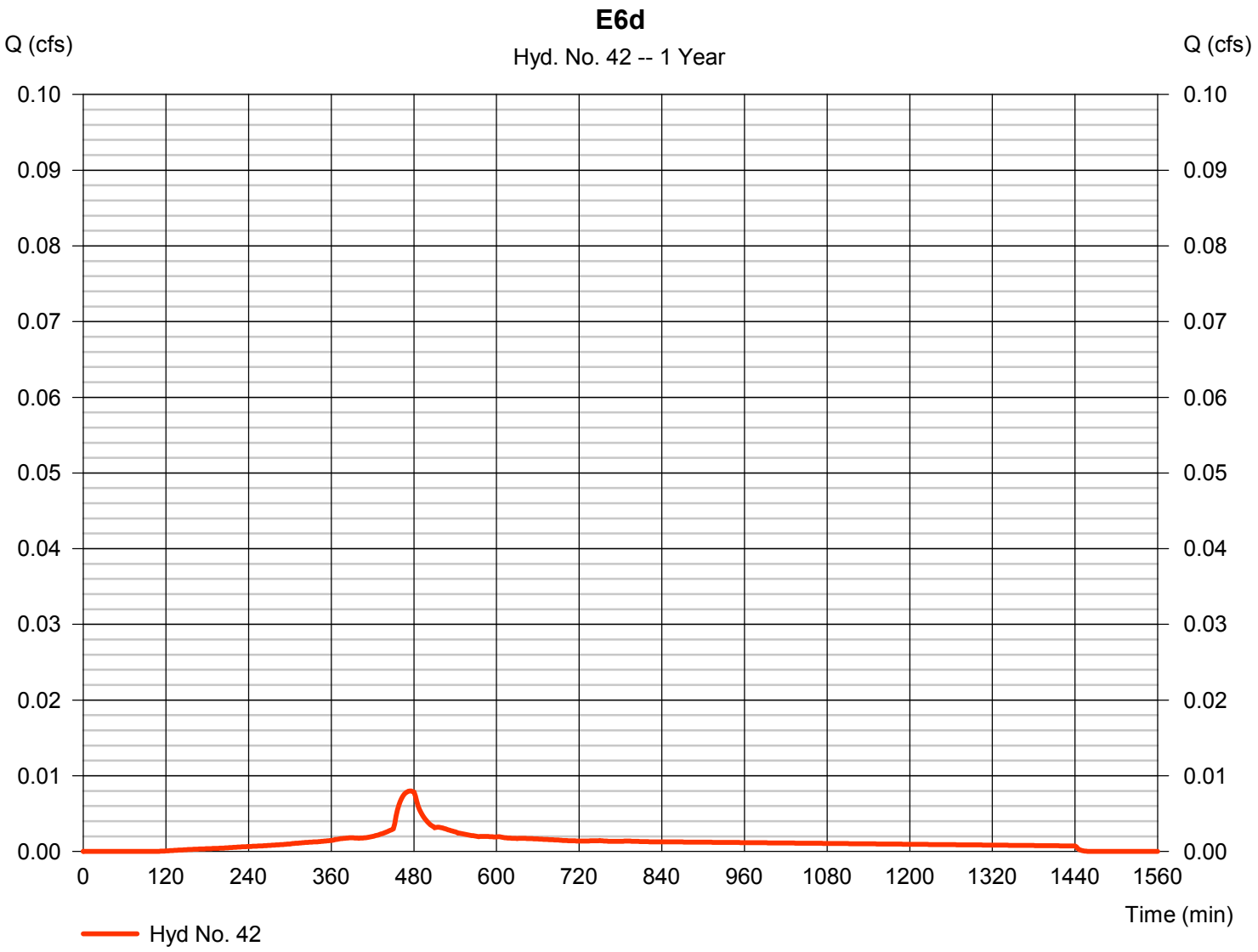
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 42

E6d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 112 cuft
Drainage area	= 0.039 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



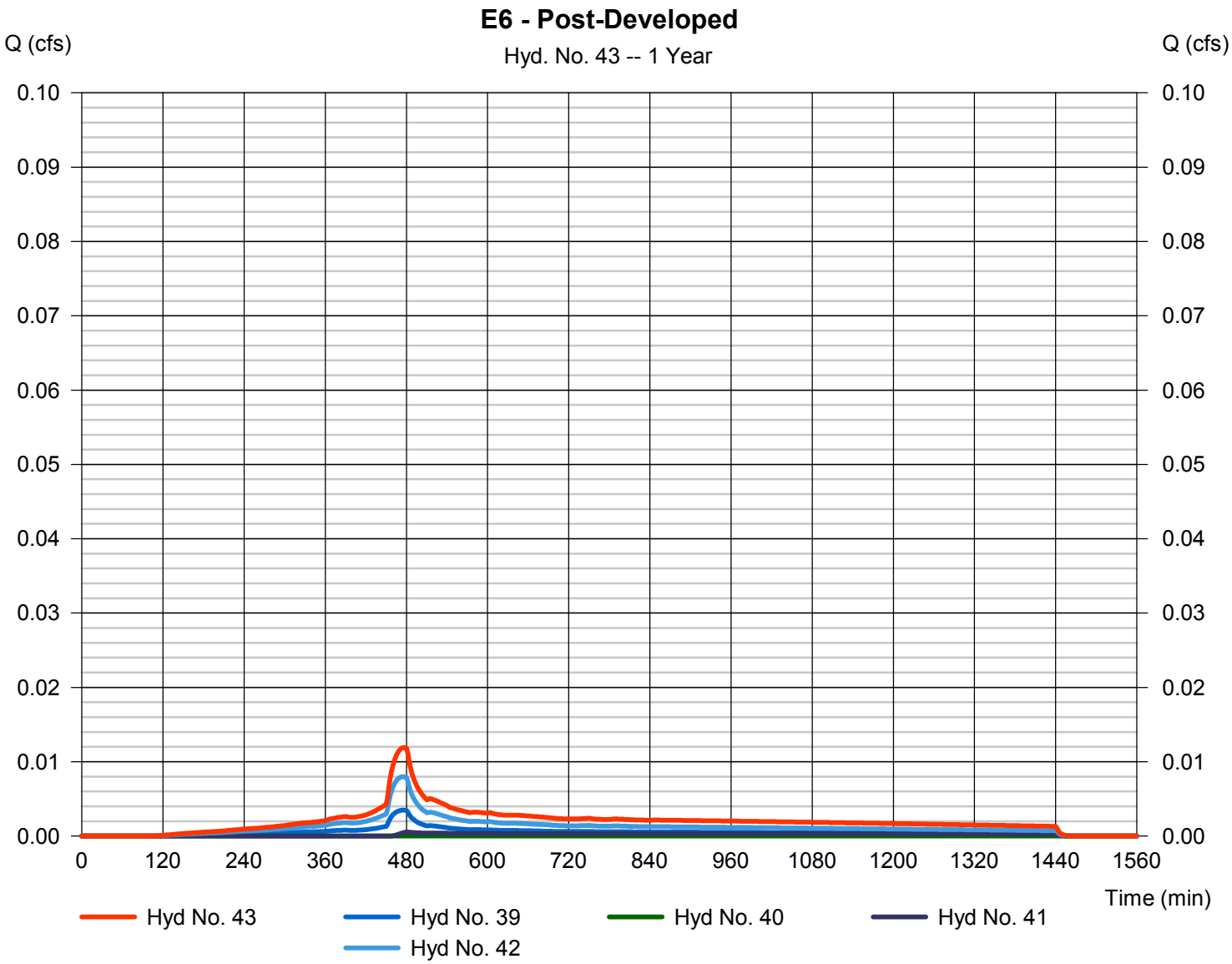
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 43

E6 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 180 cuft
Inflow hyds.	= 39, 40, 41, 42	Contrib. drain. area	= 0.087 ac



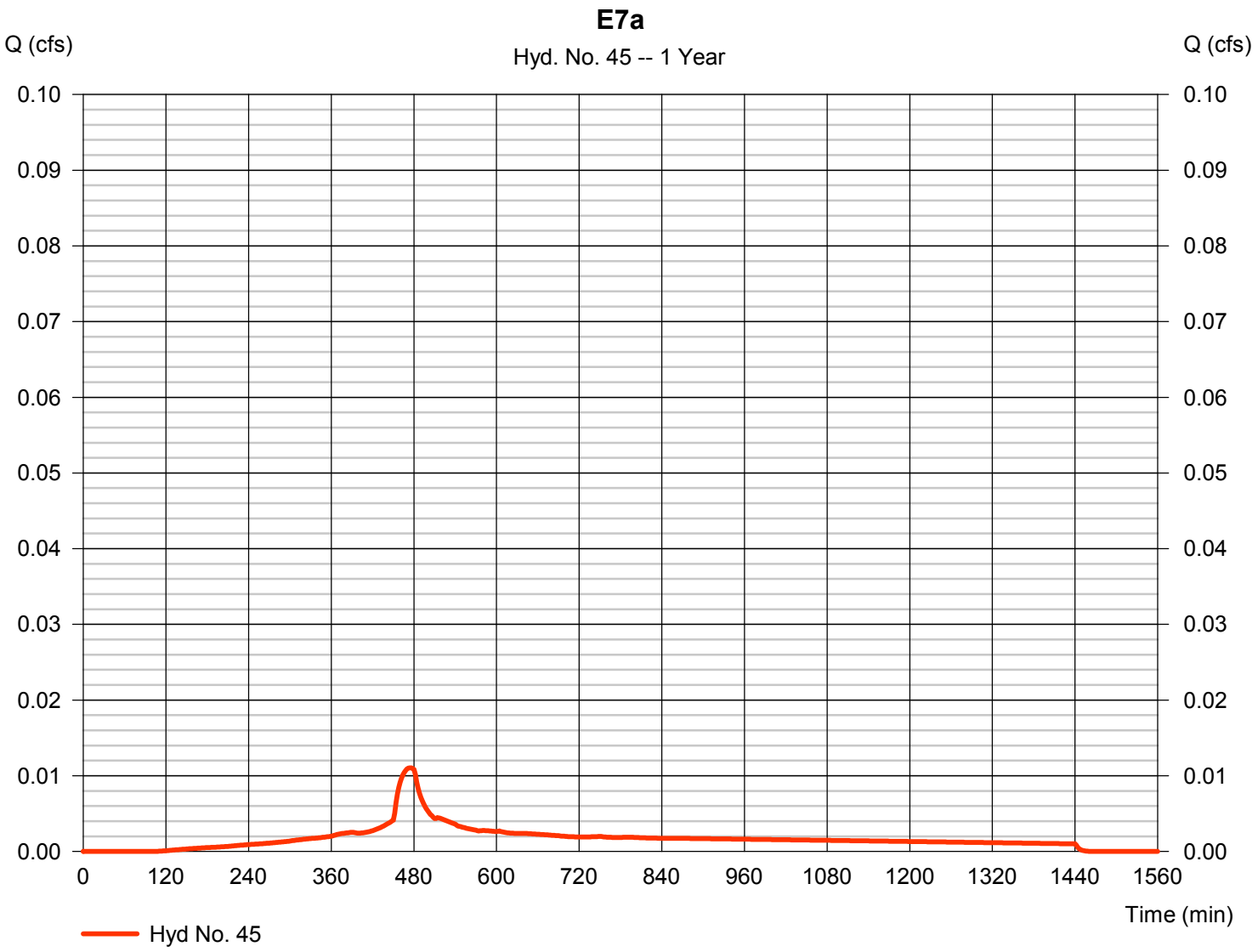
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 45

E7a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.011 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 155 cuft
Drainage area	= 0.054 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



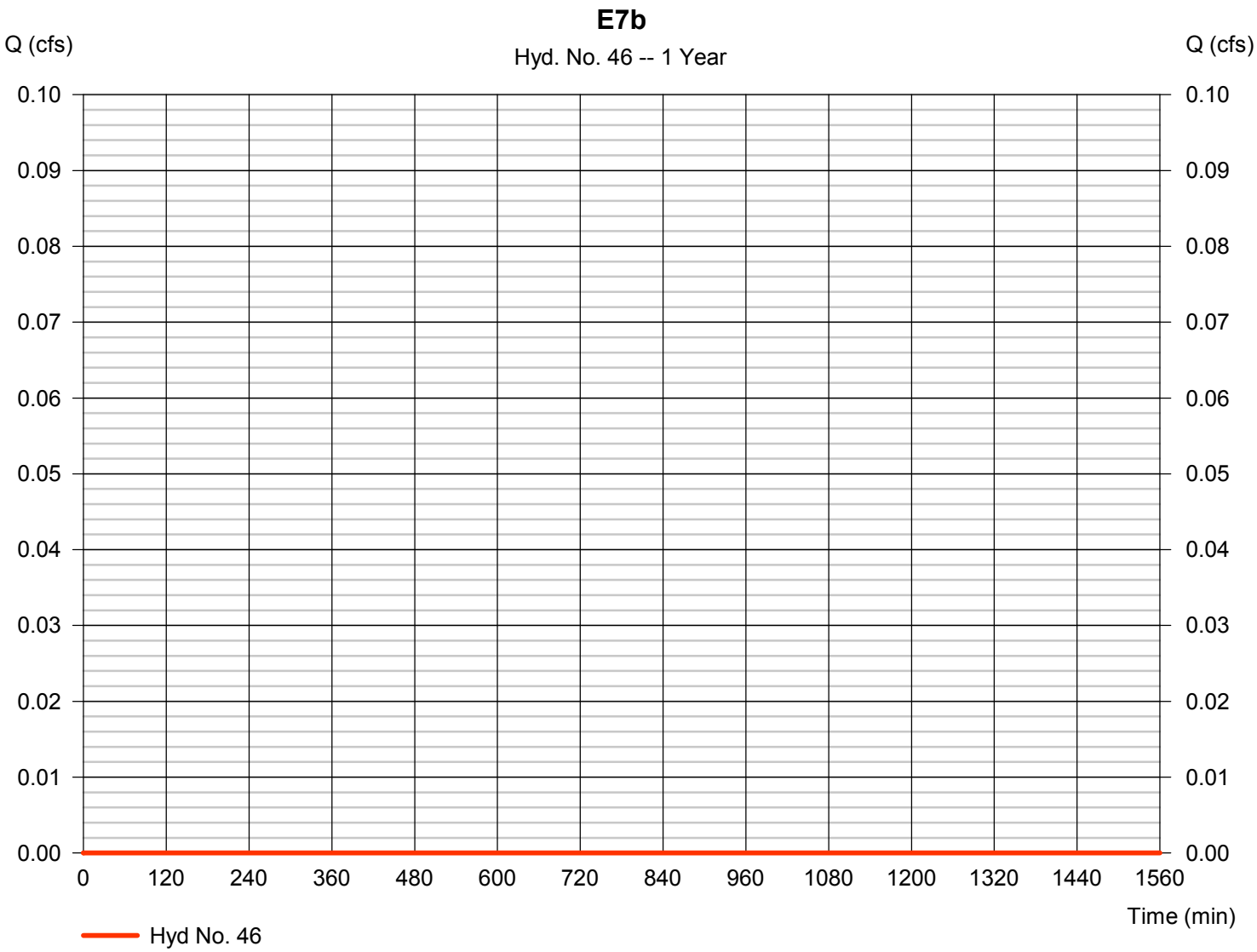
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 46

E7b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.006 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



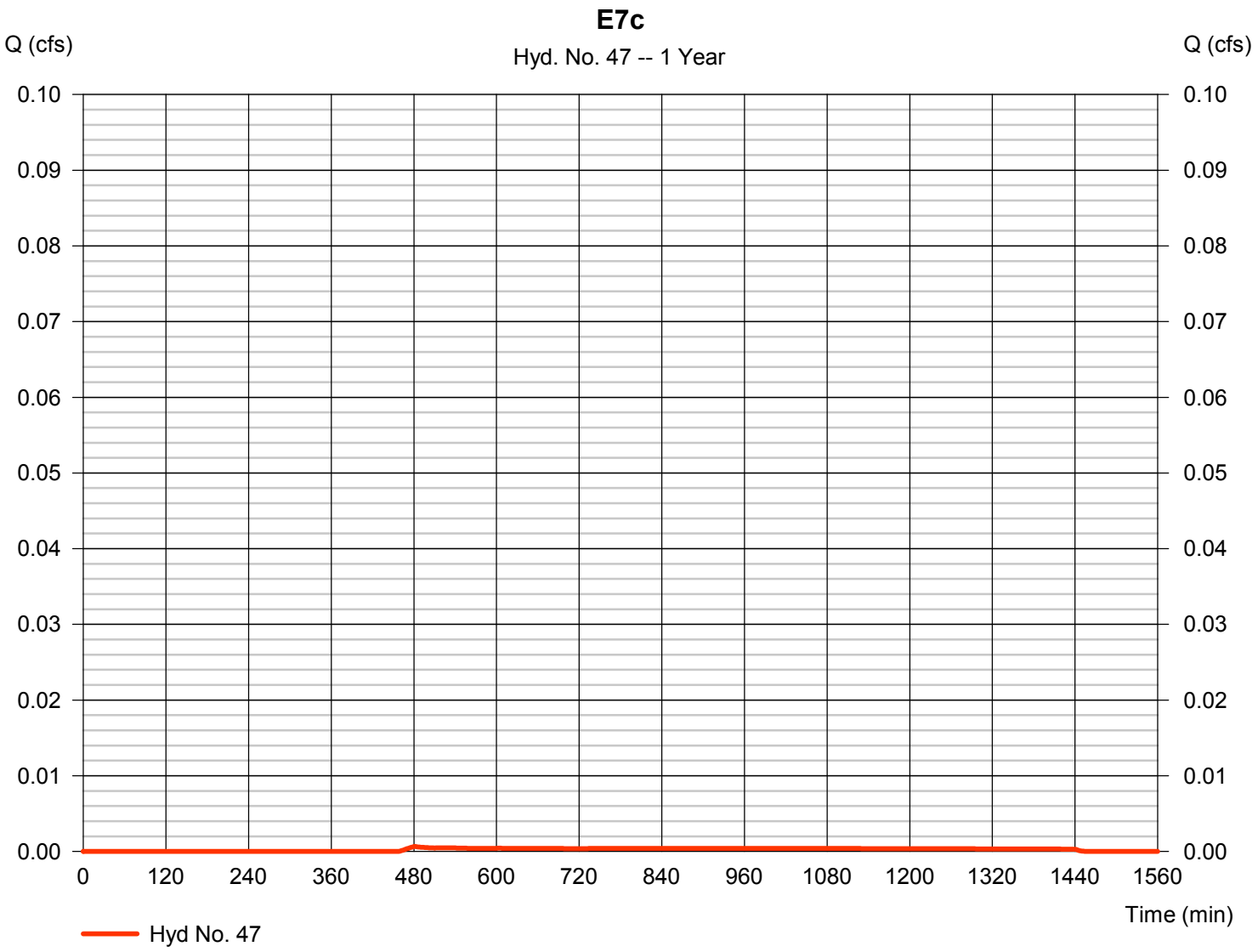
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 47

E7c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 23 cuft
Drainage area	= 0.032 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



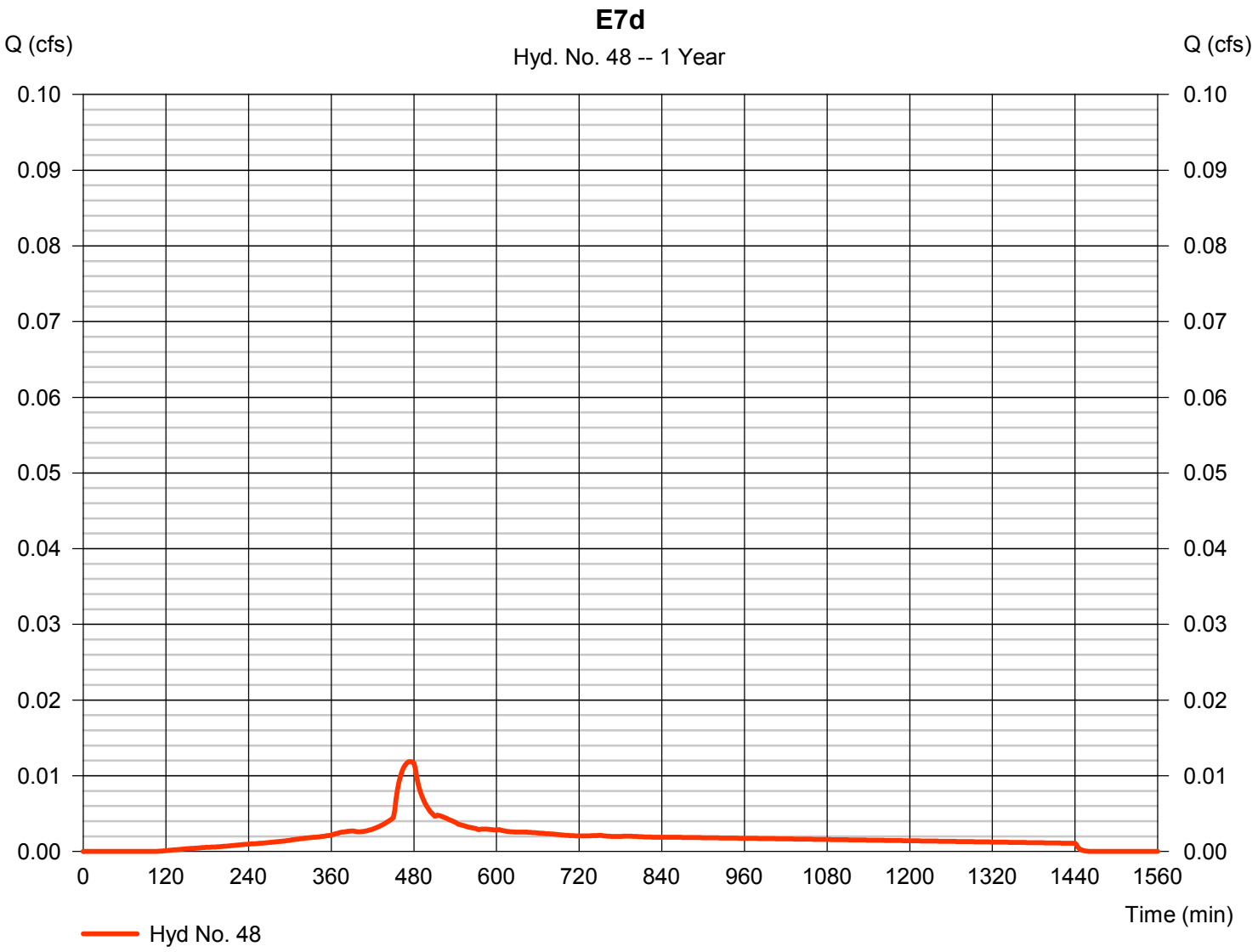
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 48

E7d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 167 cuft
Drainage area	= 0.058 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



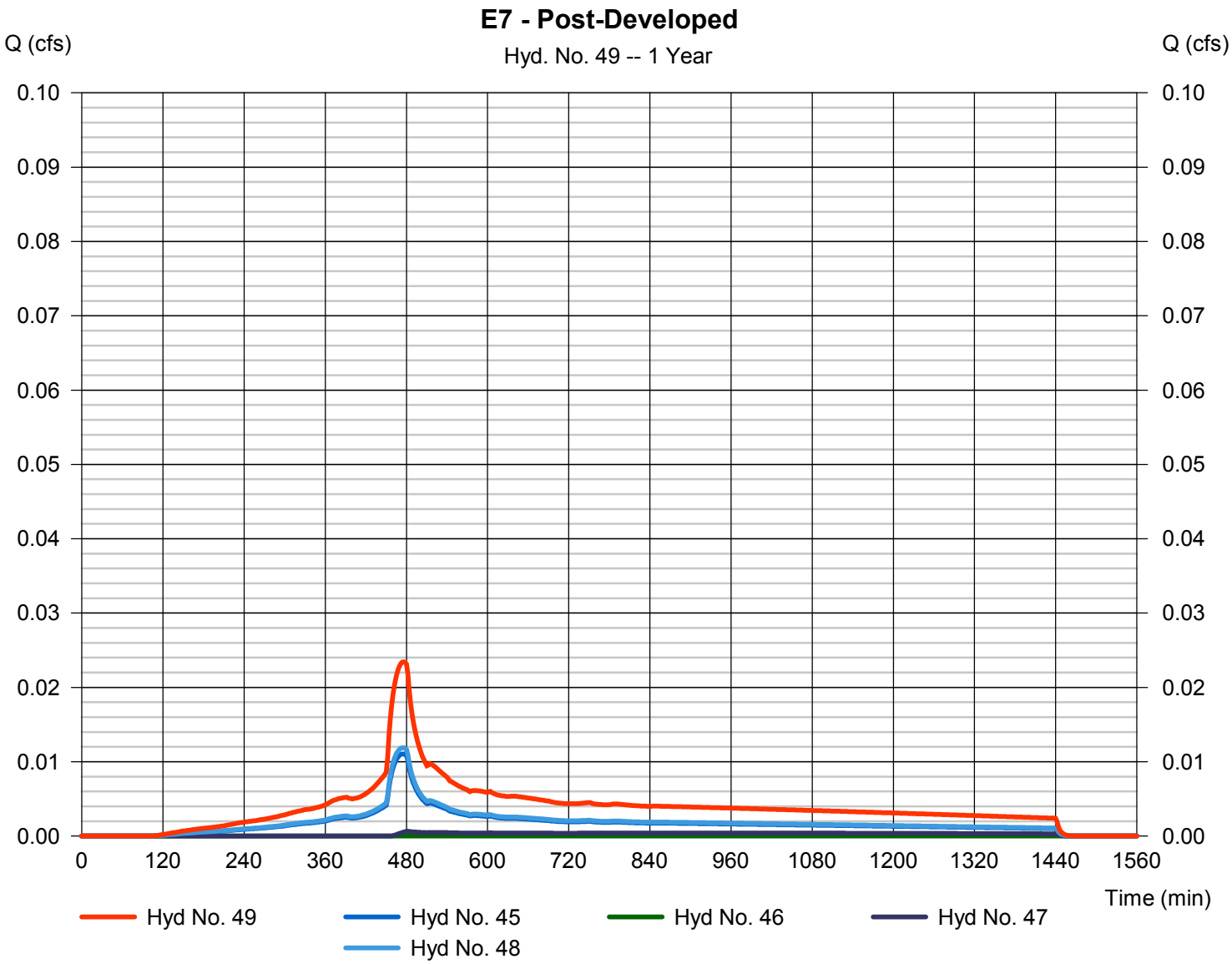
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 49

E7 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.023 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 345 cuft
Inflow hyds.	= 45, 46, 47, 48	Contrib. drain. area	= 0.150 ac



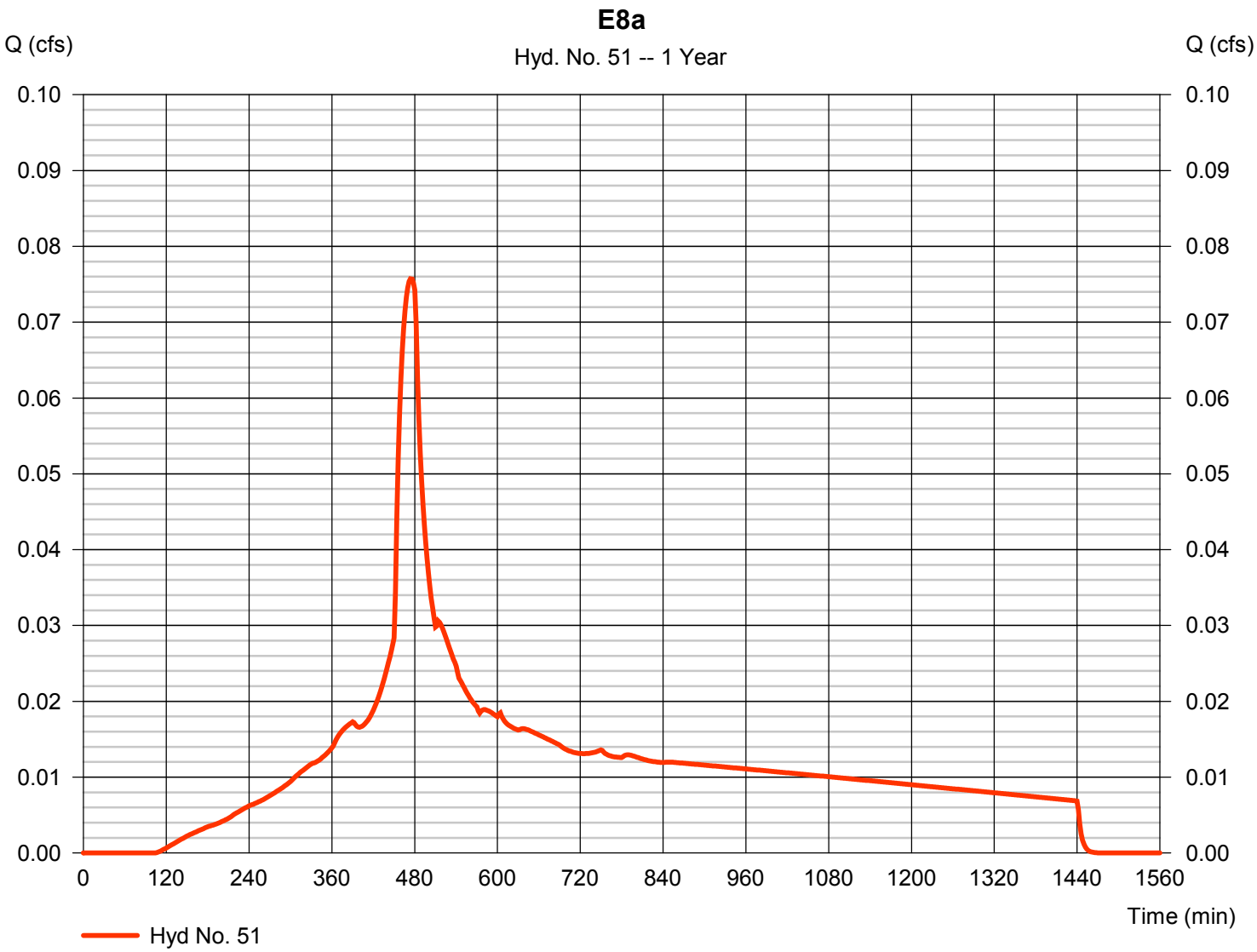
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 51

E8a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.076 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,062 cuft
Drainage area	= 0.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



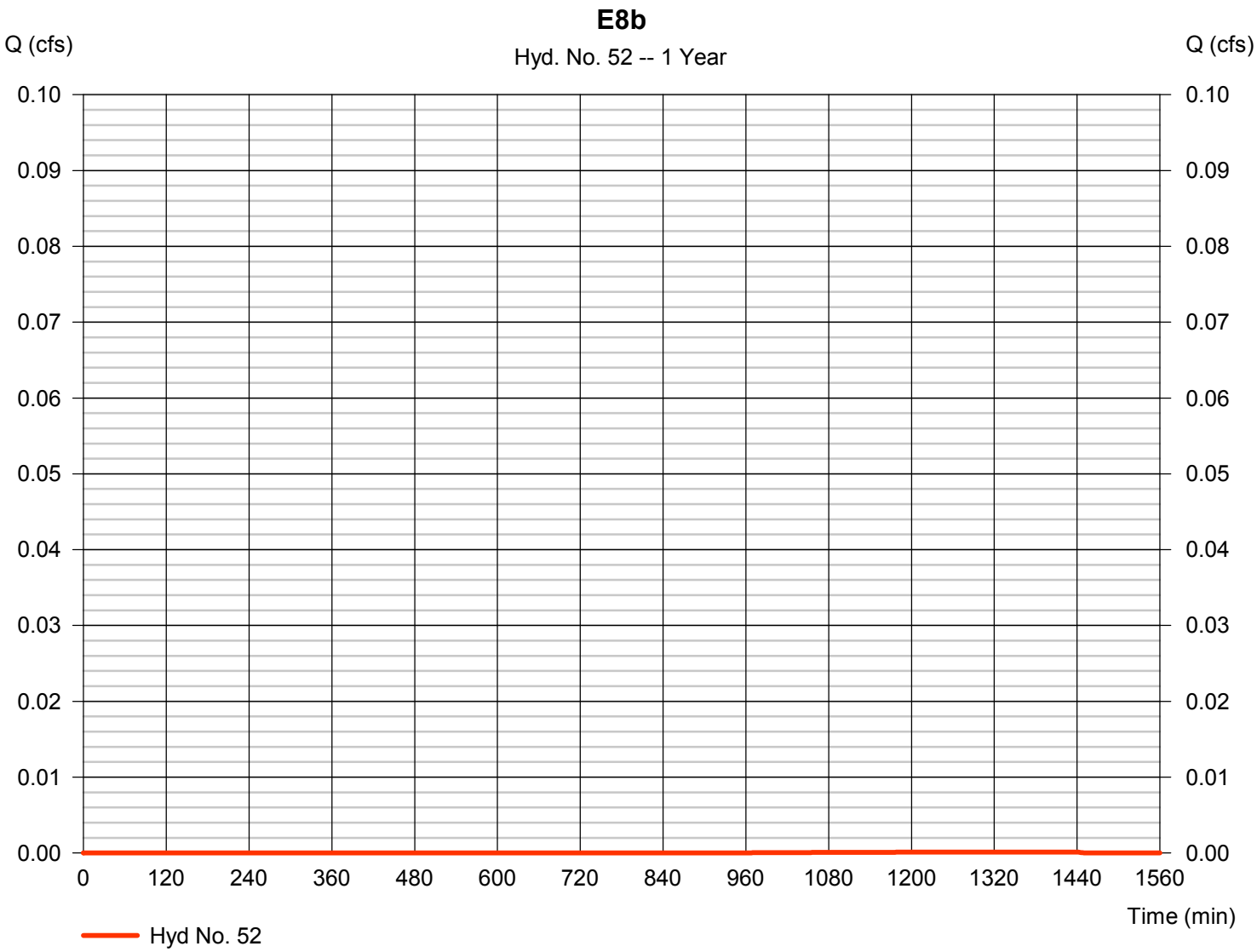
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 52

E8b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 3 cuft
Drainage area	= 0.062 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



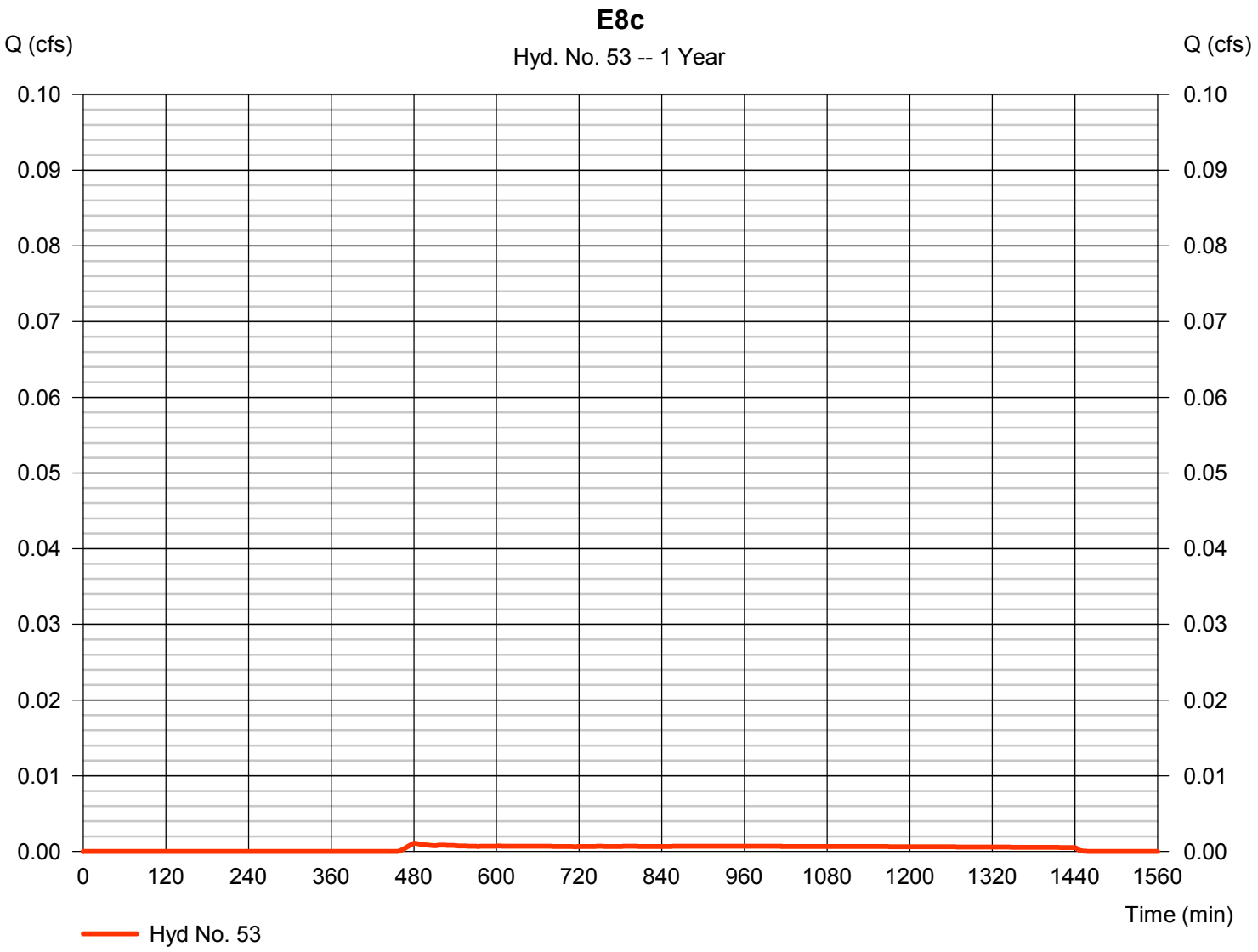
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 53

E8c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 39 cuft
Drainage area	= 0.054 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



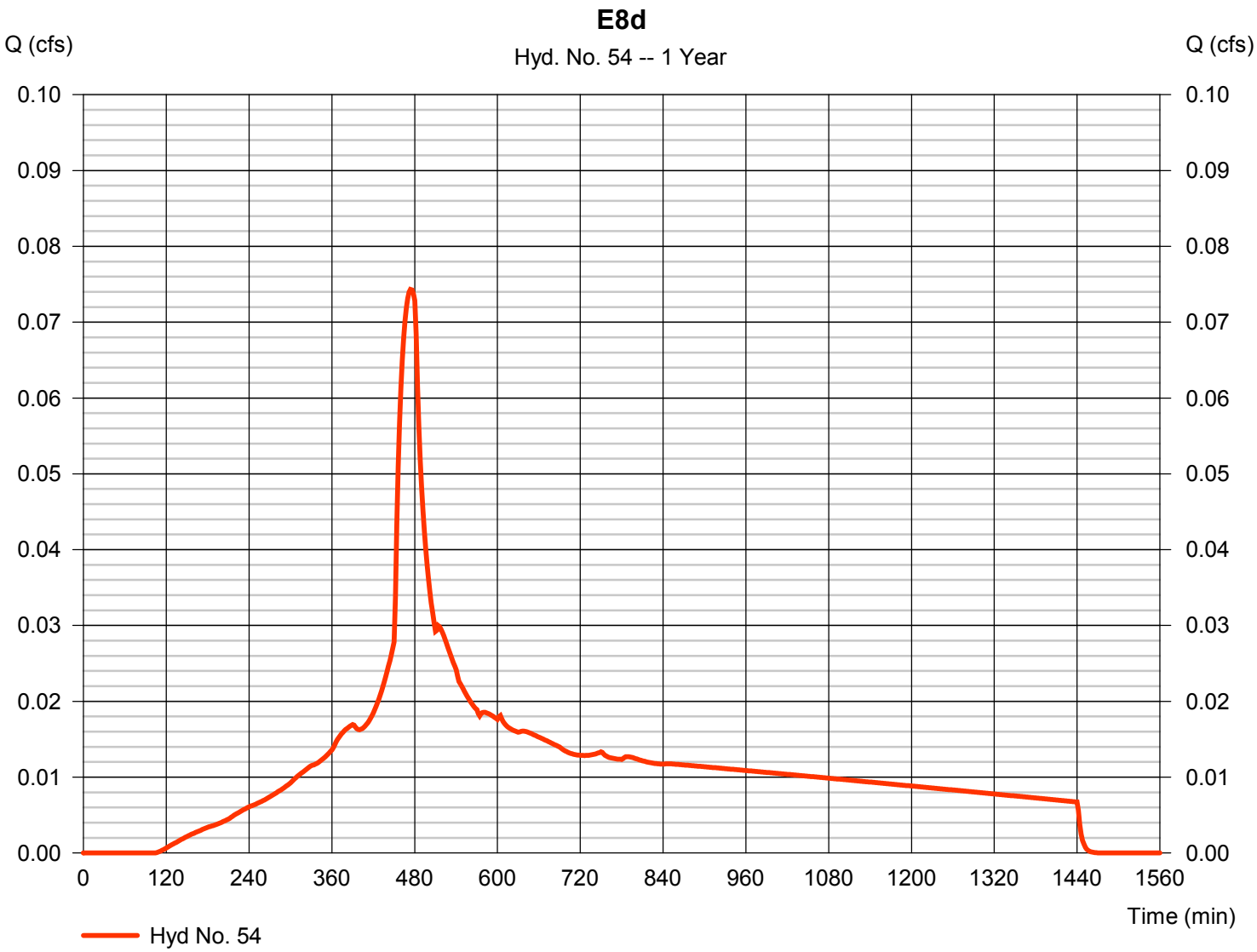
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 54

E8d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.074 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,042 cuft
Drainage area	= 0.363 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



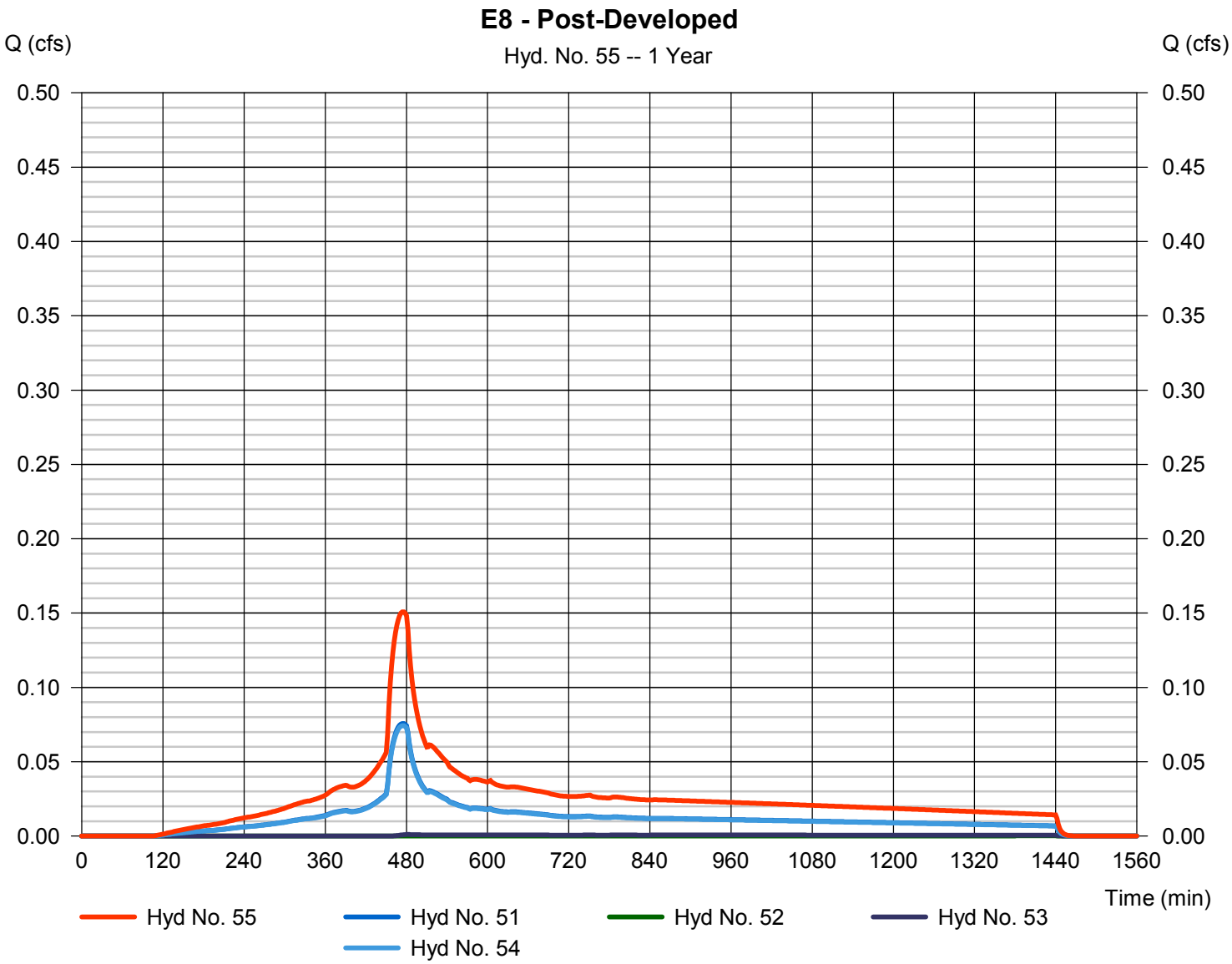
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 55

E8 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.151 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 2,146 cuft
Inflow hyds.	= 51, 52, 53, 54	Contrib. drain. area	= 0.849 ac



Hydrograph Report

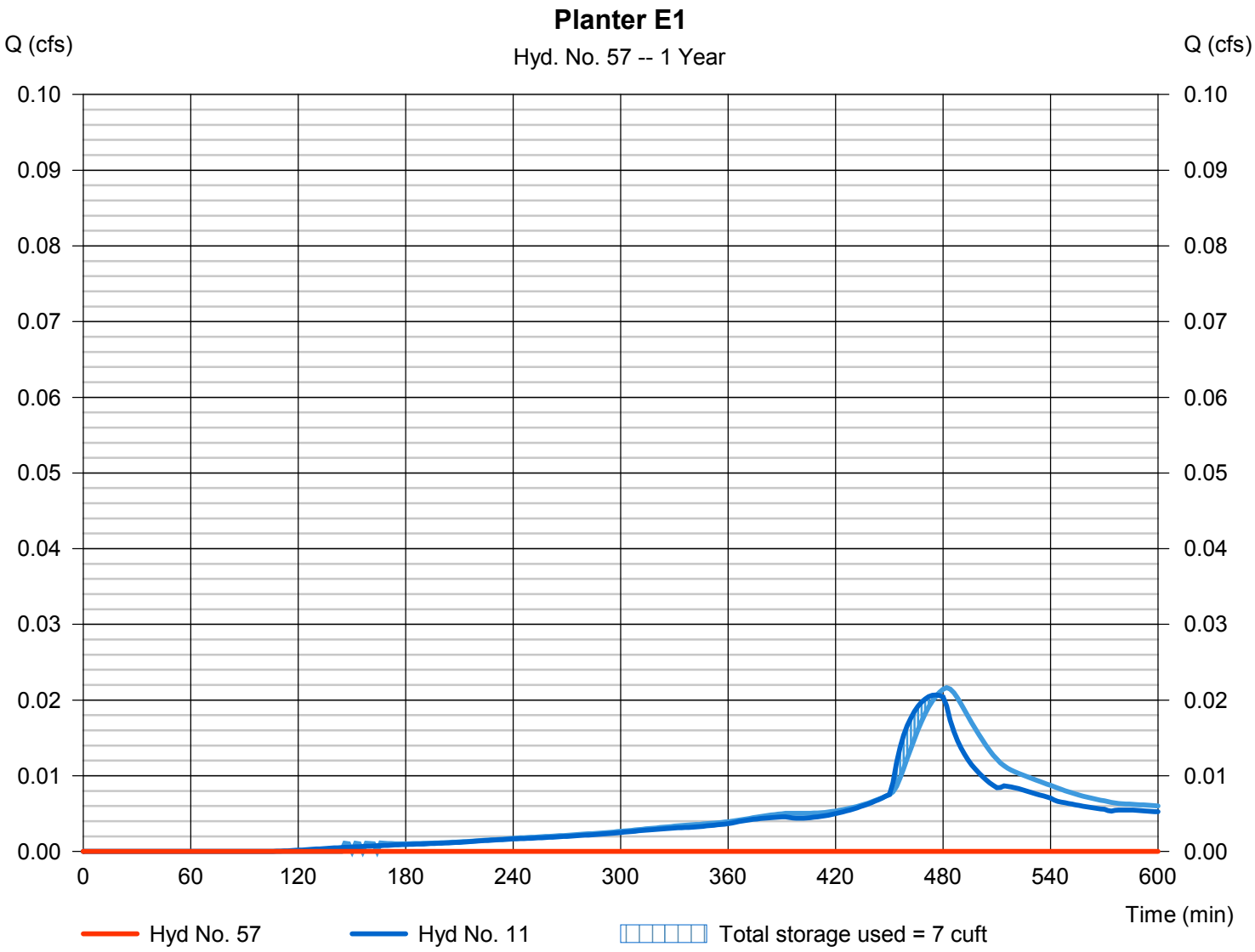
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 57

Planter E1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 492 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 11 - E1 - Post Developed	Max. Elevation	= 97.46 ft
Reservoir name	= Planter E1	Max. Storage	= 7 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

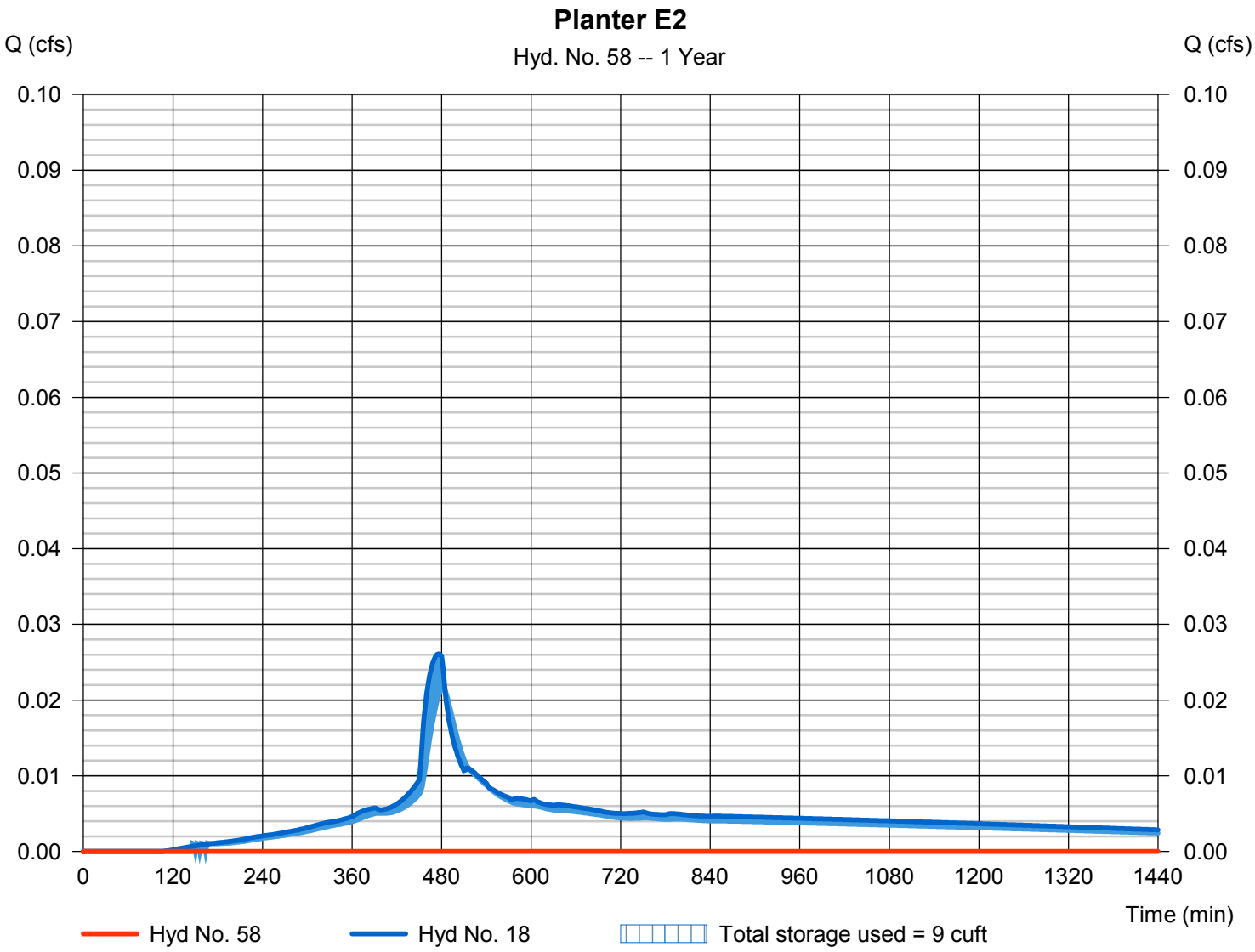
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 58

Planter E2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 496 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - E2 - Post-Developed	Max. Elevation	= 97.45 ft
Reservoir name	= Planter E2	Max. Storage	= 9 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

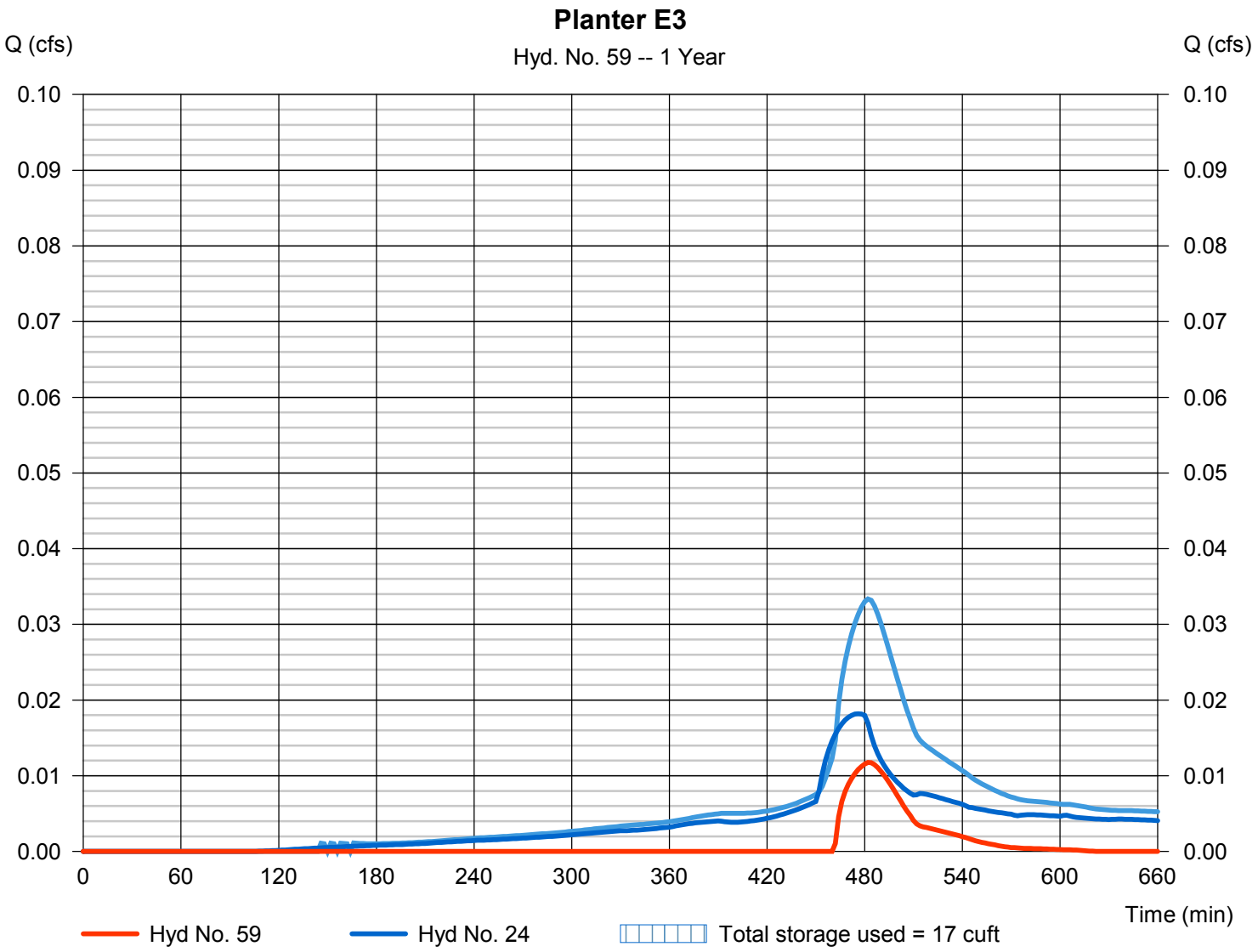
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 59

Planter E3

Hydrograph type	= Reservoir	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 33 cuft
Inflow hyd. No.	= 24 - E3 - Post-Developed	Max. Elevation	= 97.99 ft
Reservoir name	= Planter E3	Max. Storage	= 17 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

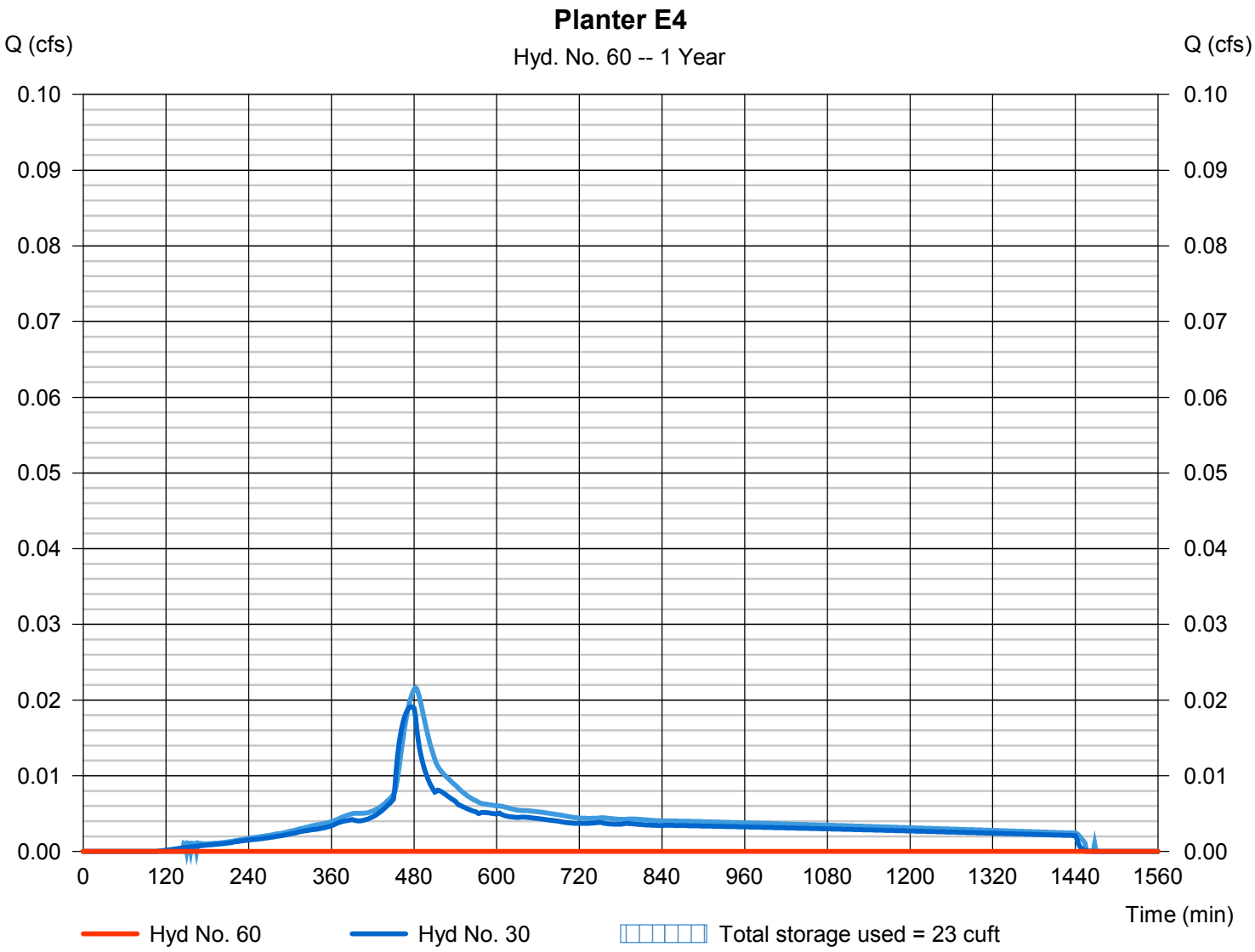
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 60

Planter E4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 986 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - E4 - Post-Developed	Max. Elevation	= 97.52 ft
Reservoir name	= Planter E4	Max. Storage	= 23 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

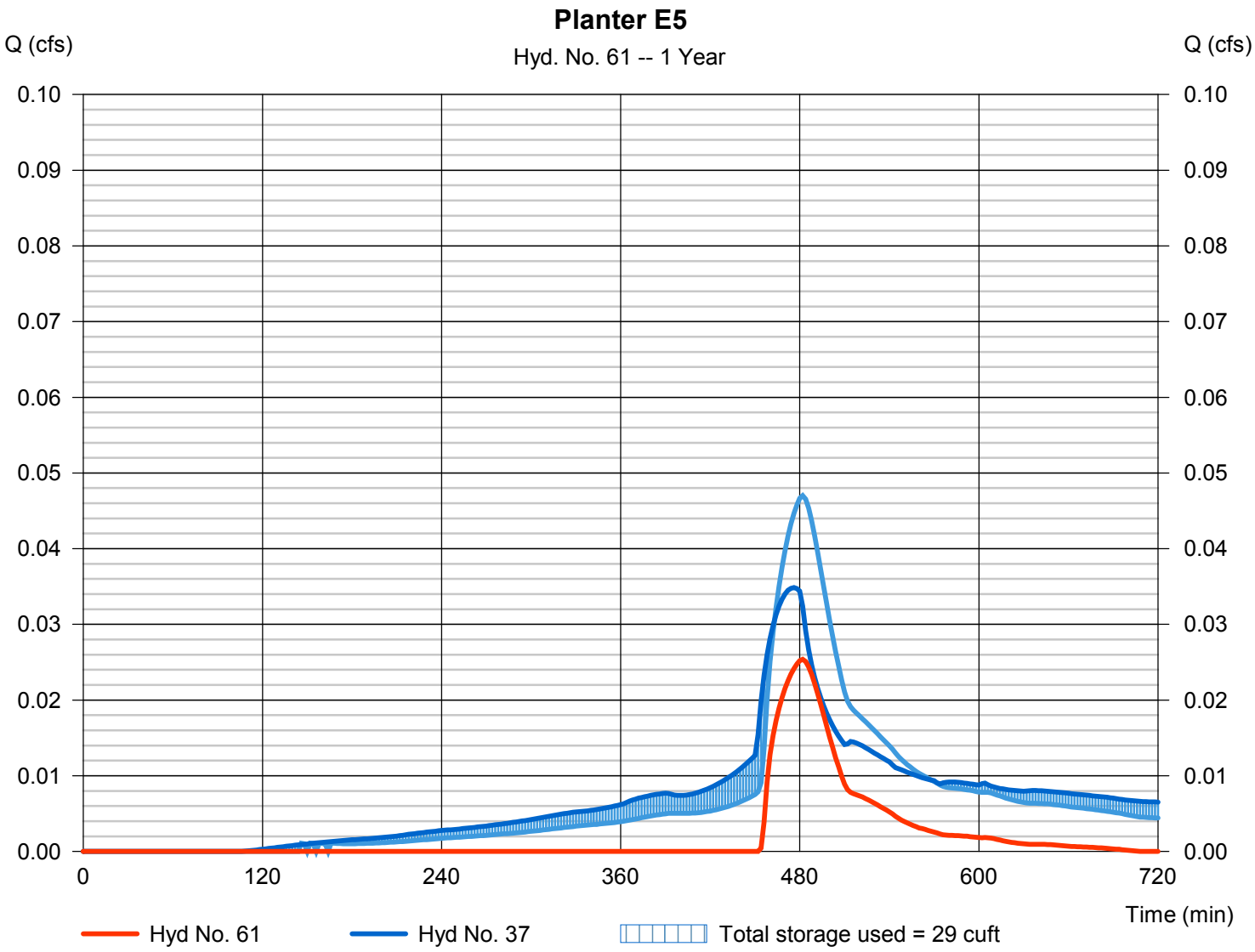
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 61

Planter E5

Hydrograph type	= Reservoir	Peak discharge	= 0.025 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 88 cuft
Inflow hyd. No.	= 37 - E5 - Post-Developed	Max. Elevation	= 98.05 ft
Reservoir name	= Planter E5	Max. Storage	= 29 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

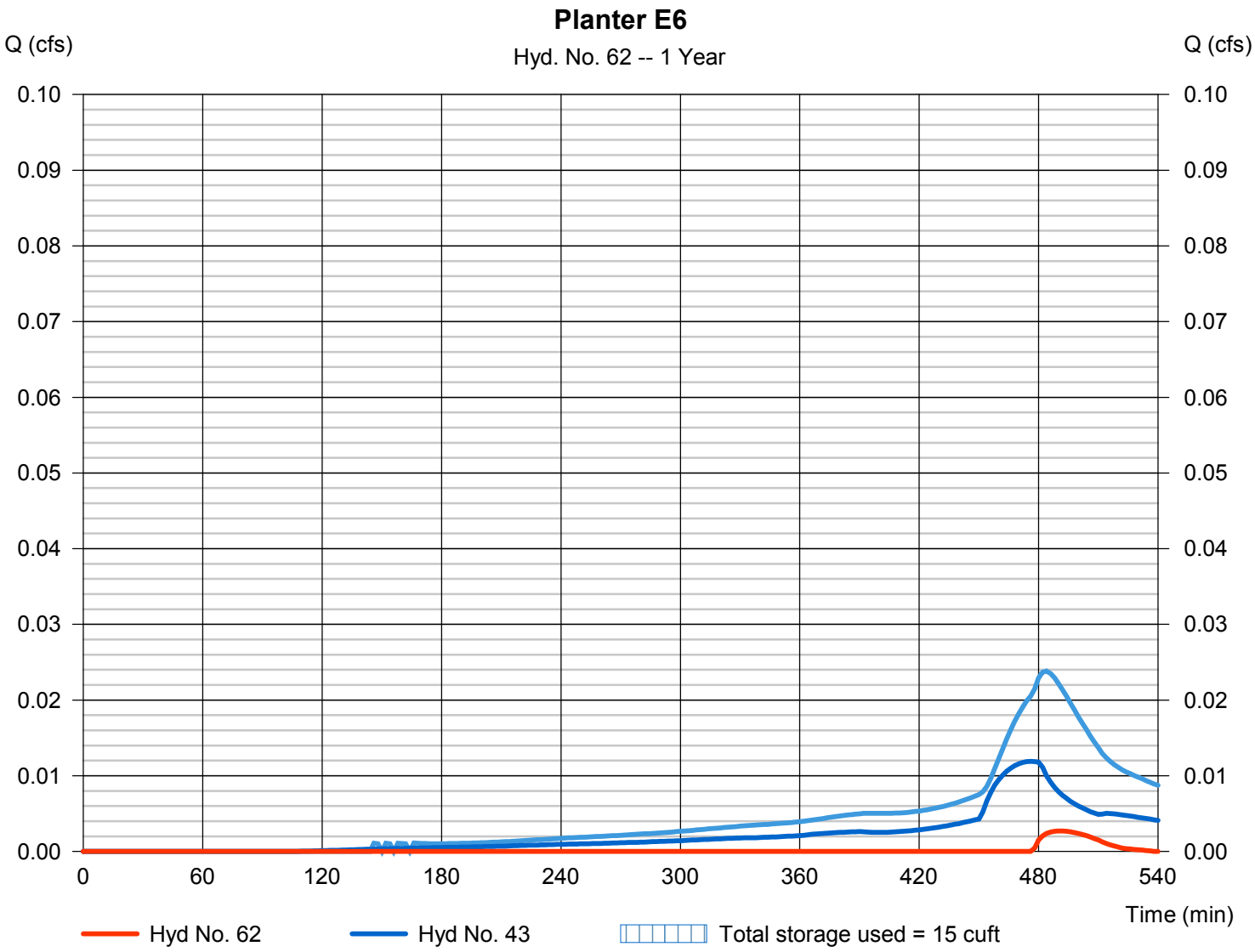
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 62

Planter E6

Hydrograph type	= Reservoir	Peak discharge	= 0.003 cfs
Storm frequency	= 1 yrs	Time to peak	= 490 min
Time interval	= 2 min	Hyd. volume	= 5 cuft
Inflow hyd. No.	= 43 - E6 - Post-Developed	Max. Elevation	= 97.86 ft
Reservoir name	= Planter E6	Max. Storage	= 15 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

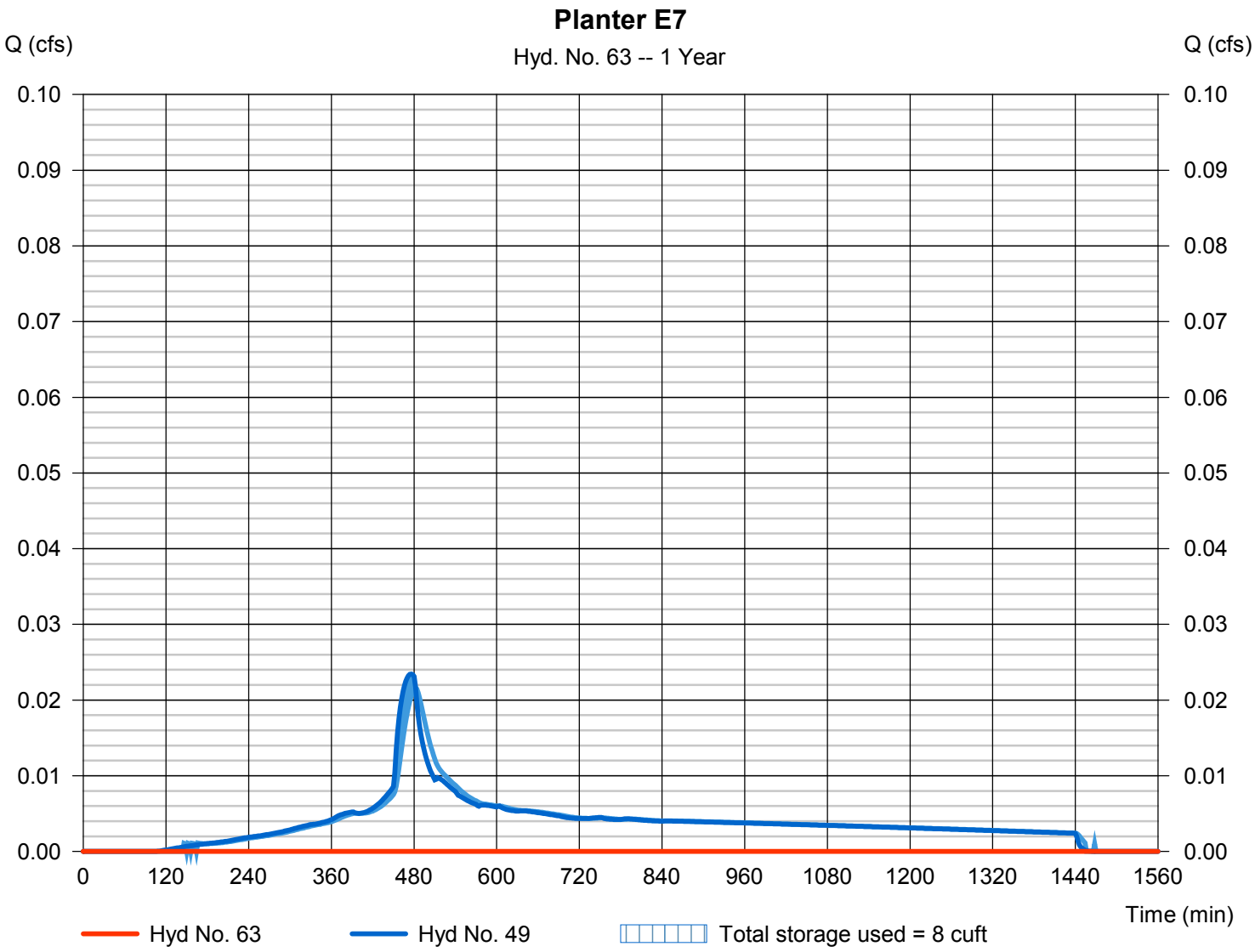
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 63

Planter E7

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 368 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 49 - E7 - Post-Developed	Max. Elevation	= 97.49 ft
Reservoir name	= Planter E7	Max. Storage	= 8 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

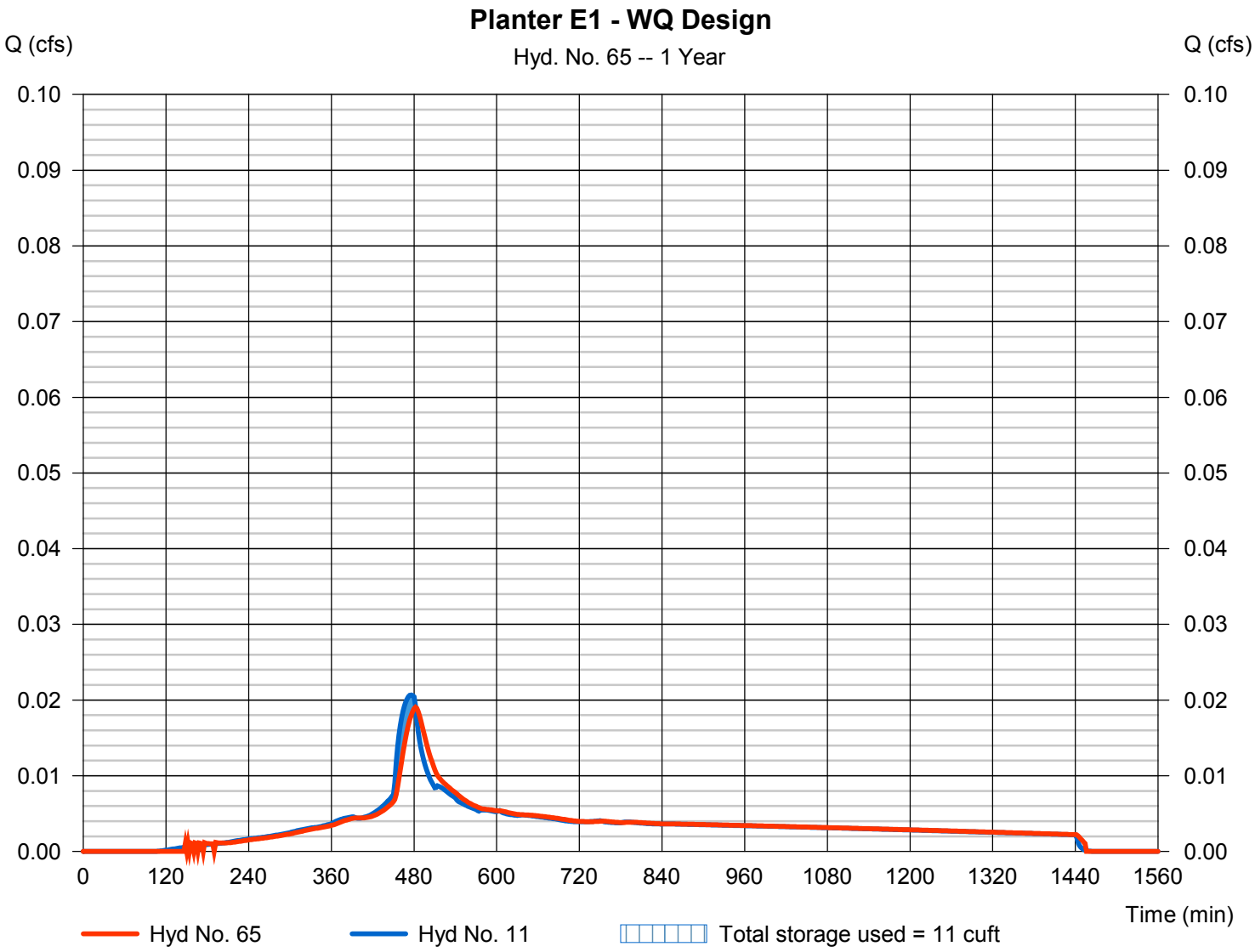
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 65

Planter E1 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 308 cuft
Inflow hyd. No.	= 11 - E1 - Post Developed	Max. Elevation	= 100.06 ft
Reservoir name	= Planter E1 - WQ	Max. Storage	= 11 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 15 - Planter E1 - WQ

Pond Data

Trapezoid -Bottom L x W = 45.5 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	182	0	0
0.08	100.08	182	15	15
0.17	100.17	182	15	30
0.25	100.25	182	15	45
0.33	100.33	182	15	60
0.41	100.42	182	15	76
0.50	100.50	182	15	91
0.58	100.58	182	15	106
0.66	100.66	182	15	121
0.75	100.75	182	15	136
0.83	100.83	182	15	151

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	15	100.08	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.17	30	100.17	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.25	45	100.25	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.33	60	100.33	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.41	76	100.42	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.50	91	100.50	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.58	106	100.58	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.66	121	100.66	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.75	136	100.75	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.83	151	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.025	---	0.380

Hydrograph Report

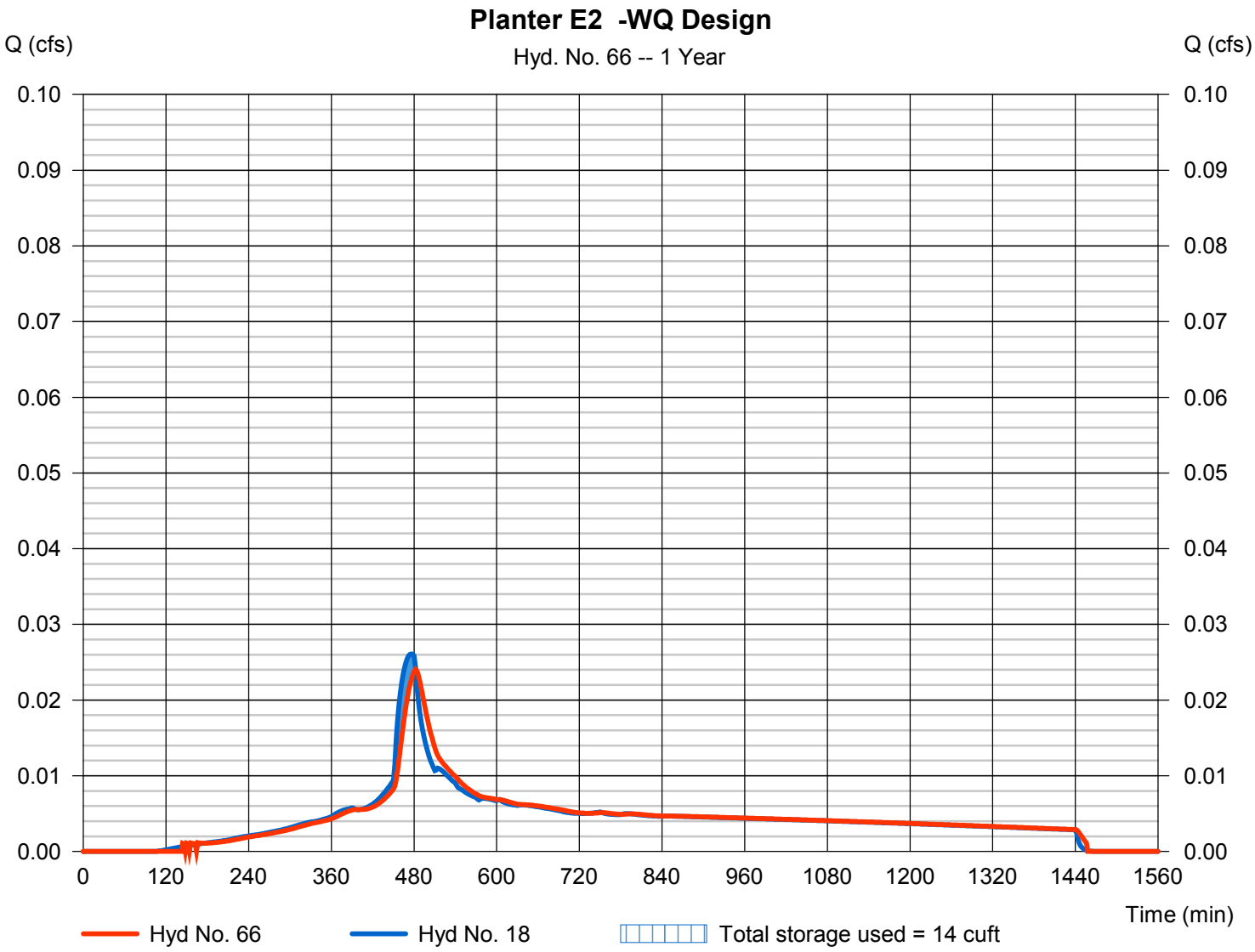
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 66

Planter E2 -WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 393 cuft
Inflow hyd. No.	= 18 - E2 - Post-Developed	Max. Elevation	= 100.06 ft
Reservoir name	= Planter E2 - WQ	Max. Storage	= 14 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 16 - Planter E2 - WQ

Pond Data

Trapezoid -Bottom L x W = 58.5 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	234	0	0
0.08	100.08	234	19	19
0.17	100.17	234	19	39
0.25	100.25	234	19	58
0.33	100.33	234	19	78
0.41	100.42	234	19	97
0.50	100.50	234	19	117
0.58	100.58	234	19	136
0.66	100.66	234	19	155
0.75	100.75	234	19	175
0.83	100.83	234	19	194

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Contour)

not extracted from model. Soil media design infiltration rate

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	19	100.08	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.17	39	100.17	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.25	58	100.25	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.33	78	100.33	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.41	97	100.42	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.50	117	100.50	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.58	136	100.58	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.66	155	100.66	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.75	175	100.75	0.00	0.00	---	---	0.00	---	---	---	0.032	---	0.032
0.83	194	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.032	---	0.387

Hydrograph Report

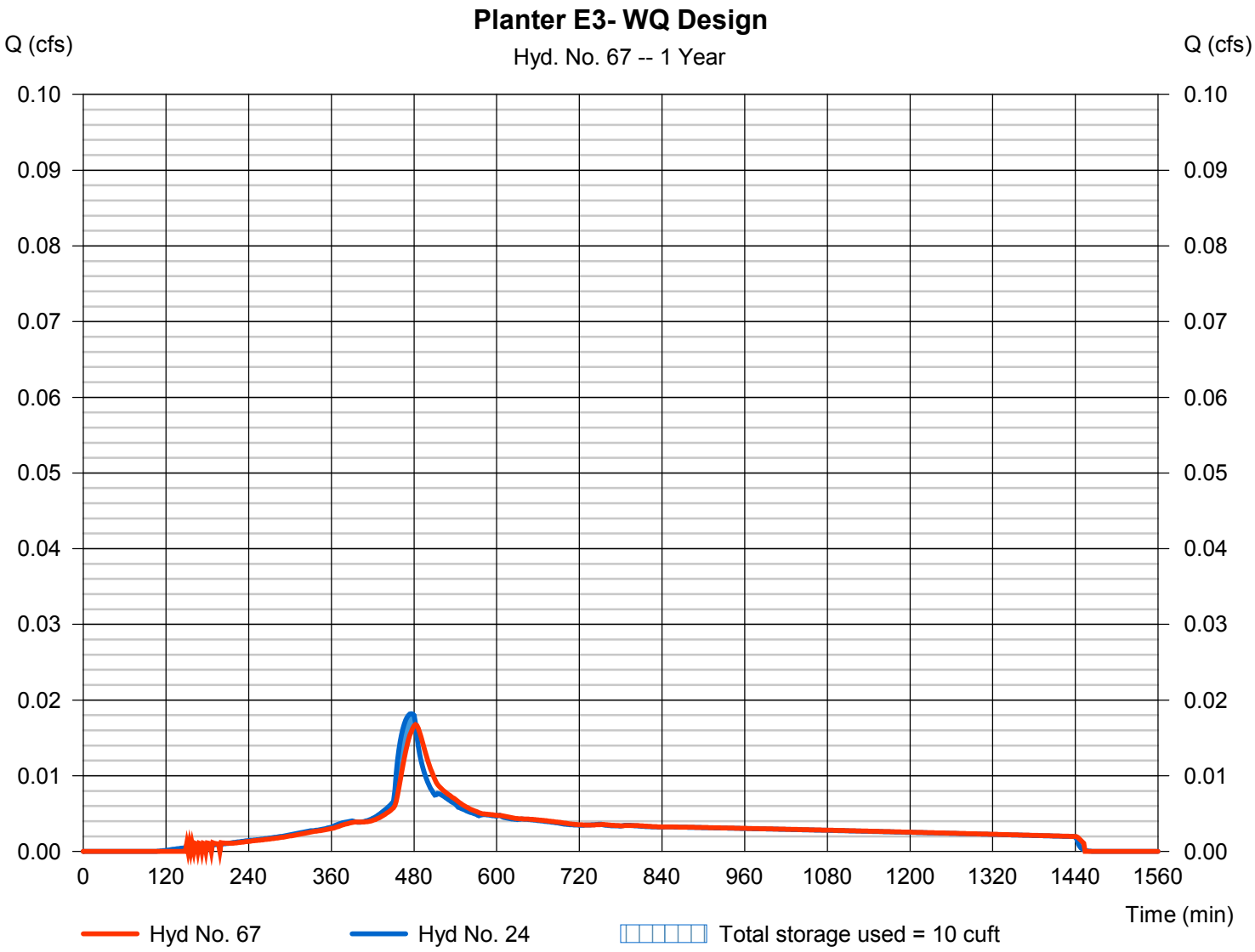
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 67

Planter E3- WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.017 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 273 cuft
Inflow hyd. No.	= 24 - E3 - Post-Developed	Max. Elevation	= 100.08 ft
Reservoir name	= Planter E3 - WQ	Max. Storage	= 10 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 17 - Planter E3 - WQ

Pond Data

Trapezoid -Bottom L x W = 32.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	128	0	0
0.08	100.08	128	11	11
0.17	100.17	128	11	21
0.25	100.25	128	11	32
0.33	100.33	128	11	42
0.41	100.42	128	11	53
0.50	100.50	128	11	64
0.58	100.58	128	11	74
0.66	100.66	128	11	85
0.75	100.75	128	11	96
0.83	100.83	128	11	106

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	11	100.08	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.17	21	100.17	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.25	32	100.25	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.33	42	100.33	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.41	53	100.42	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.50	64	100.50	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.58	74	100.58	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.66	85	100.66	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.75	96	100.75	0.00	0.00	---	---	0.00	---	---	---	0.018	---	0.018
0.83	106	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.018	---	0.373

Hydrograph Report

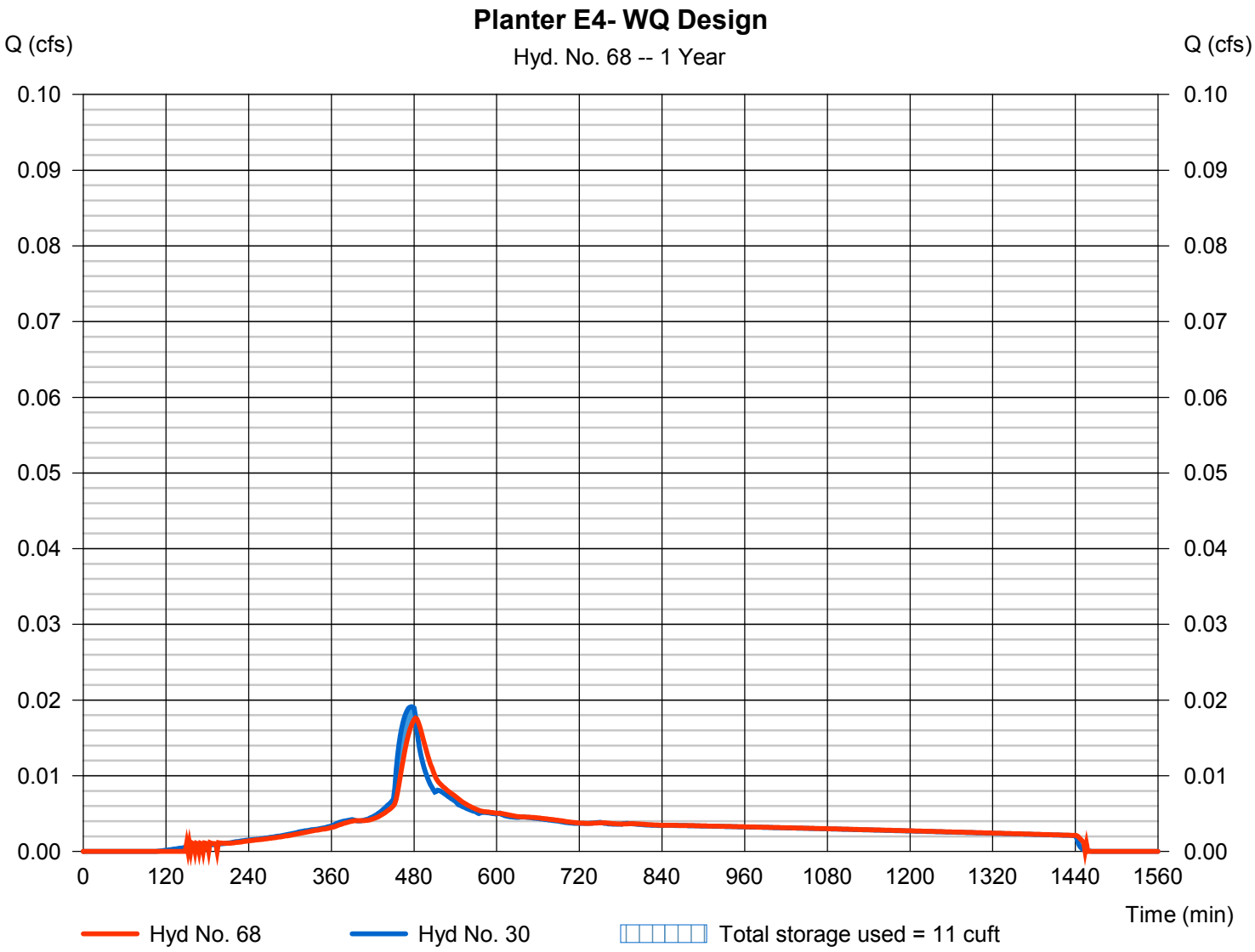
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 68

Planter E4- WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.018 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 289 cuft
Inflow hyd. No.	= 30 - E4 - Post-Developed	Max. Elevation	= 100.03 ft
Reservoir name	= Planter E4 - WQ	Max. Storage	= 11 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 18 - Planter E4 - WQ

Pond Data

Trapezoid -Bottom L x W = 75.4 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	302	0	0
0.08	100.08	302	25	25
0.17	100.17	302	25	50
0.25	100.25	302	25	75
0.33	100.33	302	25	100
0.41	100.42	302	25	125
0.50	100.50	302	25	150
0.58	100.58	302	25	175
0.66	100.66	302	25	200
0.75	100.75	302	25	225
0.83	100.83	302	25	250

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Contour)

not extracted from model. Soil media design infiltration rate

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	25	100.08	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.17	50	100.17	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.25	75	100.25	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.33	100	100.33	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.41	125	100.42	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.50	150	100.50	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.58	175	100.58	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.66	200	100.66	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.75	225	100.75	0.00	0.00	---	---	0.00	---	---	---	0.042	---	0.042
0.83	250	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.042	---	0.397

Hydrograph Report

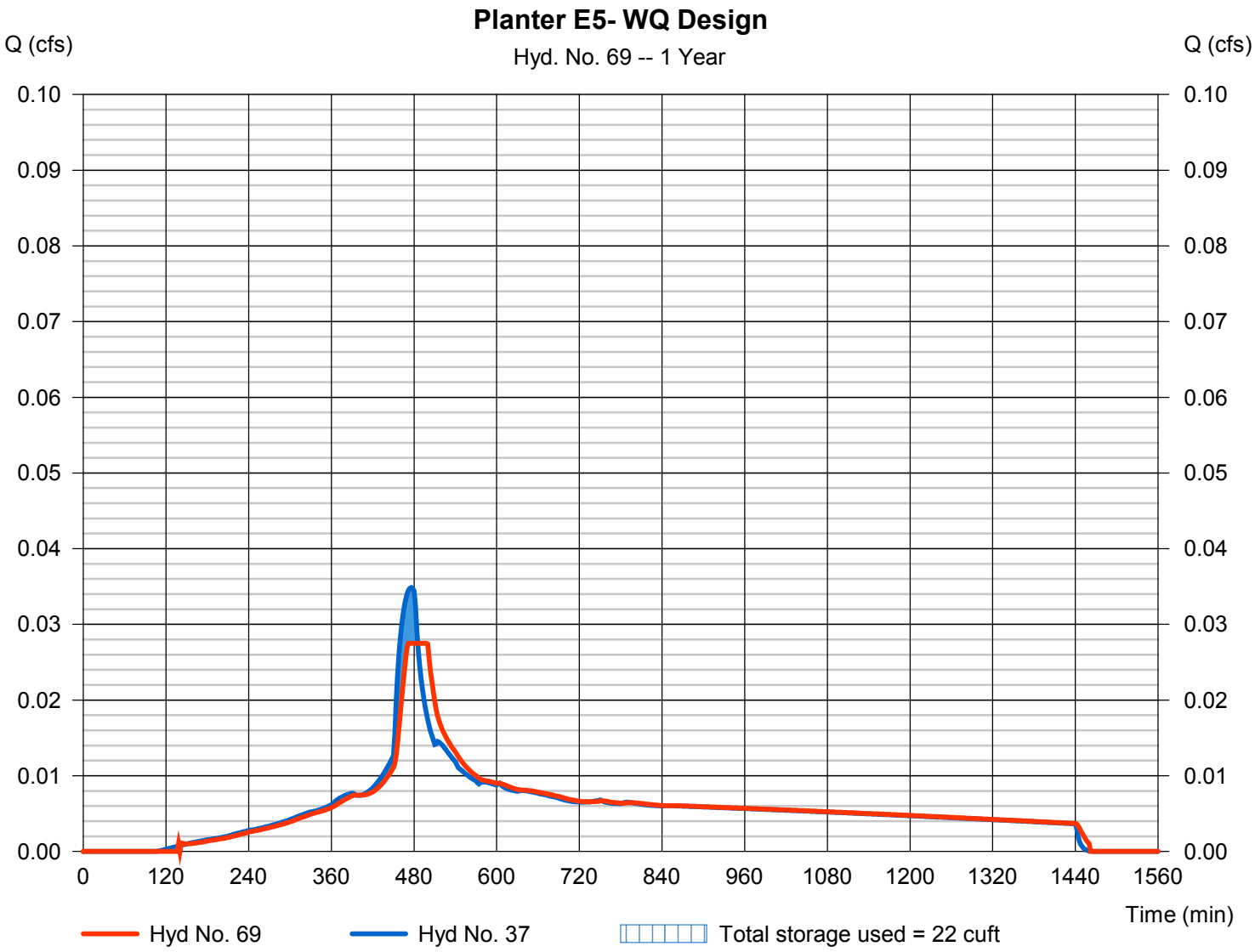
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 69

Planter E5- WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.027 cfs
Storm frequency	= 1 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 516 cuft
Inflow hyd. No.	= 37 - E5 - Post-Developed	Max. Elevation	= 100.10 ft
Reservoir name	= Planter E5 - WQ	Max. Storage	= 22 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 19 - Planter E5 - WQ

Pond Data

Trapezoid -Bottom L x W = 49.5 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	198	0	0
0.08	100.08	198	16	16
0.17	100.17	198	16	33
0.25	100.25	198	16	49
0.33	100.33	198	16	66
0.41	100.42	198	16	82
0.50	100.50	198	16	99
0.58	100.58	198	16	115
0.66	100.66	198	16	131
0.75	100.75	198	16	148
0.83	100.83	198	16	164

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	16	100.08	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.17	33	100.17	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.25	49	100.25	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.33	66	100.33	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.41	82	100.42	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.50	99	100.50	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.58	115	100.58	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.66	131	100.66	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.75	148	100.75	0.00	0.00	---	---	0.00	---	---	---	0.027	---	0.027
0.83	164	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.027	---	0.382

Hydrograph Report

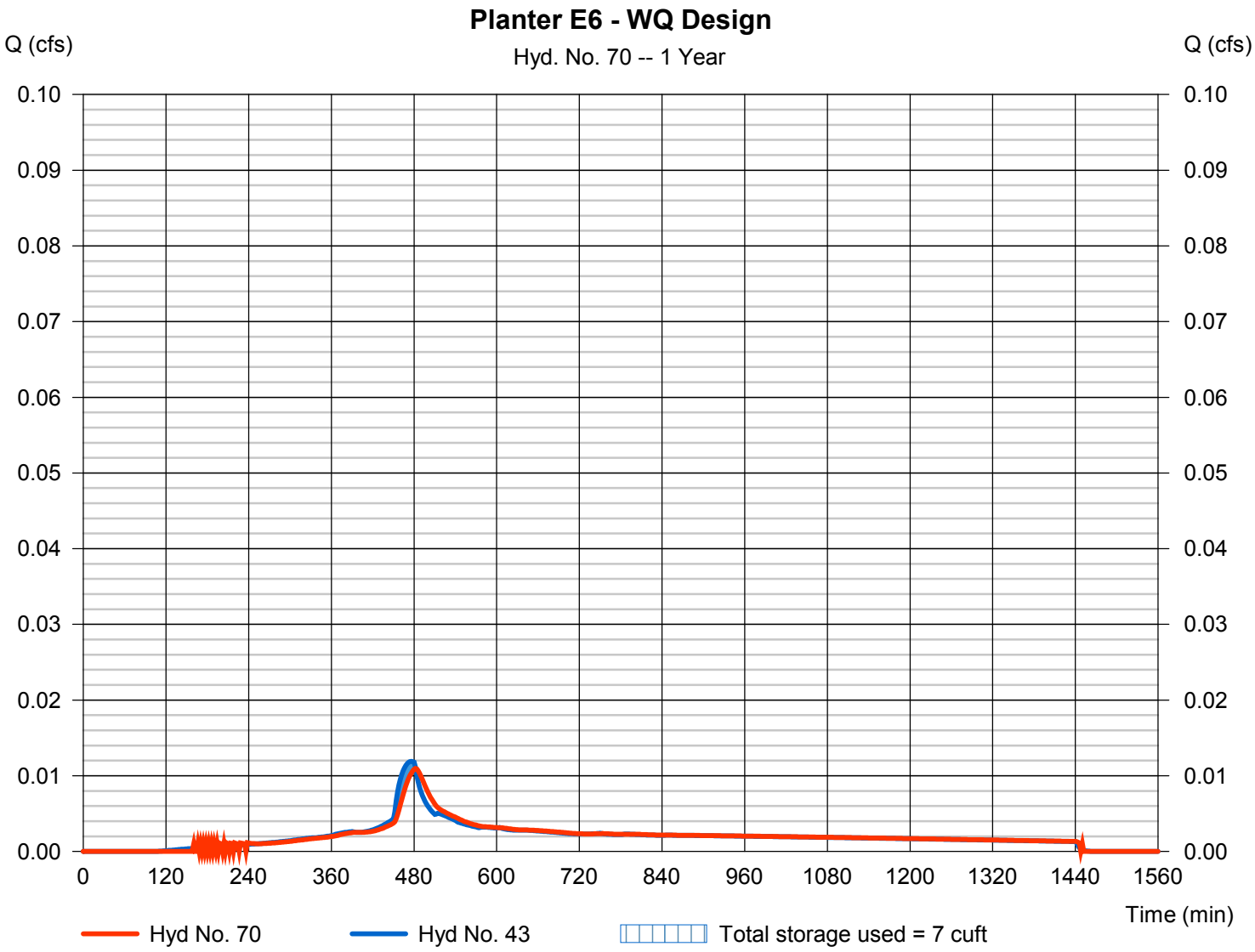
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 70

Planter E6 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.011 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 180 cuft
Inflow hyd. No.	= 43 - E6 - Post-Developed	Max. Elevation	= 100.05 ft
Reservoir name	= Planter E6 - WQ	Max. Storage	= 7 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 20 - Planter E6 - WQ

Pond Data

Trapezoid -Bottom L x W = 35.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	140	0	0
0.08	100.08	140	12	12
0.17	100.17	140	12	23
0.25	100.25	140	12	35
0.33	100.33	140	12	46
0.41	100.42	140	12	58
0.50	100.50	140	12	70
0.58	100.58	140	12	81
0.66	100.66	140	12	93
0.75	100.75	140	12	105
0.83	100.83	140	12	116

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	12	100.08	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.17	23	100.17	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.25	35	100.25	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.33	46	100.33	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.41	58	100.42	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.50	70	100.50	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.58	81	100.58	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.66	93	100.66	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.75	105	100.75	0.00	0.00	---	---	0.00	---	---	---	0.019	---	0.019
0.83	116	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.019	---	0.374

Hydrograph Report

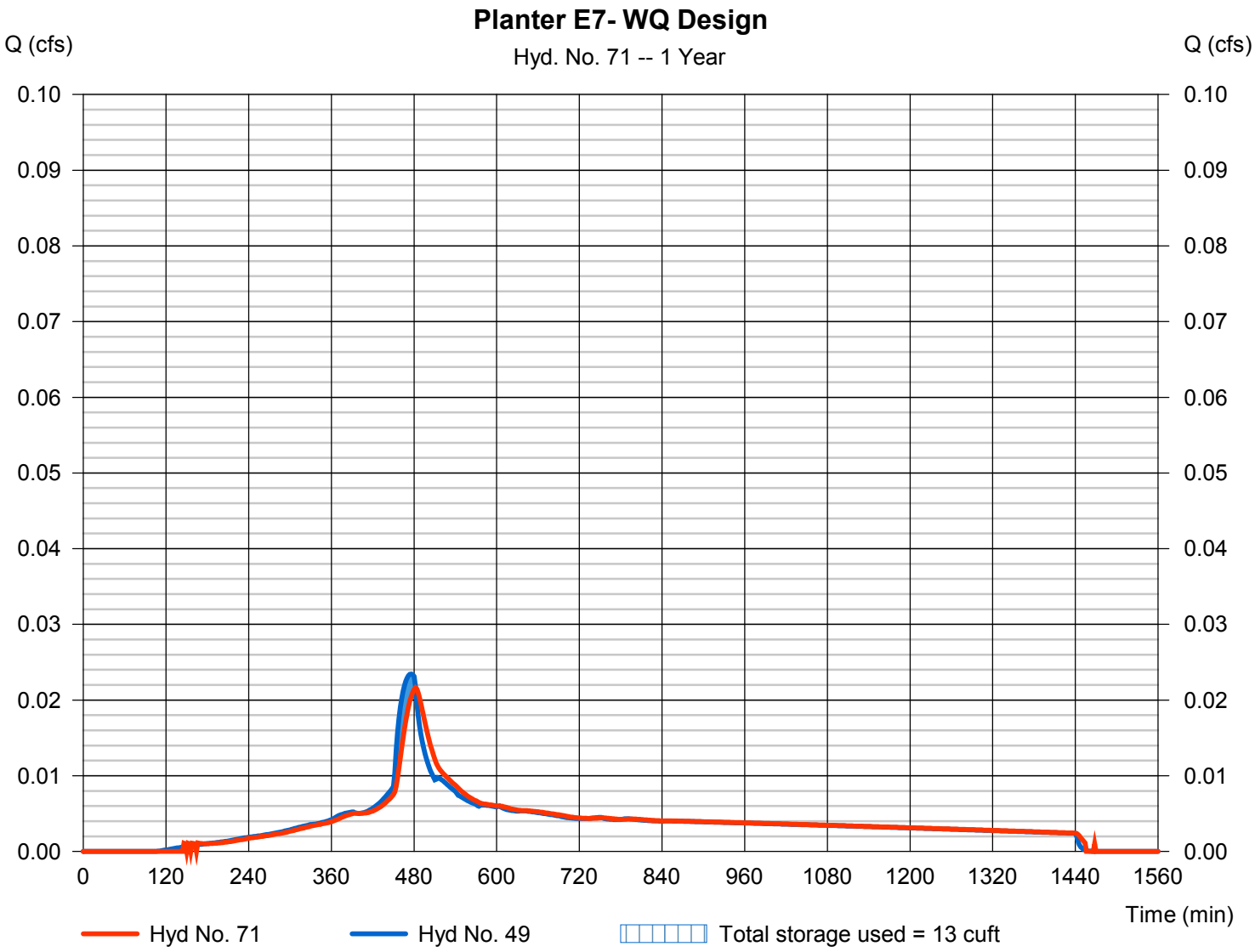
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 71

Planter E7- WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.022 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 344 cuft
Inflow hyd. No.	= 49 - E7 - Post-Developed	Max. Elevation	= 100.07 ft
Reservoir name	= Planter E7 - WQ	Max. Storage	= 13 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 21 - Planter E7 - WQ

Pond Data

Trapezoid -Bottom L x W = 45.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	180	0	0
0.08	100.08	180	15	15
0.17	100.17	180	15	30
0.25	100.25	180	15	45
0.33	100.33	180	15	60
0.41	100.42	180	15	75
0.50	100.50	180	15	90
0.58	100.58	180	15	105
0.66	100.66	180	15	120
0.75	100.75	180	15	134
0.83	100.83	180	15	149

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.70	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 6.000 (by Contour)

not extracted from model. Soil media design infiltration rate

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	15	100.08	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.17	30	100.17	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.25	45	100.25	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.33	60	100.33	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.41	75	100.42	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.50	90	100.50	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.58	105	100.58	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.66	120	100.66	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.75	134	100.75	0.00	0.00	---	---	0.00	---	---	---	0.025	---	0.025
0.83	149	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.025	---	0.380

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.216	2	478	3,340	------	------	------	exEa
2	SBUH Runoff	0.108	2	478	1,675	------	------	------	exEb
3	SBUH Runoff	0.058	2	478	851	------	------	------	exEe
4	SBUH Runoff	0.479	2	474	6,866	------	------	------	exEd (Overlay)
5	Combine	0.858	2	476	12,731	1, 2, 3, 4	------	------	exE - Pre-Developed
7	SBUH Runoff	0.026	2	474	370	------	------	------	E1a
8	SBUH Runoff	0.001	2	480	27	------	------	------	E1b
9	SBUH Runoff	0.012	2	478	178	------	------	------	E1c
10	SBUH Runoff	0.033	2	474	473	------	------	------	E1d
11	Combine	0.071	2	474	1,049	7, 8, 9, 10	------	------	E1 - Post Developed
13	SBUH Runoff	0.029	2	474	413	------	------	------	E2a
14	SBUH Runoff	0.002	2	480	49	------	------	------	E2b
15	SBUH Runoff	0.017	2	478	260	------	------	------	E2c
16	SBUH Runoff	0.045	2	474	645	------	------	------	E2d
17	SBUH Runoff	0.000	2	478	6	------	------	------	E2e
18	Combine	0.092	2	474	1,372	13, 14, 15, 16, 17	------	------	E2 - Post-Developed
20	SBUH Runoff	0.020	2	474	284	------	------	------	E3a
21	SBUH Runoff	0.001	2	480	21	------	------	------	E3b
22	SBUH Runoff	0.011	2	478	173	------	------	------	E3c
23	SBUH Runoff	0.032	2	474	456	------	------	------	E3d
24	Combine	0.063	2	474	934	20, 21, 22, 23	------	------	E3 - Post-Developed
26	SBUH Runoff	0.017	2	474	250	------	------	------	E4a
27	SBUH Runoff	0.001	2	480	19	------	------	------	E4b
28	SBUH Runoff	0.013	2	478	207	------	------	------	E4c
29	SBUH Runoff	0.037	2	474	525	------	------	------	E4d
30	Combine	0.068	2	474	1,000	26, 27, 28, 29	------	------	E4 - Post-Developed
32	SBUH Runoff	0.043	2	474	619	------	------	------	E5a
33	SBUH Runoff	0.002	2	480	59	------	------	------	E5b
34	SBUH Runoff	0.015	2	478	236	------	------	------	E5c
35	SBUH Runoff	0.056	2	474	800	------	------	------	E5d
36	SBUH Runoff	0.002	2	478	34	------	------	------	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
37	Combine	0.118	2	474	1,748	32, 33, 34, 35, 36	------	------	E5 - Post-Developed
39	SBUH Runoff	0.010	2	474	146	------	------	------	E6a
40	SBUH Runoff	0.000	2	480	8	------	------	------	E6b
41	SBUH Runoff	0.008	2	478	130	------	------	------	E6c
42	SBUH Runoff	0.023	2	474	336	------	------	------	E6d
43	Combine	0.042	2	474	620	39, 40, 41, 42	------	------	E6 - Post-Developed
45	SBUH Runoff	0.032	2	474	465	------	------	------	E7a
46	SBUH Runoff	0.000	2	480	13	------	------	------	E7b
47	SBUH Runoff	0.010	2	478	154	------	------	------	E7c
48	SBUH Runoff	0.035	2	474	499	------	------	------	E7d
49	Combine	0.077	2	474	1,130	45, 46, 47, 48	------	------	E7 - Post-Developed
51	SBUH Runoff	0.222	2	474	3,183	------	------	------	E8a
52	SBUH Runoff	0.005	2	480	131	------	------	------	E8b
53	SBUH Runoff	0.017	2	478	260	------	------	------	E8c
54	SBUH Runoff	0.218	2	474	3,123	------	------	------	E8d
55	Combine	0.461	2	474	6,697	51, 52, 53, 54	------	------	E8 - Post-Developed
57	Reservoir	0.009	2	500	54	11	99.64	78.2	Planter E1
58	Reservoir	0.013	2	498	76	18	99.63	100	Planter E2
59	Reservoir	0.039	2	488	556	24	100.00	64.4	Planter E3
60	Reservoir	0.010	2	546	238	30	100.04	163	Planter E4
61	Reservoir	0.077	2	488	1,158	37	100.04	107	Planter E5
62	Reservoir	0.014	2	504	230	43	100.02	73.2	Planter E6
63	Reservoir	0.014	2	498	83	49	99.88	85.3	Planter E7
65	Reservoir	0.025	2	586	1,048	11	100.51	111	Planter E1 - WQ Design
66	Reservoir	0.032	2	596	1,372	18	100.51	146	Planter E2 -WQ Design
67	Reservoir	0.040	2	492	934	24	100.76	97.6	Planter E3- WQ Design
68	Reservoir	0.042	2	510	1,000	30	100.14	57.4	Planter E4- WQ Design
69	Reservoir	0.118	2	480	1,747	37	100.78	155	Planter E5- WQ Design
70	Reservoir	0.019	2	500	620	43	100.36	50.1	Planter E6 - WQ Design
71	Reservoir	0.025	2	474	1,130	49	100.36	133	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.001	2	1294	43	------	------	------	exEa
2	SBUH Runoff	0.001	2	1294	21	------	------	------	exEb
3	SBUH Runoff	0.001	2	1126	24	------	------	------	exEe
4	SBUH Runoff	0.064	2	476	921	------	------	------	exEd (Overlay)
5	Combine	0.064	2	476	1,008	1, 2, 3, 4	------	------	exE - Pre-Developed
7	SBUH Runoff	0.003	2	476	50	------	------	------	E1a
8	SBUH Runoff	0.000	2	n/a	0	------	------	------	E1b
9	SBUH Runoff	0.000	2	1294	2	------	------	------	E1c
10	SBUH Runoff	0.004	2	476	63	------	------	------	E1d
11	Combine	0.008	2	476	115	7, 8, 9, 10	------	------	E1 - Post Developed
13	SBUH Runoff	0.004	2	476	55	------	------	------	E2a
14	SBUH Runoff	0.000	2	n/a	0	------	------	------	E2b
15	SBUH Runoff	0.000	2	1294	3	------	------	------	E2c
16	SBUH Runoff	0.006	2	476	87	------	------	------	E2d
17	SBUH Runoff	0.000	2	1126	0	------	------	------	E2e
18	Combine	0.010	2	476	145	13, 14, 15, 16, 17	------	------	E2 - Post-Developed
20	SBUH Runoff	0.003	2	476	38	------	------	------	E3a
21	SBUH Runoff	0.000	2	n/a	0	------	------	------	E3b
22	SBUH Runoff	0.000	2	1294	2	------	------	------	E3c
23	SBUH Runoff	0.004	2	476	61	------	------	------	E3d
24	Combine	0.007	2	476	101	20, 21, 22, 23	------	------	E3 - Post-Developed
26	SBUH Runoff	0.002	2	476	33	------	------	------	E4a
27	SBUH Runoff	0.000	2	n/a	0	------	------	------	E4b
28	SBUH Runoff	0.000	2	1294	3	------	------	------	E4c
29	SBUH Runoff	0.005	2	476	70	------	------	------	E4d
30	Combine	0.007	2	476	106	26, 27, 28, 29	------	------	E4 - Post-Developed
32	SBUH Runoff	0.006	2	476	83	------	------	------	E5a
33	SBUH Runoff	0.000	2	n/a	0	------	------	------	E5b
34	SBUH Runoff	0.000	2	1294	3	------	------	------	E5c
35	SBUH Runoff	0.007	2	476	107	------	------	------	E5d
36	SBUH Runoff	0.000	2	1126	1	------	------	------	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
37	Combine	0.013	2	476	194	32, 33, 34, 35, 36	------	------	E5 - Post-Developed
39	SBUH Runoff	0.001	2	476	20	------	------	------	E6a
40	SBUH Runoff	0.000	2	n/a	0	------	------	------	E6b
41	SBUH Runoff	0.000	2	1294	2	------	------	------	E6c
42	SBUH Runoff	0.003	2	476	45	------	------	------	E6d
43	Combine	0.004	2	476	66	39, 40, 41, 42	------	------	E6 - Post-Developed
45	SBUH Runoff	0.004	2	476	62	------	------	------	E7a
46	SBUH Runoff	0.000	2	n/a	0	------	------	------	E7b
47	SBUH Runoff	0.000	2	1294	2	------	------	------	E7c
48	SBUH Runoff	0.005	2	476	67	------	------	------	E7d
49	Combine	0.009	2	476	131	45, 46, 47, 48	------	------	E7 - Post-Developed
51	SBUH Runoff	0.030	2	476	427	------	------	------	E8a
52	SBUH Runoff	0.000	2	n/a	0	------	------	------	E8b
53	SBUH Runoff	0.000	2	1294	3	------	------	------	E8c
54	SBUH Runoff	0.029	2	476	419	------	------	------	E8d
55	Combine	0.058	2	476	849	51, 52, 53, 54	------	------	E8 - Post-Developed
57	Reservoir	0.000	2	462	0	11	97.33	2.57	Planter E1
58	Reservoir	0.000	2	420	0	18	97.33	3.22	Planter E2
59	Reservoir	0.000	2	474	0	24	97.52	7.38	Planter E3
60	Reservoir	0.000	2	462	0	30	97.39	7.42	Planter E4
61	Reservoir	0.000	2	470	0	37	97.52	16.3	Planter E5
62	Reservoir	0.000	2	470	0	43	97.43	4.64	Planter E6
63	Reservoir	0.000	2	458	0	49	97.34	2.94	Planter E7
65	Reservoir	0.007	2	482	115	11	100.02	4.28	Planter E1 - WQ Design
66	Reservoir	0.009	2	482	145	18	100.02	5.37	Planter E2 -WQ Design
67	Reservoir	0.006	2	482	101	24	100.03	3.76	Planter E3- WQ Design
68	Reservoir	0.007	2	482	106	30	100.01	3.93	Planter E4- WQ Design
69	Reservoir	0.012	2	482	194	37	100.04	7.21	Planter E5- WQ Design
70	Reservoir	0.004	2	482	66	43	100.02	2.45	Planter E6 - WQ Design
71	Reservoir	0.008	2	482	131	49	100.03	4.89	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Proposed Planter can fully infiltrate 0.5 inch storm

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.443	2	476	6,415	------	------	------	exEa
2	SBUH Runoff	0.222	2	476	3,217	------	------	------	exEb
3	SBUH Runoff	0.110	2	476	1,558	------	------	------	exEe
4	SBUH Runoff	0.750	2	474	10,907	------	------	------	exEd (Overlay)
5	Combine	1.522	2	474	22,095	1, 2, 3, 4	------	------	exE - Pre-Developed
7	SBUH Runoff	0.040	2	474	588	------	------	------	E1a
8	SBUH Runoff	0.004	2	480	69	------	------	------	E1b
9	SBUH Runoff	0.024	2	476	342	------	------	------	E1c
10	SBUH Runoff	0.052	2	474	752	------	------	------	E1d
11	Combine	0.119	2	474	1,750	7, 8, 9, 10	------	------	E1 - Post Developed
13	SBUH Runoff	0.045	2	474	656	------	------	------	E2a
14	SBUH Runoff	0.007	2	480	122	------	------	------	E2b
15	SBUH Runoff	0.034	2	476	499	------	------	------	E2c
16	SBUH Runoff	0.071	2	474	1,025	------	------	------	E2d
17	SBUH Runoff	0.001	2	476	10	------	------	------	E2e
18	Combine	0.157	2	474	2,312	13, 14, 15, 16, 17	------	------	E2 - Post-Developed
20	SBUH Runoff	0.031	2	474	451	------	------	------	E3a
21	SBUH Runoff	0.003	2	480	53	------	------	------	E3b
22	SBUH Runoff	0.023	2	476	333	------	------	------	E3c
23	SBUH Runoff	0.050	2	474	724	------	------	------	E3d
24	Combine	0.107	2	474	1,561	20, 21, 22, 23	------	------	E3 - Post-Developed
26	SBUH Runoff	0.027	2	474	396	------	------	------	E4a
27	SBUH Runoff	0.003	2	480	48	------	------	------	E4b
28	SBUH Runoff	0.027	2	476	397	------	------	------	E4c
29	SBUH Runoff	0.057	2	474	834	------	------	------	E4d
30	Combine	0.114	2	474	1,675	26, 27, 28, 29	------	------	E4 - Post-Developed
32	SBUH Runoff	0.068	2	474	984	------	------	------	E5a
33	SBUH Runoff	0.008	2	480	148	------	------	------	E5b
34	SBUH Runoff	0.031	2	476	453	------	------	------	E5c
35	SBUH Runoff	0.087	2	474	1,271	------	------	------	E5d
36	SBUH Runoff	0.004	2	476	61	------	------	------	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
37	Combine	0.198	2	474	2,918	32, 33, 34, 35, 36	------	------	E5 - Post-Developed
39	SBUH Runoff	0.016	2	474	232	------	------	------	E6a
40	SBUH Runoff	0.001	2	480	21	------	------	------	E6b
41	SBUH Runoff	0.017	2	476	250	------	------	------	E6c
42	SBUH Runoff	0.037	2	474	533	------	------	------	E6d
43	Combine	0.071	2	474	1,036	39, 40, 41, 42	------	------	E6 - Post-Developed
45	SBUH Runoff	0.051	2	474	738	------	------	------	E7a
46	SBUH Runoff	0.002	2	480	32	------	------	------	E7b
47	SBUH Runoff	0.020	2	476	296	------	------	------	E7c
48	SBUH Runoff	0.055	2	474	793	------	------	------	E7d
49	Combine	0.127	2	474	1,858	45, 46, 47, 48	------	------	E7 - Post-Developed
51	SBUH Runoff	0.348	2	474	5,057	------	------	------	E8a
52	SBUH Runoff	0.018	2	480	329	------	------	------	E8b
53	SBUH Runoff	0.034	2	476	499	------	------	------	E8c
54	SBUH Runoff	0.341	2	474	4,961	------	------	------	E8d
55	Combine	0.741	2	474	10,846	51, 52, 53, 54	------	------	E8 - Post-Developed
57	Reservoir	0.011	2	540	217	11	100.71	221	Planter E1
58	Reservoir	0.016	2	540	313	18	100.74	290	Planter E2
59	Reservoir	0.045	2	502	1,171	24	100.69	152	Planter E3
60	Reservoir	0.021	2	554	738	30	100.76	380	Planter E4
61	Reservoir	0.118	2	490	2,312	37	100.77	251	Planter E5
62	Reservoir	0.016	2	544	617	43	100.72	172	Planter E6
63	Reservoir	0.021	2	524	296	49	100.75	226	Planter E7
65	Reservoir	0.120	2	476	1,750	11	100.78	143	Planter E1 - WQ Design
66	Reservoir	0.157	2	476	2,312	18	100.79	185	Planter E2 -WQ Design
67	Reservoir	0.106	2	474	1,561	24	100.78	100	Planter E3- WQ Design
68	Reservoir	0.042	2	478	1,675	30	100.36	173	Planter E4- WQ Design
69	Reservoir	0.198	2	474	2,917	37	100.80	158	Planter E5- WQ Design
70	Reservoir	0.048	2	490	1,036	43	100.76	107	Planter E6 - WQ Design
71	Reservoir	0.132	2	470	1,858	49	100.79	141	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.580	2	476	8,265	------	------	------	exEa
2	SBUH Runoff	0.291	2	476	4,144	------	------	------	exEb
3	SBUH Runoff	0.140	2	476	1,976	------	------	------	exEe
4	SBUH Runoff	0.904	2	474	13,219	------	------	------	exEd (Overlay)
5	Combine	1.913	2	474	27,604	1, 2, 3, 4	------	------	exE - Pre-Developed
7	SBUH Runoff	0.049	2	474	712	------	------	------	E1a
8	SBUH Runoff	0.006	2	480	97	------	------	------	E1b
9	SBUH Runoff	0.031	2	476	441	------	------	------	E1c
10	SBUH Runoff	0.062	2	474	911	------	------	------	E1d
11	Combine	0.147	2	474	2,161	7, 8, 9, 10	------	------	E1 - Post Developed
13	SBUH Runoff	0.054	2	474	795	------	------	------	E2a
14	SBUH Runoff	0.010	2	480	171	------	------	------	E2b
15	SBUH Runoff	0.045	2	476	643	------	------	------	E2c
16	SBUH Runoff	0.085	2	474	1,242	------	------	------	E2d
17	SBUH Runoff	0.001	2	476	13	------	------	------	E2e
18	Combine	0.195	2	474	2,864	13, 14, 15, 16, 17	------	------	E2 - Post-Developed
20	SBUH Runoff	0.037	2	474	547	------	------	------	E3a
21	SBUH Runoff	0.004	2	480	74	------	------	------	E3b
22	SBUH Runoff	0.030	2	476	429	------	------	------	E3c
23	SBUH Runoff	0.060	2	474	878	------	------	------	E3d
24	Combine	0.132	2	474	1,928	20, 21, 22, 23	------	------	E3 - Post-Developed
26	SBUH Runoff	0.033	2	474	480	------	------	------	E4a
27	SBUH Runoff	0.004	2	480	67	------	------	------	E4b
28	SBUH Runoff	0.036	2	476	512	------	------	------	E4c
29	SBUH Runoff	0.069	2	474	1,010	------	------	------	E4d
30	Combine	0.142	2	474	2,070	26, 27, 28, 29	------	------	E4 - Post-Developed
32	SBUH Runoff	0.082	2	474	1,193	------	------	------	E5a
33	SBUH Runoff	0.013	2	480	208	------	------	------	E5b
34	SBUH Runoff	0.041	2	476	584	------	------	------	E5c
35	SBUH Runoff	0.105	2	474	1,541	------	------	------	E5d
36	SBUH Runoff	0.006	2	476	78	------	------	------	E5e

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
37	Combine	0.245	2	474	3,603	32, 33, 34, 35, 36	------	------	E5 - Post-Developed
39	SBUH Runoff	0.019	2	474	282	------	------	------	E6a
40	SBUH Runoff	0.002	2	480	30	------	------	------	E6b
41	SBUH Runoff	0.023	2	476	322	------	------	------	E6c
42	SBUH Runoff	0.044	2	474	646	------	------	------	E6d
43	Combine	0.088	2	474	1,279	39, 40, 41, 42	------	------	E6 - Post-Developed
45	SBUH Runoff	0.061	2	474	895	------	------	------	E7a
46	SBUH Runoff	0.003	2	480	45	------	------	------	E7b
47	SBUH Runoff	0.027	2	476	381	------	------	------	E7c
48	SBUH Runoff	0.066	2	474	961	------	------	------	E7d
49	Combine	0.156	2	474	2,281	45, 46, 47, 48	------	------	E7 - Post-Developed
51	SBUH Runoff	0.419	2	474	6,129	------	------	------	E8a
52	SBUH Runoff	0.028	2	480	460	------	------	------	E8b
53	SBUH Runoff	0.045	2	476	643	------	------	------	E8c
54	SBUH Runoff	0.411	2	474	6,013	------	------	------	E8d
55	Combine	0.902	2	474	13,246	51, 52, 53, 54	------	------	E8 - Post-Developed
57	Reservoir	0.103	2	484	416	11	100.78	234	Planter E1
58	Reservoir	0.138	2	484	592	18	100.79	302	Planter E2
59	Reservoir	0.128	2	480	1,534	24	100.78	164	Planter E3
60	Reservoir	0.088	2	488	1,055	30	100.78	387	Planter E4
61	Reservoir	0.246	2	478	2,992	37	100.80	257	Planter E5
62	Reservoir	0.073	2	484	853	43	100.77	179	Planter E6
63	Reservoir	0.130	2	482	514	49	100.79	232	Planter E7
65	Reservoir	0.147	2	474	2,160	11	100.79	144	Planter E1 - WQ Design
66	Reservoir	0.195	2	476	2,864	18	100.80	187	Planter E2 -WQ Design
67	Reservoir	0.132	2	474	1,927	24	100.79	101	Planter E3- WQ Design
68	Reservoir	0.069	2	500	2,069	30	100.76	230	Planter E4- WQ Design
69	Reservoir	0.245	2	474	3,602	37	100.81	160	Planter E5- WQ Design
70	Reservoir	0.089	2	476	1,278	43	100.78	109	Planter E6 - WQ Design
71	Reservoir	0.156	2	474	2,280	49	100.79	142	Planter E7- WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Proposed Planters capable of conveying 100 Year storm flows

BASIN F PLANTERS

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 11 - Planter F1

Pond Data

Contours -User defined contour area: 276 sqft, Slope = 0.00 %, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 100.00 cuft

Trapezoid -Bottom length = 10.0 ft, Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.00 ft 18.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	276	0	0
0.27	97.52	276	14	14
0.55	97.80	276	14	27
0.82	98.07	276	14	41
1.10	98.35	276	14	54
1.37	98.62	276	14	68
1.64	98.89	276	14	82
1.92	99.17	276	14	95
2.19	99.44	276	14	109
2.47	99.72	276	14	123
2.74	99.99	276	14	136
2.75	100.00	276	3	139
3.00	100.25	276	69	208
3.25	100.50	276	69	277
3.50	100.75	276	69	346
3.58	100.83	276	22	368

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.50	0.00	0.00
Span (in)	= 12.00	0.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 2.250 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	14	97.52	0.00	0.00	---	---	0.00	---	---	---	0.014	---	0.014
0.55	27	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.014	---	0.015
0.82	41	98.07	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.014	---	0.018
1.10	54	98.35	0.01 ic	0.00 ic	---	---	0.00	---	---	---	0.014	---	0.019
1.37	68	98.62	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.020
1.64	82	98.89	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.021
1.92	95	99.17	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.022
2.19	109	99.44	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.023
2.47	123	99.72	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.024
2.74	136	99.99	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.024
2.75	139	100.00	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.024
3.00	208	100.25	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.025
3.25	277	100.50	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.025
3.50	346	100.75	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.014	---	0.026
3.58	368	100.83	0.37 ic	0.01 ic	---	---	0.35	---	---	---	0.014	---	0.381

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 5 - Planter F2

Pond Data

Contours -User defined Contour area, Conic sides slope = 0.01 for Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 1,000 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	268	0	0
0.27	97.52	268	13	13
0.55	97.80	268	13	26
0.82	98.07	268	13	40
1.10	98.35	268	13	53
1.37	98.62	268	13	66
1.64	98.89	268	13	79
1.92	99.17	268	13	93
2.19	99.44	268	13	106
2.47	99.72	268	13	119
2.74	99.99	268	13	132
2.75	100.00	268	3	135
3.00	100.25	268	67	202
3.25	100.50	268	67	269
3.50	100.75	268	67	336
3.58	100.83	268	21	357

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.90	0.00	0.00
Span (in)	= 12.00	0.90	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 96.75	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr)	= 0.000 (by Contour)
TW Elev. (ft)	= 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.27	13	97.52	0.95 ic	0.00	---	---	0.00	---	---	---	---	---	0.000
0.55	26	97.80	0.95 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.002
0.82	40	98.07	0.95 ic	0.01 ic	---	---	0.00	---	---	---	---	---	0.011
1.10	53	98.35	0.95 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.016
1.37	66	98.62	0.95 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.019
1.64	79	98.89	0.95 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.022
1.92	93	99.17	0.95 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.025
2.19	106	99.44	0.95 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.027
2.47	119	99.72	0.95 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.030
2.74	132	99.99	0.95 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.032
2.75	135	100.00	0.95 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.032
3.00	202	100.25	0.95 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.033
3.25	269	100.50	0.95 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.035
3.50	336	100.75	0.95 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.037
3.58	357	100.83	0.95 ic	0.04 ic	---	---	0.35	---	---	---	---	---	0.392

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 7 - Planter F3

Pond Data

Contours -User defined Contour area, Conic sloped Used for Volume calculation, Bottom elev = 97.25 ft, Depth = 2.74 ft, = 100.99 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	296	0	0
0.27	97.52	296	15	15
0.55	97.80	296	15	29
0.82	98.07	296	15	44
1.10	98.35	296	15	58
1.37	98.62	296	15	73
1.64	98.89	296	15	88
1.92	99.17	296	15	102
2.19	99.44	296	15	117
2.47	99.72	296	15	131
2.74	99.99	296	15	146
2.75	100.00	296	3	149
3.00	100.25	296	74	223
3.25	100.50	296	74	297
3.50	100.75	296	74	371
3.58	100.83	296	24	395

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.10	0.00	0.00
Span (in)	= 12.00	1.10	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.00	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.27	15	97.52	0.26 ic	0.00	---	---	0.00	---	---	---	---	---	0.000
0.55	29	97.80	0.26 ic	0.00 ic	---	---	0.00	---	---	---	---	---	0.003
0.82	44	98.07	0.26 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.017
1.10	58	98.35	0.26 ic	0.02 ic	---	---	0.00	---	---	---	---	---	0.024
1.37	73	98.62	0.26 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.029
1.64	88	98.89	0.26 ic	0.03 ic	---	---	0.00	---	---	---	---	---	0.033
1.92	102	99.17	0.26 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.037
2.19	117	99.44	0.26 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.041
2.47	131	99.72	0.26 ic	0.04 ic	---	---	0.00	---	---	---	---	---	0.044
2.74	146	99.99	0.26 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.047
2.75	149	100.00	0.26 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.047
3.00	223	100.25	0.26 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.050
3.25	297	100.50	0.26 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.052
3.50	371	100.75	0.26 ic	0.05 ic	---	---	0.00	---	---	---	---	---	0.055
3.58	395	100.83	0.42 ic	0.06 ic	---	---	0.35	---	---	---	---	---	0.410

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 9 - Planter F4

Pond Data

Contours -User defined Contour area (sqft), Side slope = 0.00:1, Bottom elev = 97.25 ft, Depth = 2.74 ft, Volume = 1,000 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	97.25	272	0	0
0.27	97.52	272	13	13
0.55	97.80	272	13	27
0.82	98.07	272	13	40
1.10	98.35	272	13	54
1.37	98.62	272	13	67
1.64	98.89	272	13	80
1.92	99.17	272	13	94
2.19	99.44	272	13	107
2.47	99.72	272	13	121
2.74	99.99	272	13	134
2.75	100.00	272	3	137
3.00	100.25	272	68	205
3.25	100.50	272	68	273
3.50	100.75	272	68	341
3.58	100.83	272	22	363

Assume 18% void space in soil & rock section of planter:

18" Growing Media ~ 5% Void
3" Rock Storage ~ 10% Void
12" Rock Storage ~ 40% Void

[(1.5' * 0.05) + (0.25' * 0.10)+(1.00 * 0.40]/ 2.75' *100 = 18% Voids

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	1.00	0.00	0.00
Span (in)	= 12.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 97.25	97.75	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.550 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	97.25	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.27	13	97.52	0.00	0.00	---	---	0.00	---	---	---	0.003	---	0.003
0.55	27	97.80	0.00 ic	0.00 ic	---	---	0.00	---	---	---	0.003	---	0.006
0.82	40	98.07	0.01 ic	0.01 ic	---	---	0.00	---	---	---	0.003	---	0.017
1.10	54	98.35	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.003	---	0.023
1.37	67	98.62	0.02 ic	0.02 ic	---	---	0.00	---	---	---	0.003	---	0.027
1.64	80	98.89	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.003	---	0.031
1.92	94	99.17	0.03 ic	0.03 ic	---	---	0.00	---	---	---	0.003	---	0.034
2.19	107	99.44	0.04 ic	0.03 ic	---	---	0.00	---	---	---	0.003	---	0.037
2.47	121	99.72	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.003	---	0.040
2.74	134	99.99	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.003	---	0.042
2.75	137	100.00	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.003	---	0.042
3.00	205	100.25	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.003	---	0.045
3.25	273	100.50	0.04 ic	0.04 ic	---	---	0.00	---	---	---	0.003	---	0.047
3.50	341	100.75	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.003	---	0.049
3.58	363	100.83	0.40 ic	0.05 ic	---	---	0.35	---	---	---	0.003	---	0.404

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	0.014	0.218	0.001	-------	-------	0.447	-------	0.585	exFa
2	SBUH Runoff	------	0.004	0.065	0.000	-------	-------	0.134	-------	0.175	exFb
3	SBUH Runoff	------	0.168	0.493	0.065	-------	-------	0.771	-------	0.929	exFd
4	Combine	1, 2, 3	0.184	0.772	0.065	-------	-------	1.349	-------	1.686	exF - Pre-Developed
6	SBUH Runoff	------	0.005	0.013	0.002	-------	-------	0.021	-------	0.025	F1a
7	SBUH Runoff	------	0.000	0.003	0.000	-------	-------	0.011	-------	0.017	F1b
8	SBUH Runoff	------	0.001	0.012	0.000	-------	-------	0.024	-------	0.031	F1c
9	SBUH Runoff	------	0.014	0.040	0.005	-------	-------	0.063	-------	0.076	F1d
10	Combine	6, 7, 8, 9	0.019	0.067	0.007	-------	-------	0.118	-------	0.148	F1 - Post Developed
12	SBUH Runoff	------	0.004	0.013	0.002	-------	-------	0.020	-------	0.024	F2a
13	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.007	-------	0.010	F2b
14	SBUH Runoff	------	0.001	0.019	0.000	-------	-------	0.039	-------	0.051	F2c
15	SBUH Runoff	------	0.015	0.043	0.006	-------	-------	0.067	-------	0.080	F2d
16	Combine	12, 13, 14, 15	0.020	0.075	0.007	-------	-------	0.132	-------	0.165	F2 - Post-Developed
18	SBUH Runoff	------	0.009	0.026	0.003	-------	-------	0.040	-------	0.049	F3a
19	SBUH Runoff	------	0.000	0.002	0.000	-------	-------	0.007	-------	0.011	F3b
20	SBUH Runoff	------	0.001	0.021	0.000	-------	-------	0.043	-------	0.057	F3c
21	SBUH Runoff	------	0.018	0.054	0.007	-------	-------	0.085	-------	0.102	F3d
22	Combine	18, 19, 20, 21	0.028	0.102	0.011	-------	-------	0.175	-------	0.218	F3 - Post-Developed
24	SBUH Runoff	------	0.005	0.016	0.002	-------	-------	0.024	-------	0.029	F4a
25	SBUH Runoff	------	0.000	0.001	0.000	-------	-------	0.003	-------	0.004	F4b
26	SBUH Runoff	------	0.001	0.014	0.000	-------	-------	0.029	-------	0.038	F4c
27	SBUH Runoff	------	0.020	0.058	0.008	-------	-------	0.090	-------	0.109	F4d
28	Combine	24, 25, 26, 27	0.026	0.088	0.010	-------	-------	0.147	-------	0.181	F4 - Post-Developed
30	SBUH Runoff	------	0.066	0.195	0.026	-------	-------	0.305	-------	0.367	F5a
31	SBUH Runoff	------	0.000	0.003	0.000	-------	-------	0.012	-------	0.017	F5b
32	SBUH Runoff	------	0.002	0.025	0.000	-------	-------	0.052	-------	0.068	F5c
33	SBUH Runoff	------	0.102	0.298	0.040	-------	-------	0.466	-------	0.562	F5d
34	Combine	30, 31, 32, 33	0.169	0.520	0.065	-------	-------	0.833	-------	1.013	F5 - Post-Developed
36	Reservoir	10	0.000	0.009	0.000	-------	-------	0.017	-------	0.087	Planter F1
37	Reservoir	16	0.013	0.032	0.004	-------	-------	0.052	-------	0.154	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
38	Reservoir	22	0.021	0.048	0.008	-------	-------	0.085	-------	0.214	Planter F3
39	Reservoir	28	0.015	0.039	0.000	-------	-------	0.045	-------	0.149	Planter F4
41	Reservoir	10	0.017	0.038	0.007	-------	-------	0.038	-------	0.110	Planter F1 - WQ Design
42	Reservoir	16	0.018	0.037	0.007	-------	-------	0.076	-------	0.163	Planter F2 - WQ Design
43	Reservoir	22	0.026	0.041	0.010	-------	-------	0.165	-------	0.218	Planter F3 - WQ Design
44	Reservoir	28	0.024	0.038	0.009	-------	-------	0.115	-------	0.181	Planter F4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.014	2	482	502	------	------	------	exFa
2	SBUH Runoff	0.004	2	482	150	------	------	------	exFb
3	SBUH Runoff	0.168	2	474	2,354	------	------	------	exFd
4	Combine	0.184	2	478	3,006	1, 2, 3	------	------	exF - Pre-Developed
6	SBUH Runoff	0.005	2	474	63	------	------	------	F1a
7	SBUH Runoff	0.000	2	1436	2	------	------	------	F1b
8	SBUH Runoff	0.001	2	482	27	------	------	------	F1c
9	SBUH Runoff	0.014	2	474	192	------	------	------	F1d
10	Combine	0.019	2	476	284	6, 7, 8, 9	------	------	F1 - Post Developed
12	SBUH Runoff	0.004	2	474	60	------	------	------	F2a
13	SBUH Runoff	0.000	2	1436	1	------	------	------	F2b
14	SBUH Runoff	0.001	2	482	44	------	------	------	F2c
15	SBUH Runoff	0.015	2	474	204	------	------	------	F2d
16	Combine	0.020	2	476	309	12, 13, 14, 15	------	------	F2 - Post-Developed
18	SBUH Runoff	0.009	2	474	123	------	------	------	F3a
19	SBUH Runoff	0.000	2	1436	1	------	------	------	F3b
20	SBUH Runoff	0.001	2	482	49	------	------	------	F3c
21	SBUH Runoff	0.018	2	474	258	------	------	------	F3d
22	Combine	0.028	2	476	432	18, 19, 20, 21	------	------	F3 - Post-Developed
24	SBUH Runoff	0.005	2	474	75	------	------	------	F4a
25	SBUH Runoff	0.000	2	1436	0	------	------	------	F4b
26	SBUH Runoff	0.001	2	482	33	------	------	------	F4c
27	SBUH Runoff	0.020	2	474	276	------	------	------	F4d
28	Combine	0.026	2	476	384	24, 25, 26, 27	------	------	F4 - Post-Developed
30	SBUH Runoff	0.066	2	474	930	------	------	------	F5a
31	SBUH Runoff	0.000	2	1436	2	------	------	------	F5b
32	SBUH Runoff	0.002	2	482	58	------	------	------	F5c
33	SBUH Runoff	0.102	2	474	1,424	------	------	------	F5d
34	Combine	0.169	2	476	2,414	30, 31, 32, 33	------	------	F5 - Post-Developed
36	Reservoir	0.000	2	504	0	10	97.52	15.6	Planter F1
37	Reservoir	0.013	2	490	283	16	98.17	44.5	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.021	2	488	404	22	98.21	51.4	Planter F3
39	Reservoir	0.015	2	488	120	28	98.14	43.4	Planter F4
41	Reservoir	0.017	2	482	283	10	100.04	10.4	Planter F1 - WQ Design
42	Reservoir	0.018	2	482	308	16	100.04	10.9	Planter F2 - WQ Design
43	Reservoir	0.026	2	482	431	22	100.05	15.6	Planter F3 - WQ Design
44	Reservoir	0.024	2	482	383	28	100.05	14.2	Planter F4 - WQ Design

WQ planter will fully infiltrate through 18 inch soil media without reaching overflow

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

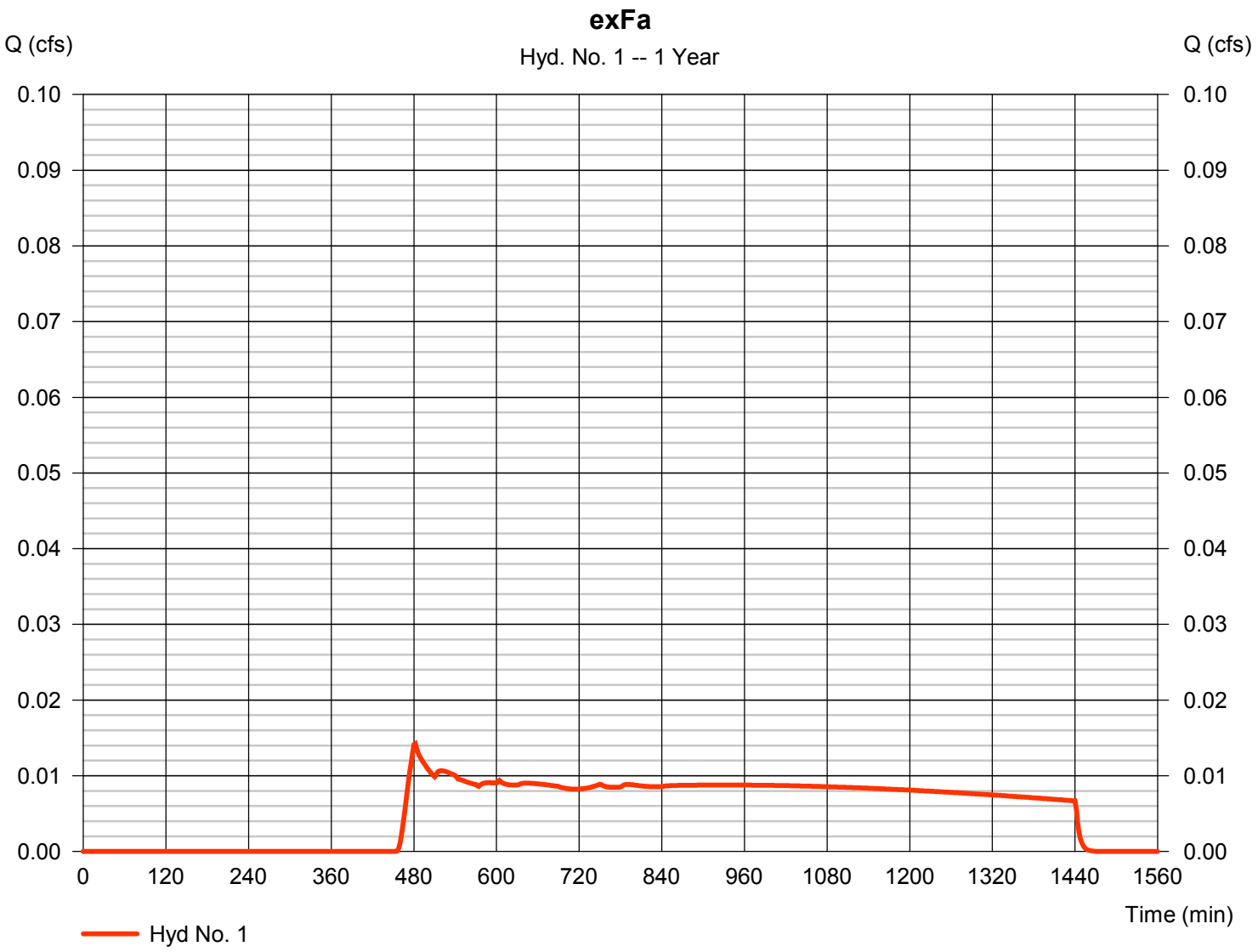
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 1

exFa

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 502 cuft
Drainage area	= 0.700 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



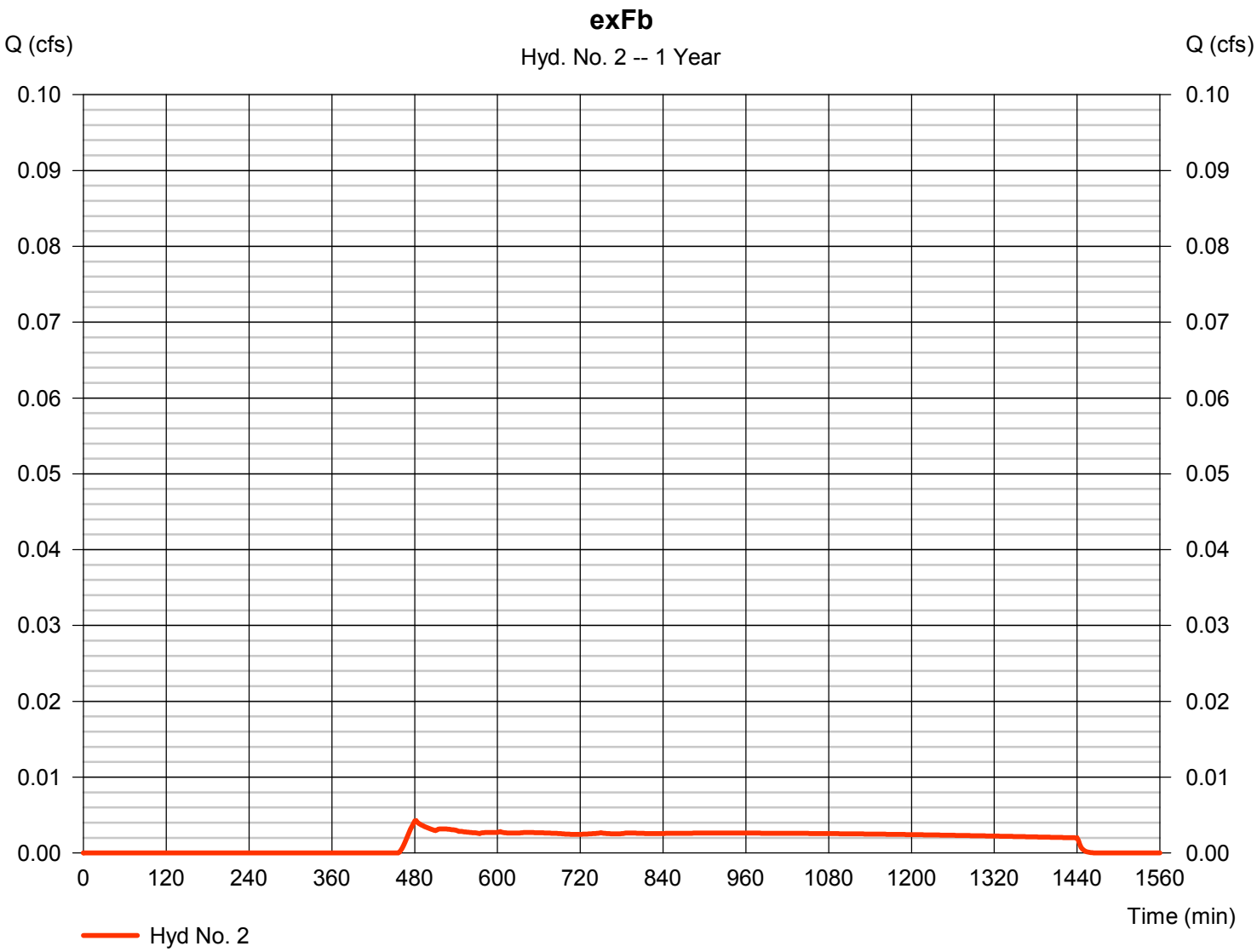
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 2

exFb

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 150 cuft
Drainage area	= 0.209 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



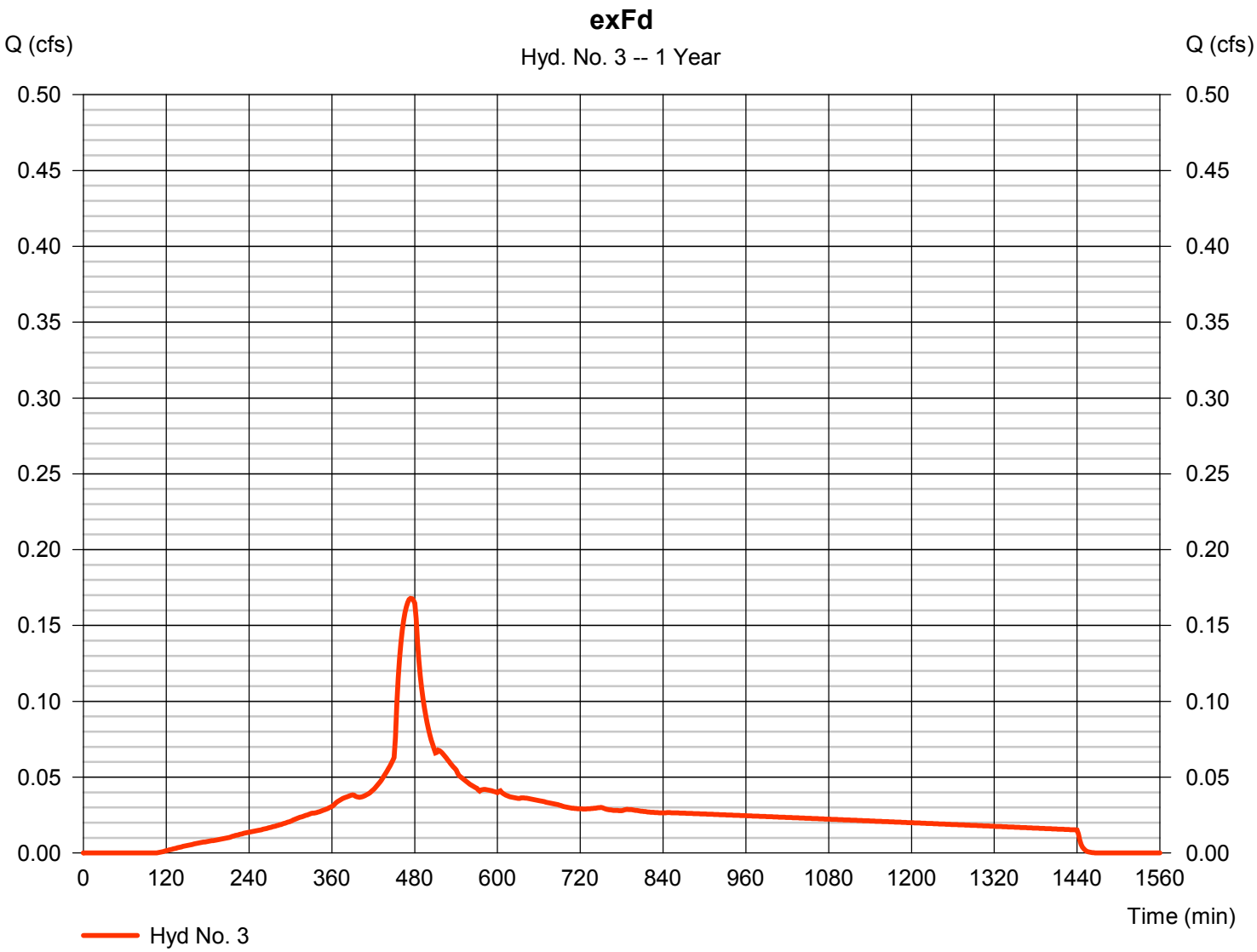
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 3

exFd

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.168 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 2,354 cuft
Drainage area	= 0.820 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



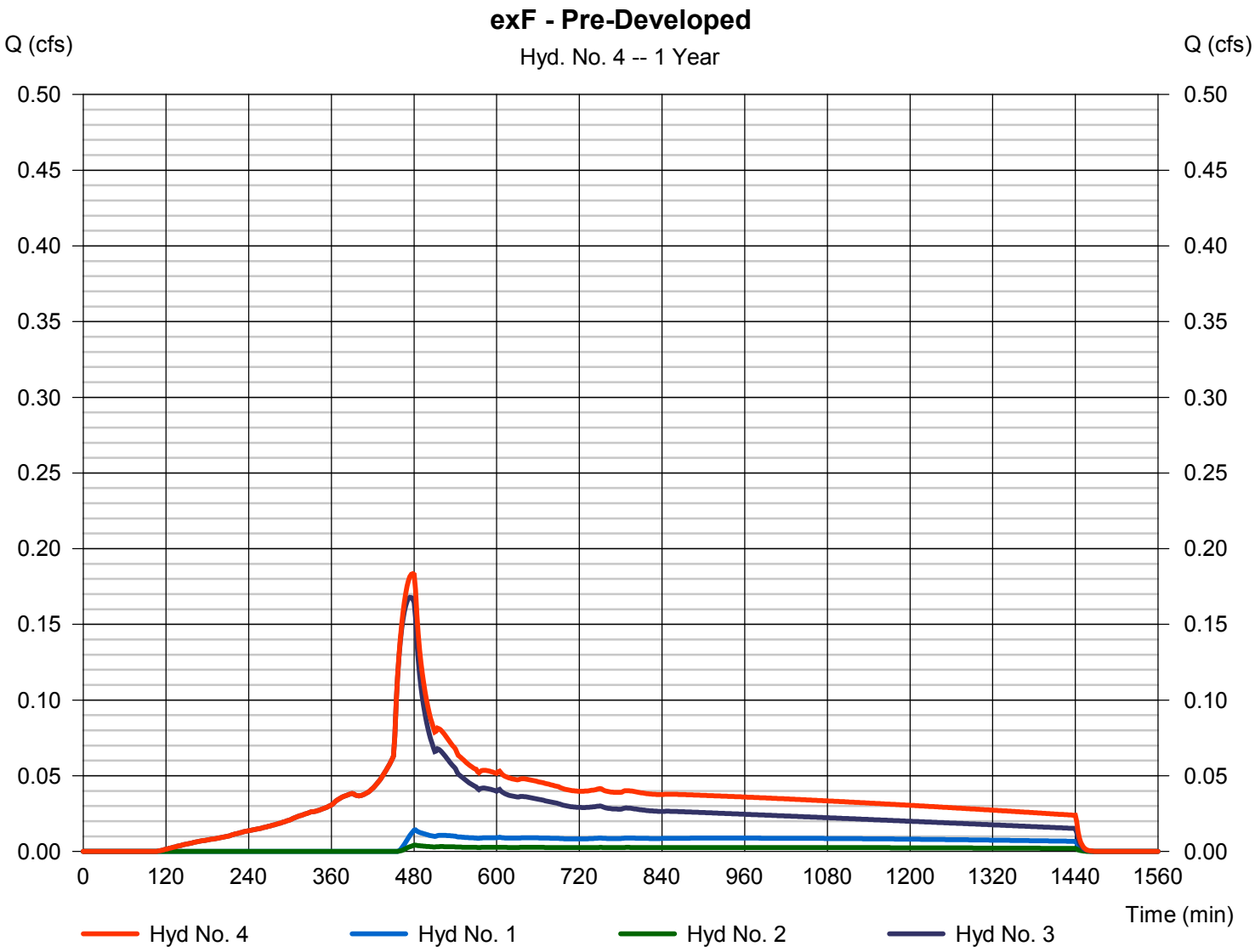
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 4

exF - Pre-Developed

Hydrograph type	= Combine	Peak discharge	= 0.184 cfs
Storm frequency	= 1 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 3,006 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 1.729 ac



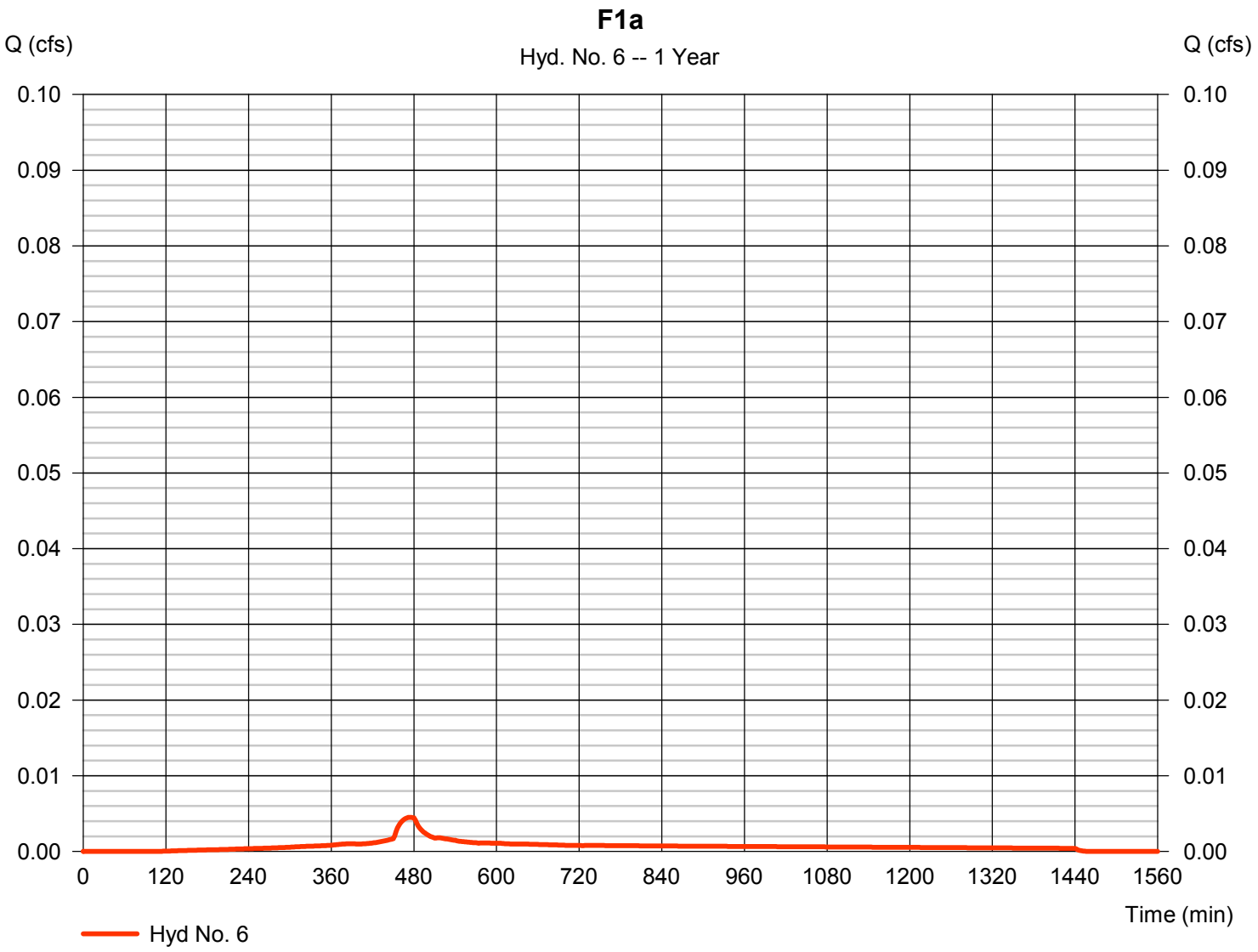
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 6

F1a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 63 cuft
Drainage area	= 0.022 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



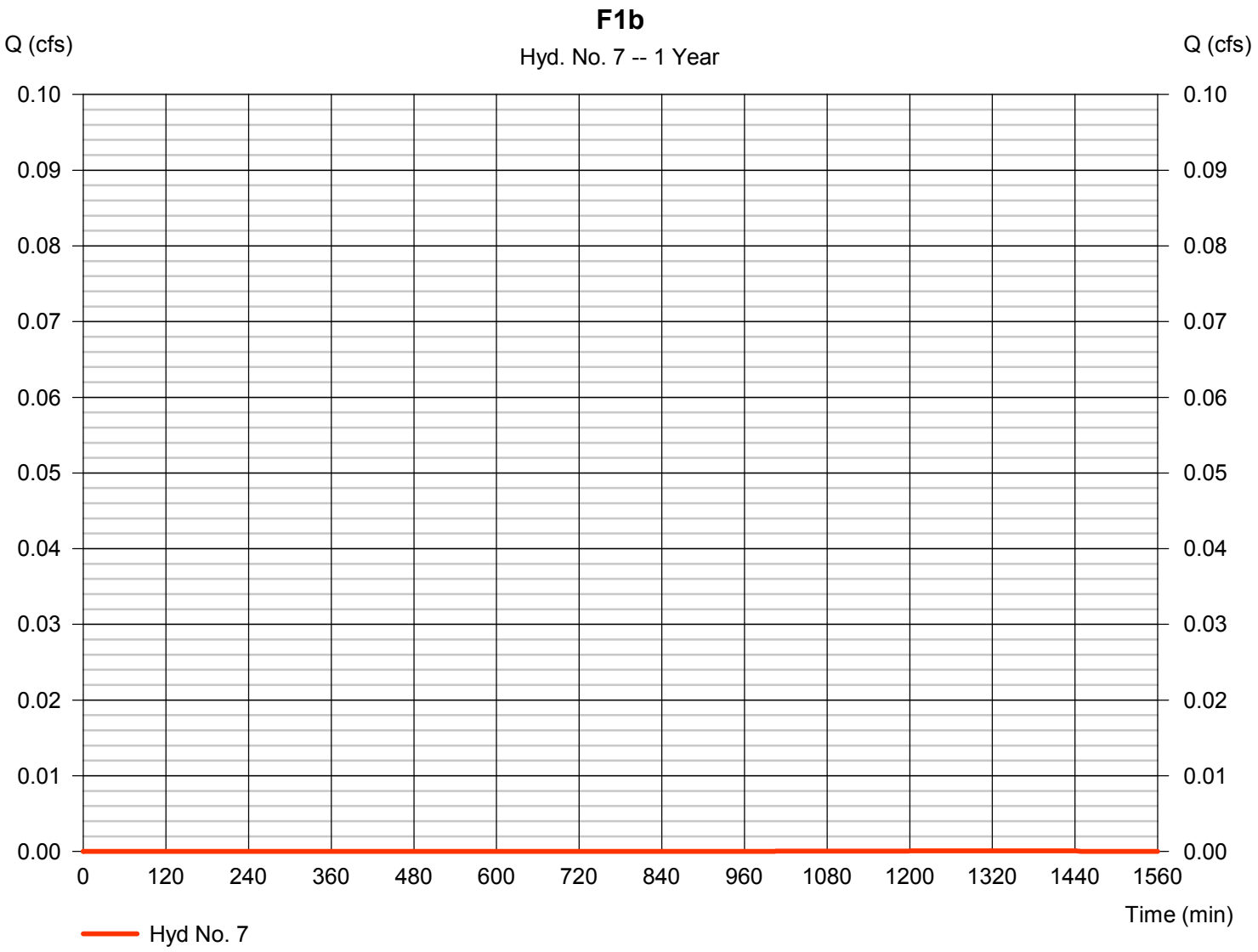
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 7

F1b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 2 cuft
Drainage area	= 0.037 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



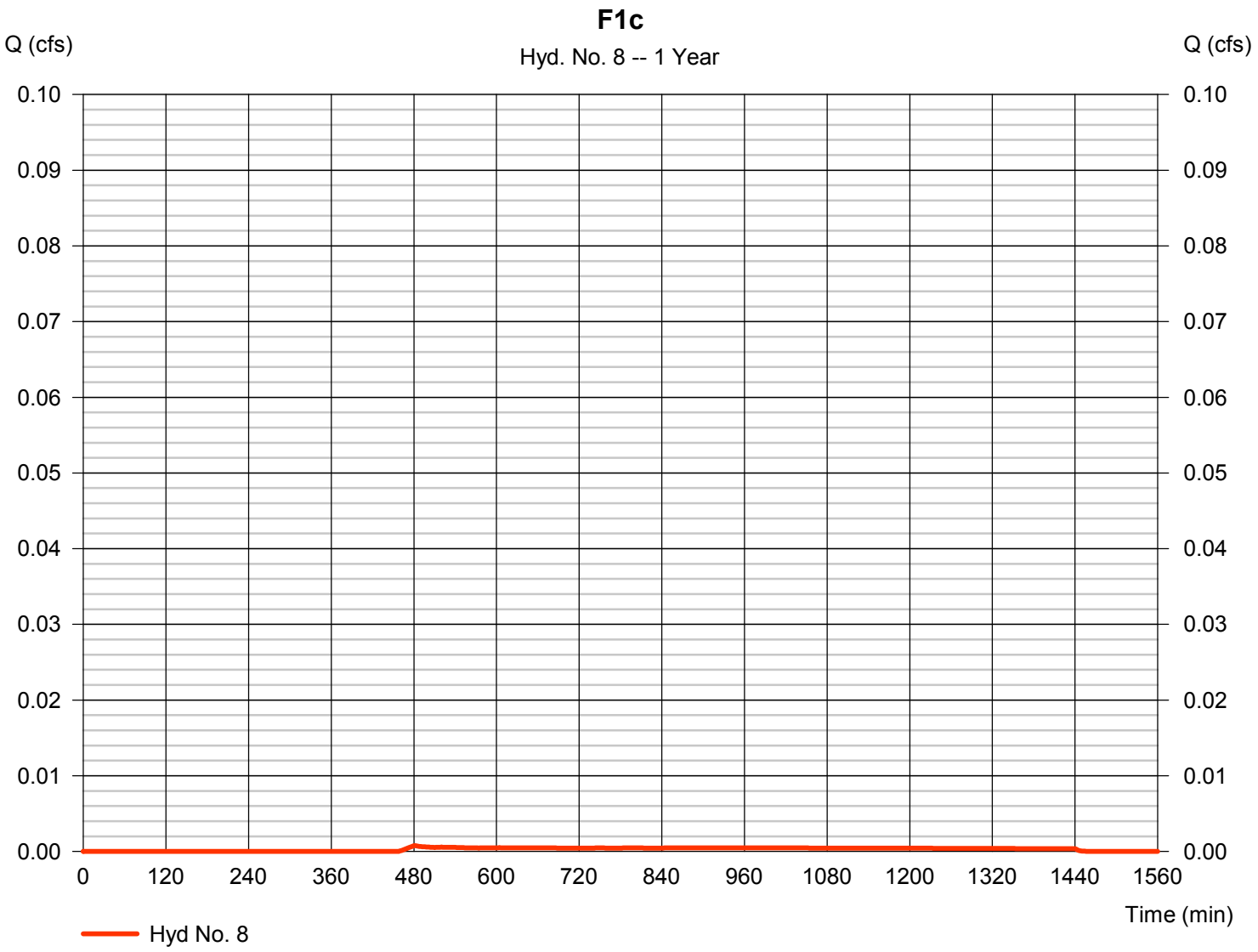
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 8

F1c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 27 cuft
Drainage area	= 0.037 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



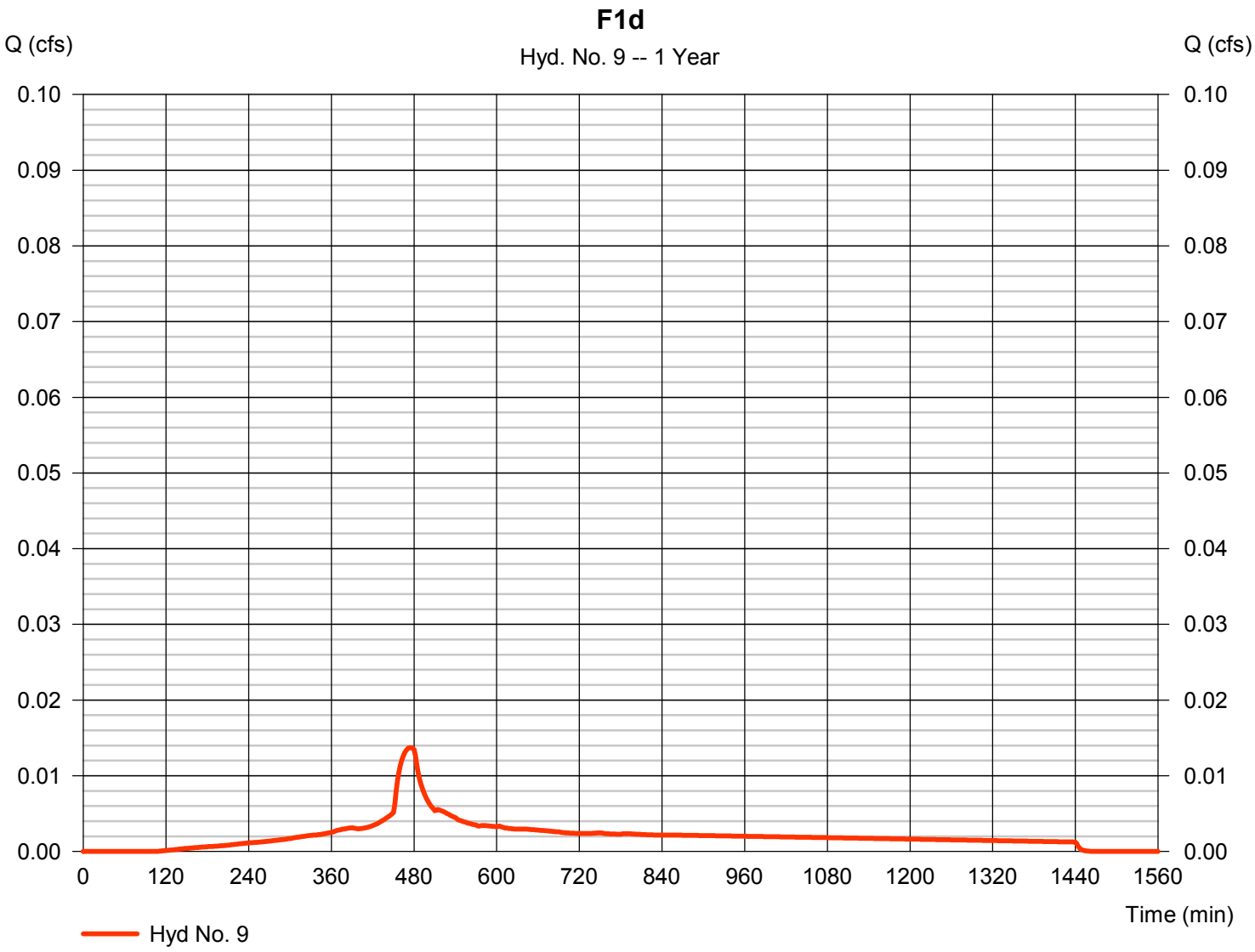
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 9

F1d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 192 cuft
Drainage area	= 0.067 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



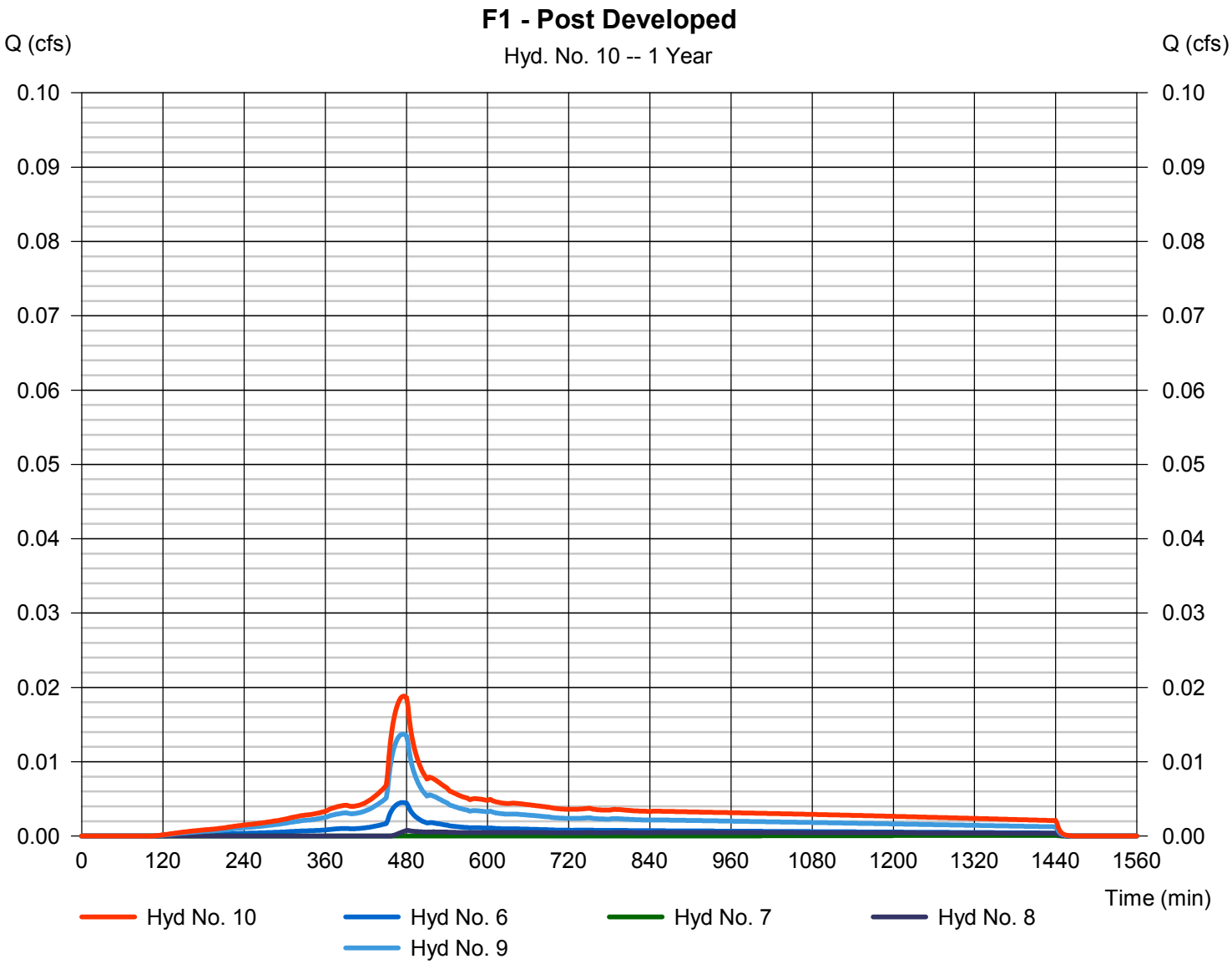
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 10

F1 - Post Developed

Hydrograph type	= Combine	Peak discharge	= 0.019 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 284 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 0.163 ac



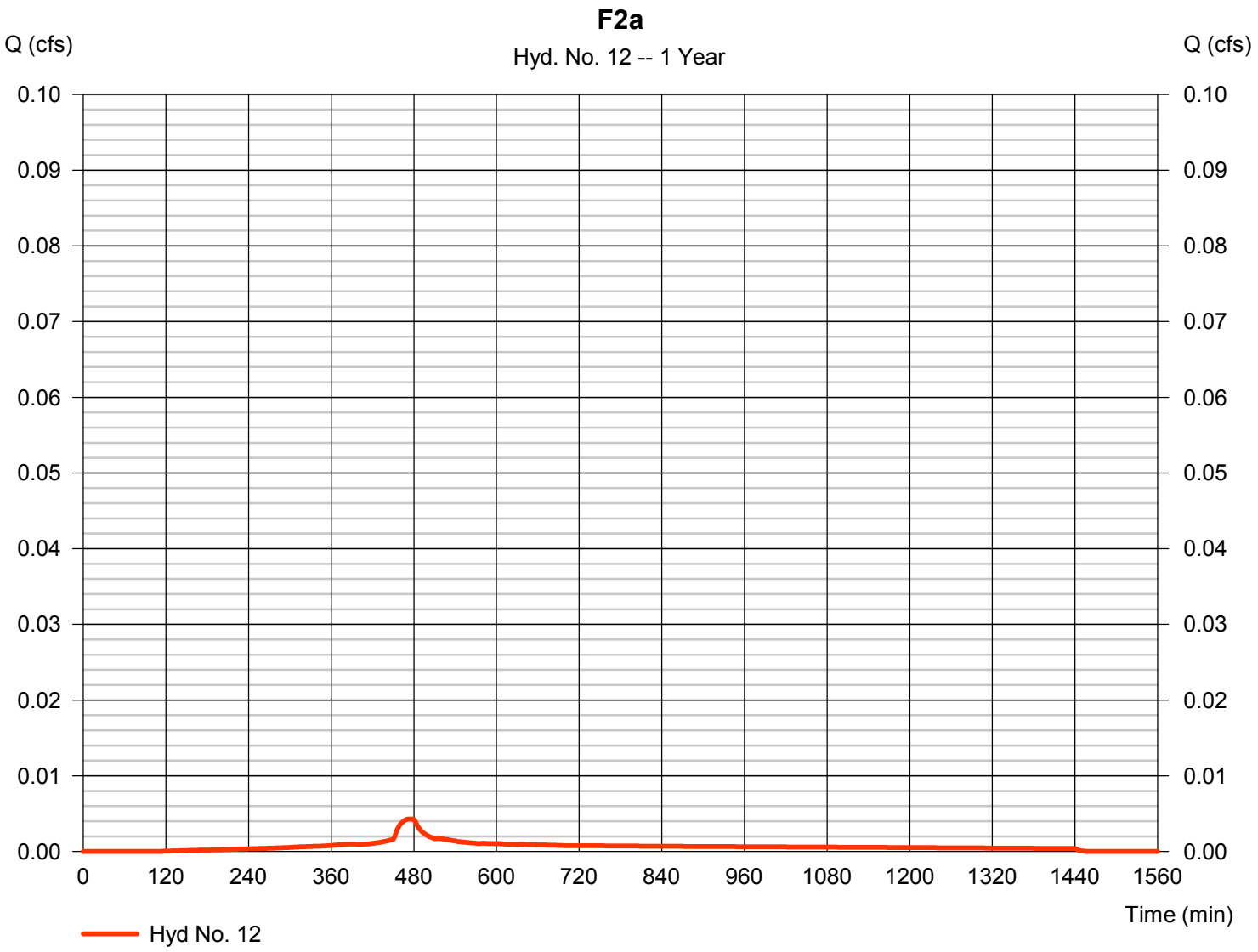
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 12

F2a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 60 cuft
Drainage area	= 0.021 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



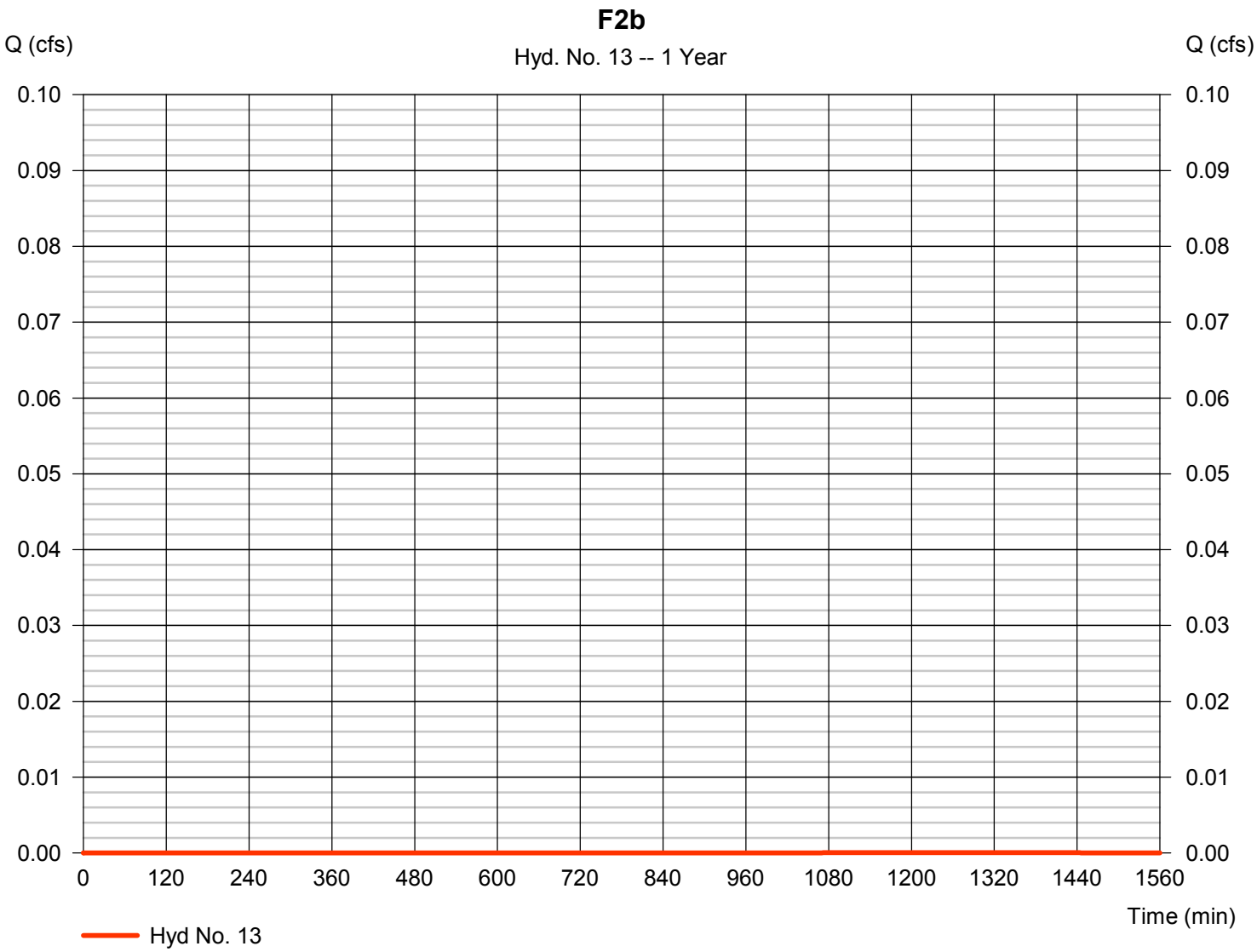
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 13

F2b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.023 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



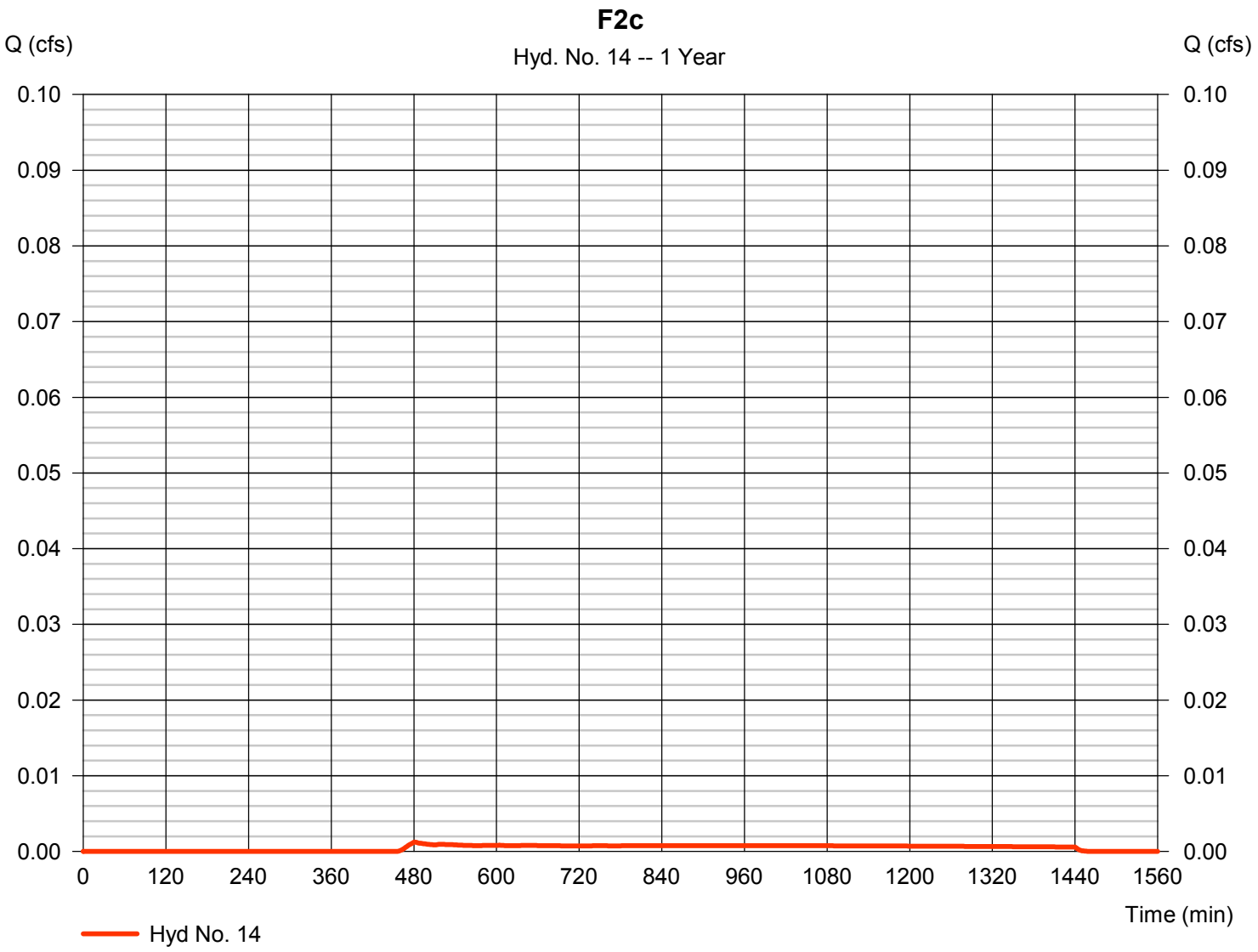
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 14

F2c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 44 cuft
Drainage area	= 0.061 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



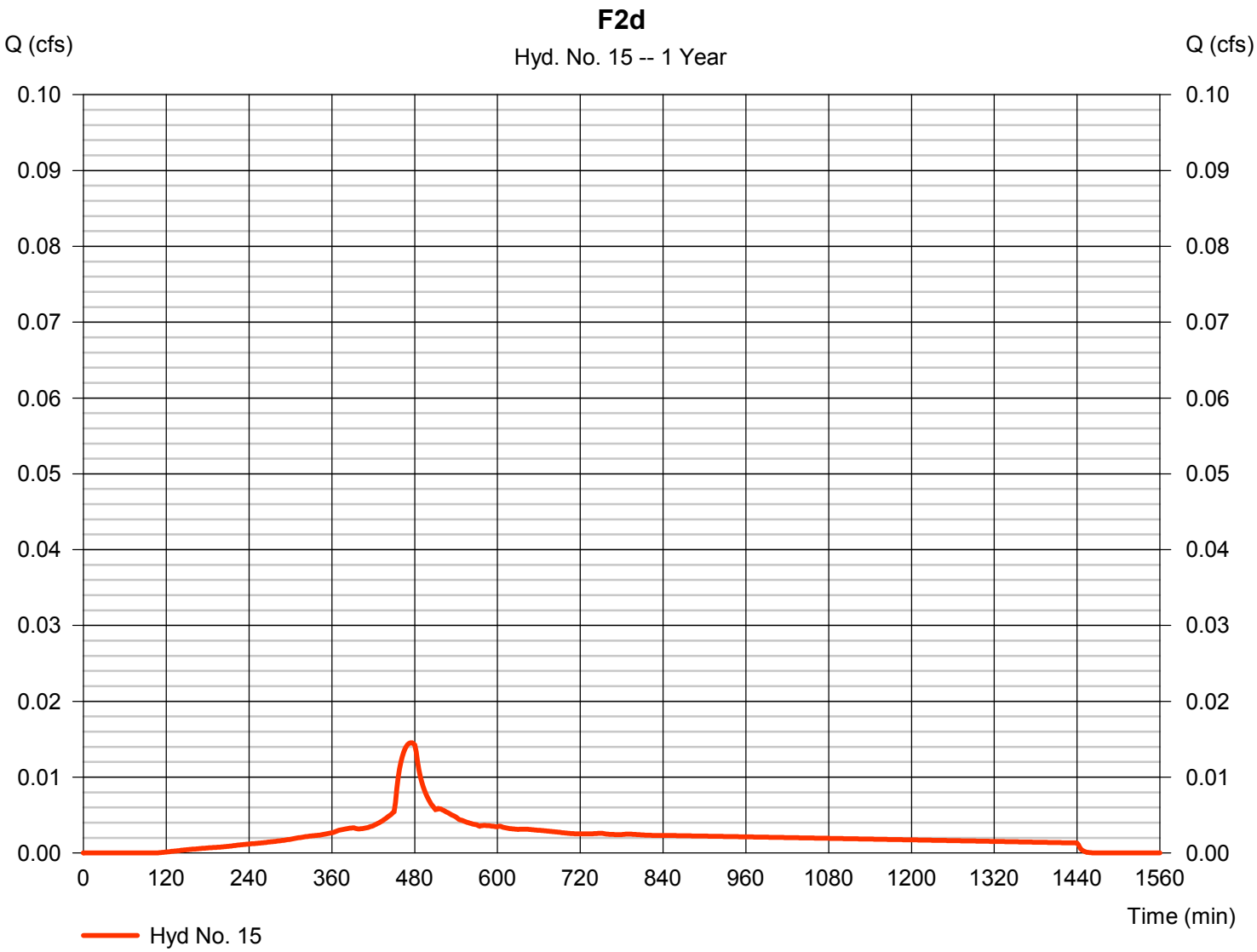
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 15

F2d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.015 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 204 cuft
Drainage area	= 0.071 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



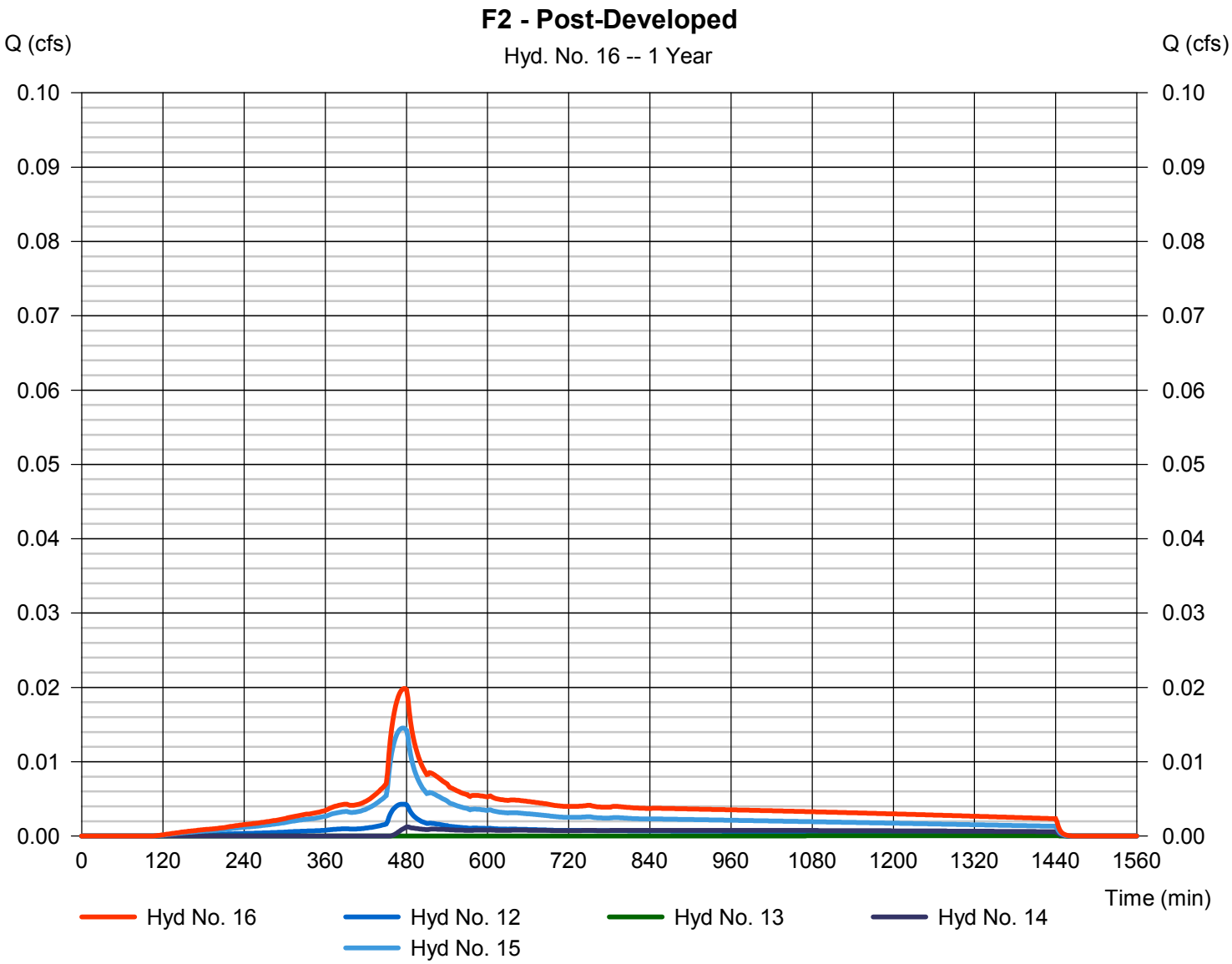
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 16

F2 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.020 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 309 cuft
Inflow hyds.	= 12, 13, 14, 15	Contrib. drain. area	= 0.176 ac



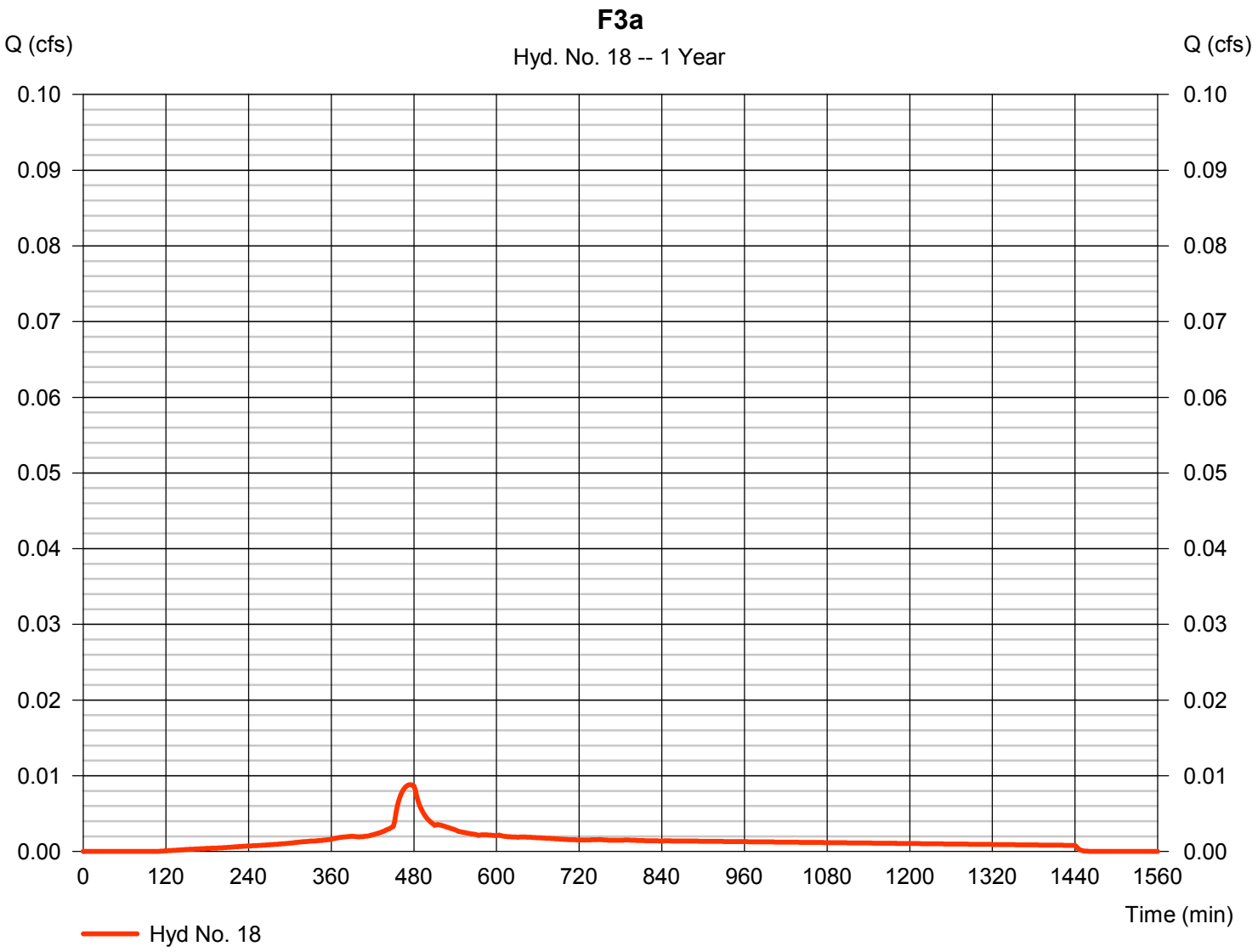
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 18

F3a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 123 cuft
Drainage area	= 0.043 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



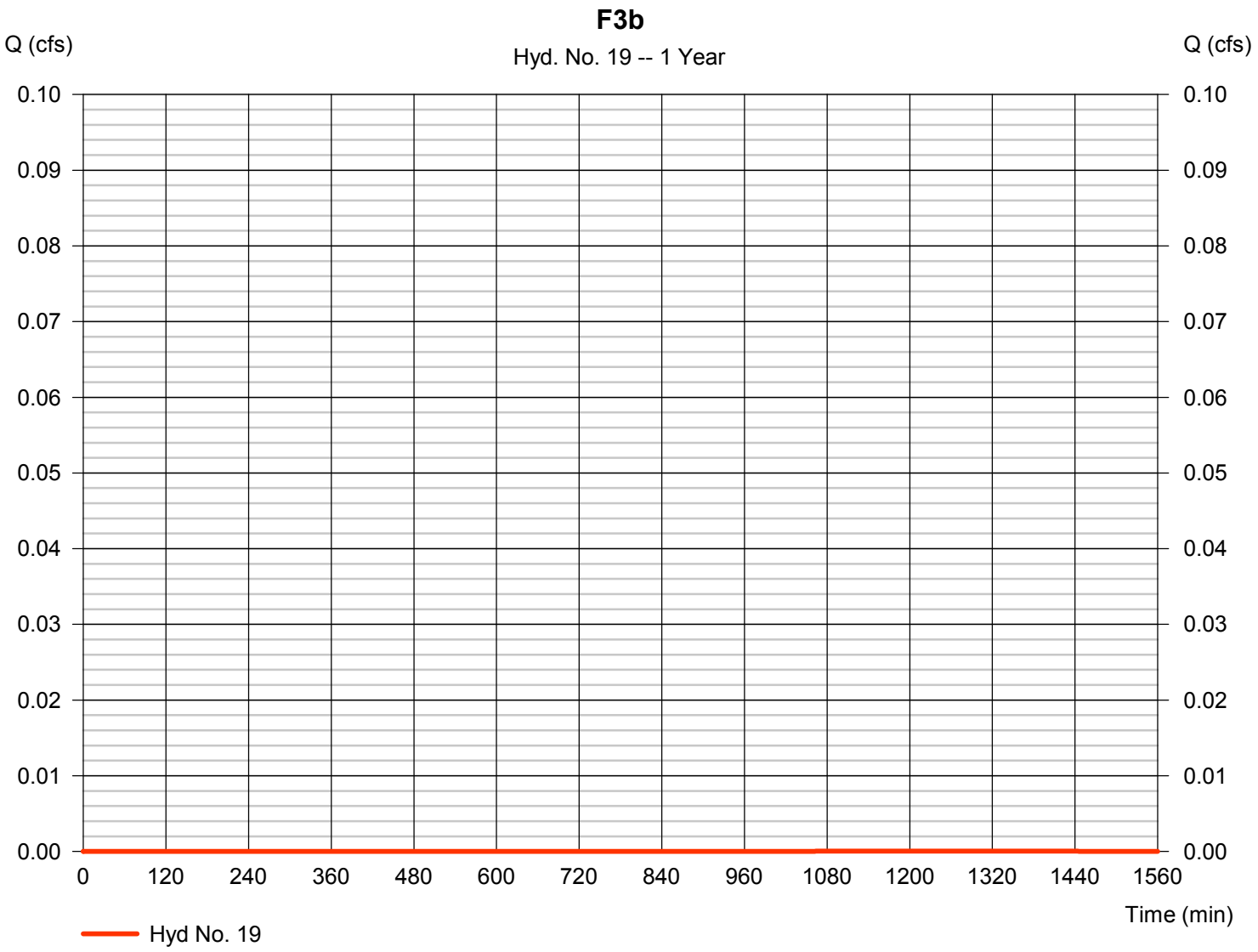
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 19

F3b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 1 cuft
Drainage area	= 0.024 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



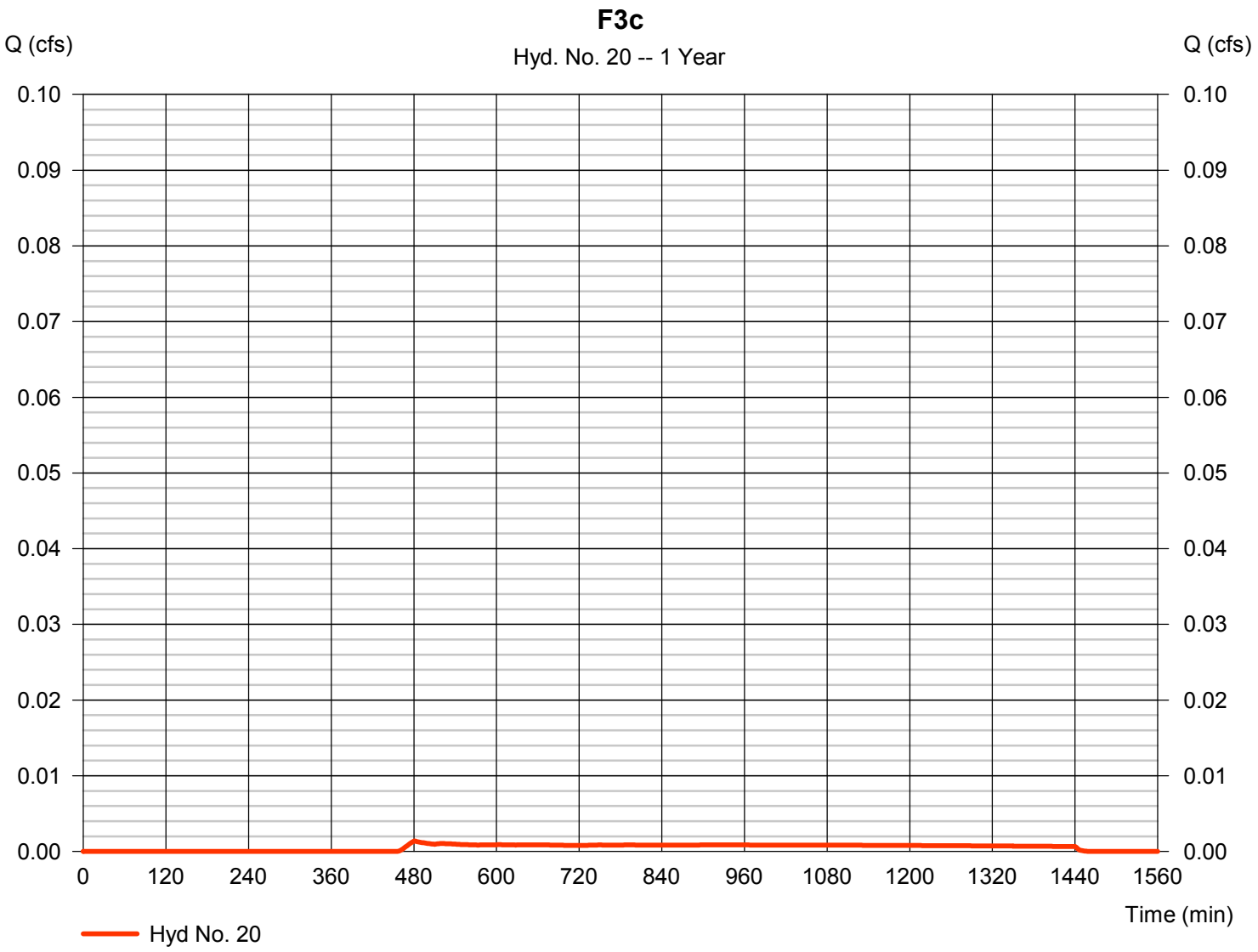
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 20

F3c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 49 cuft
Drainage area	= 0.068 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



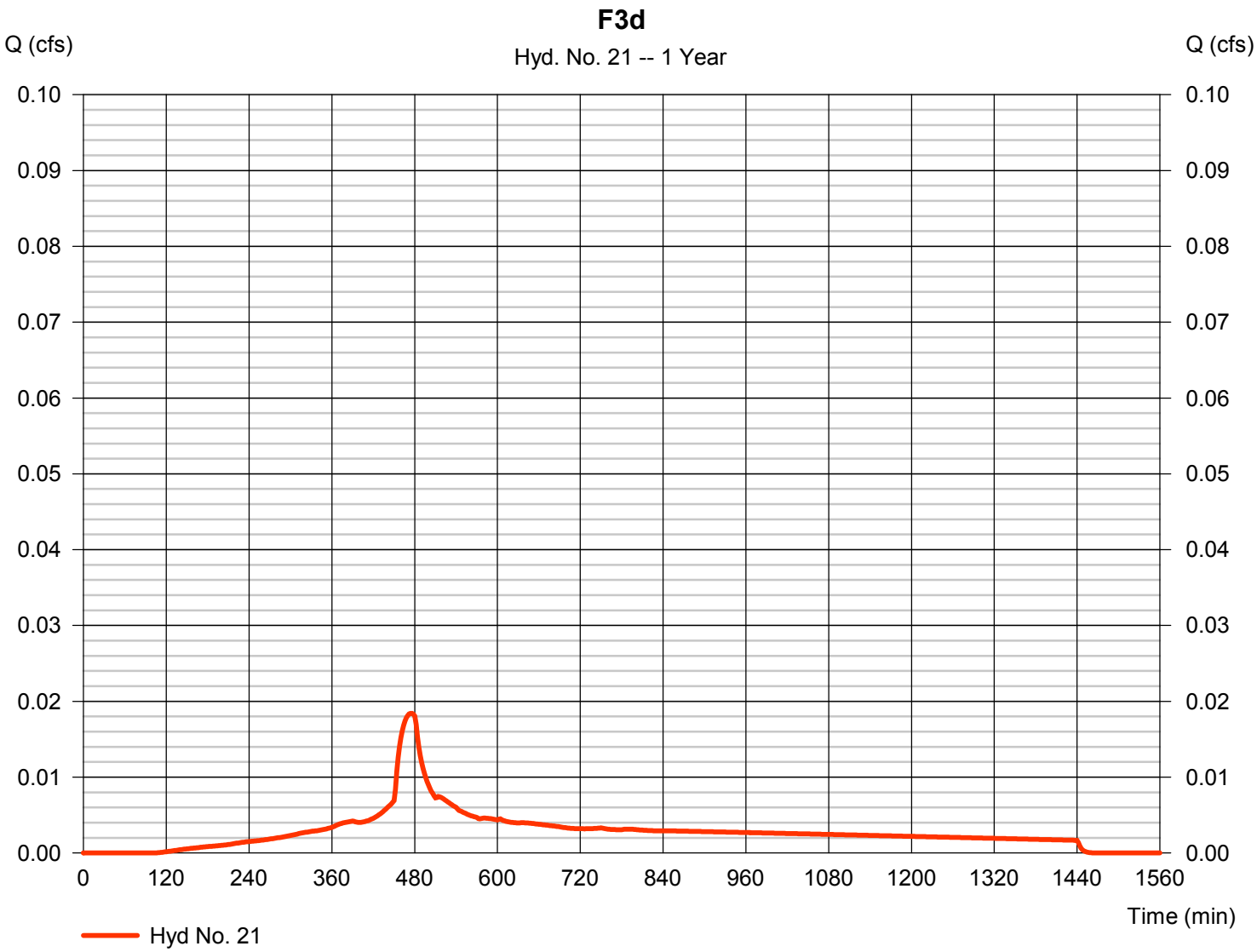
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 21

F3d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 258 cuft
Drainage area	= 0.090 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



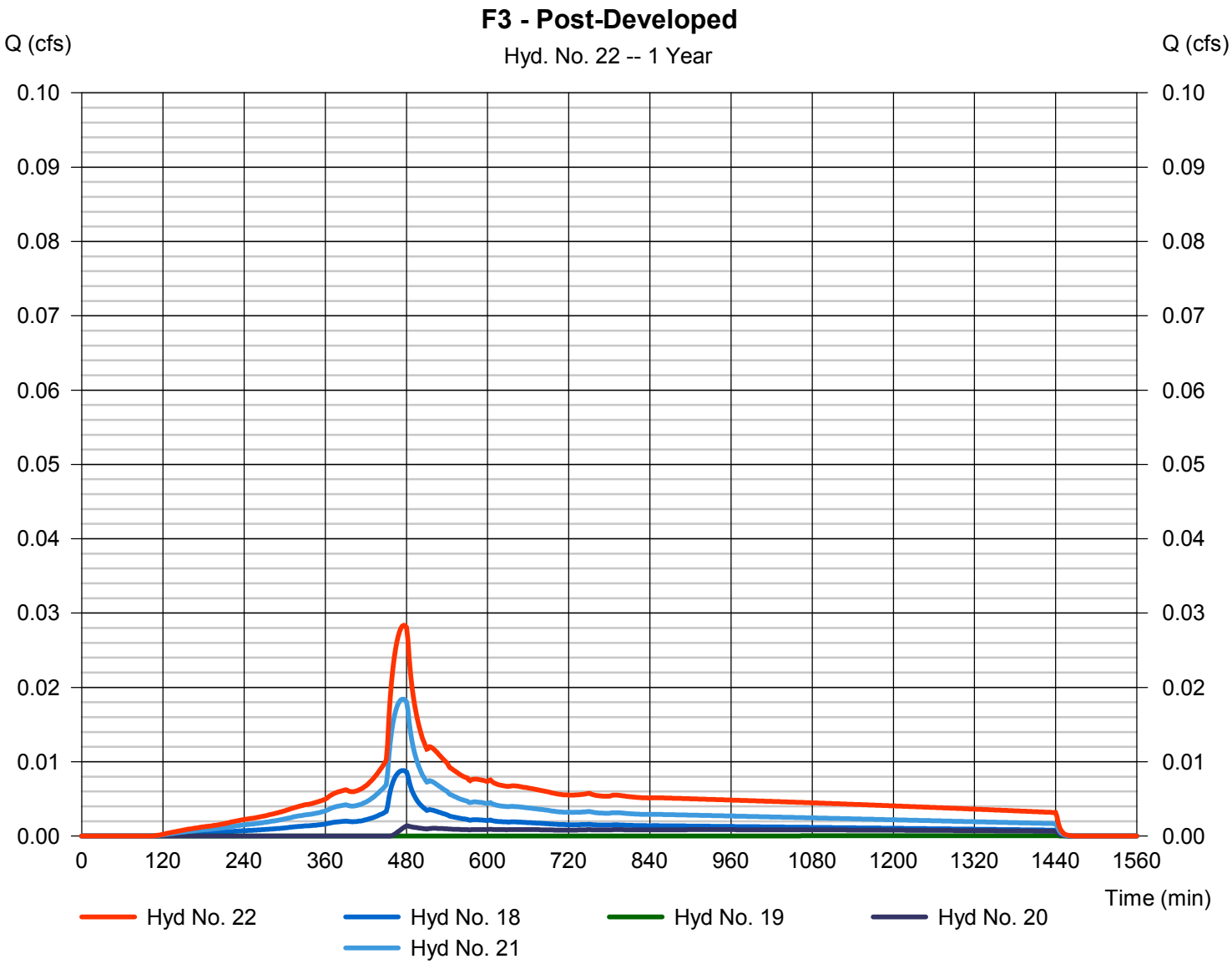
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 22

F3 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.028 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 432 cuft
Inflow hyds.	= 18, 19, 20, 21	Contrib. drain. area	= 0.225 ac



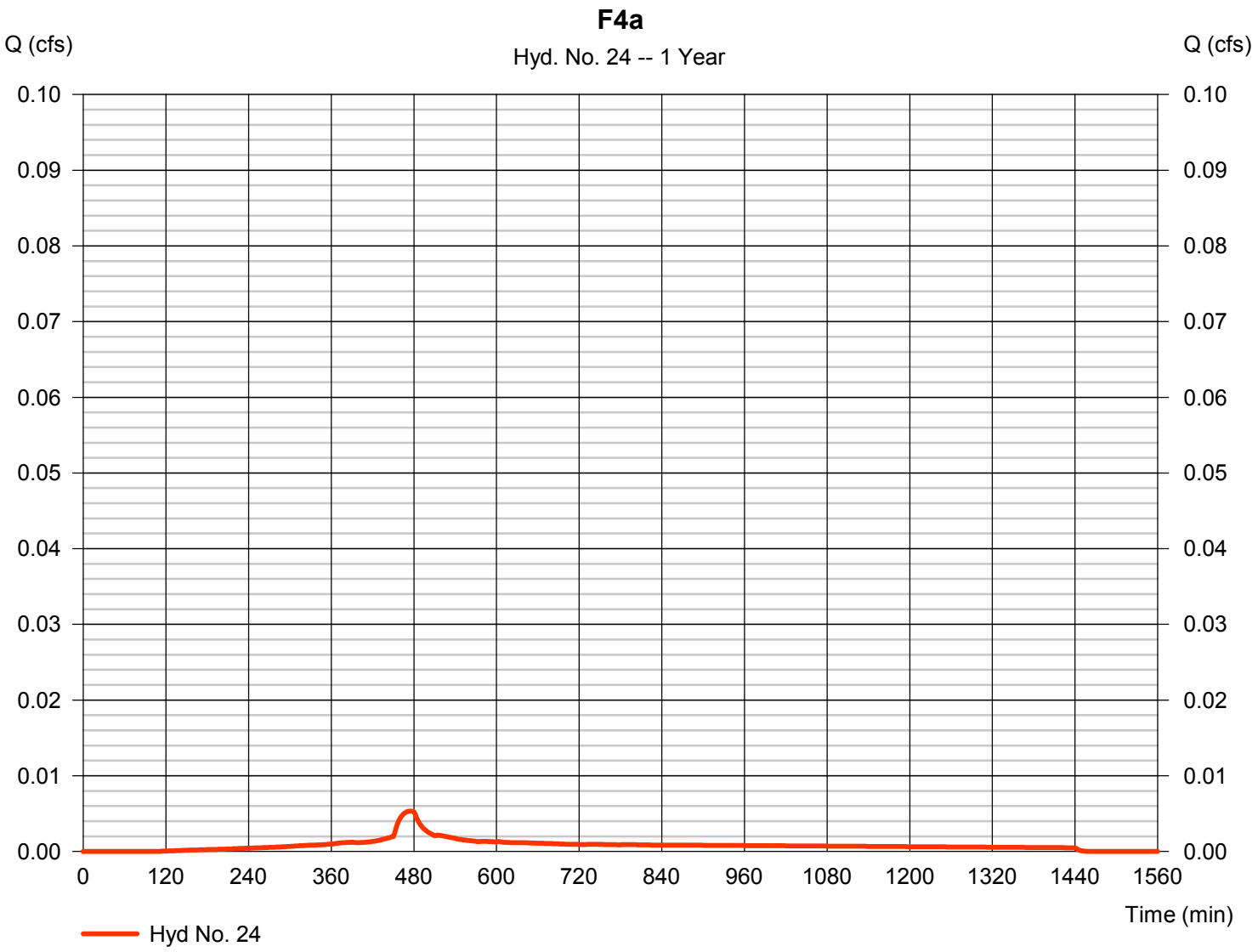
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 24

F4a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 75 cuft
Drainage area	= 0.026 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



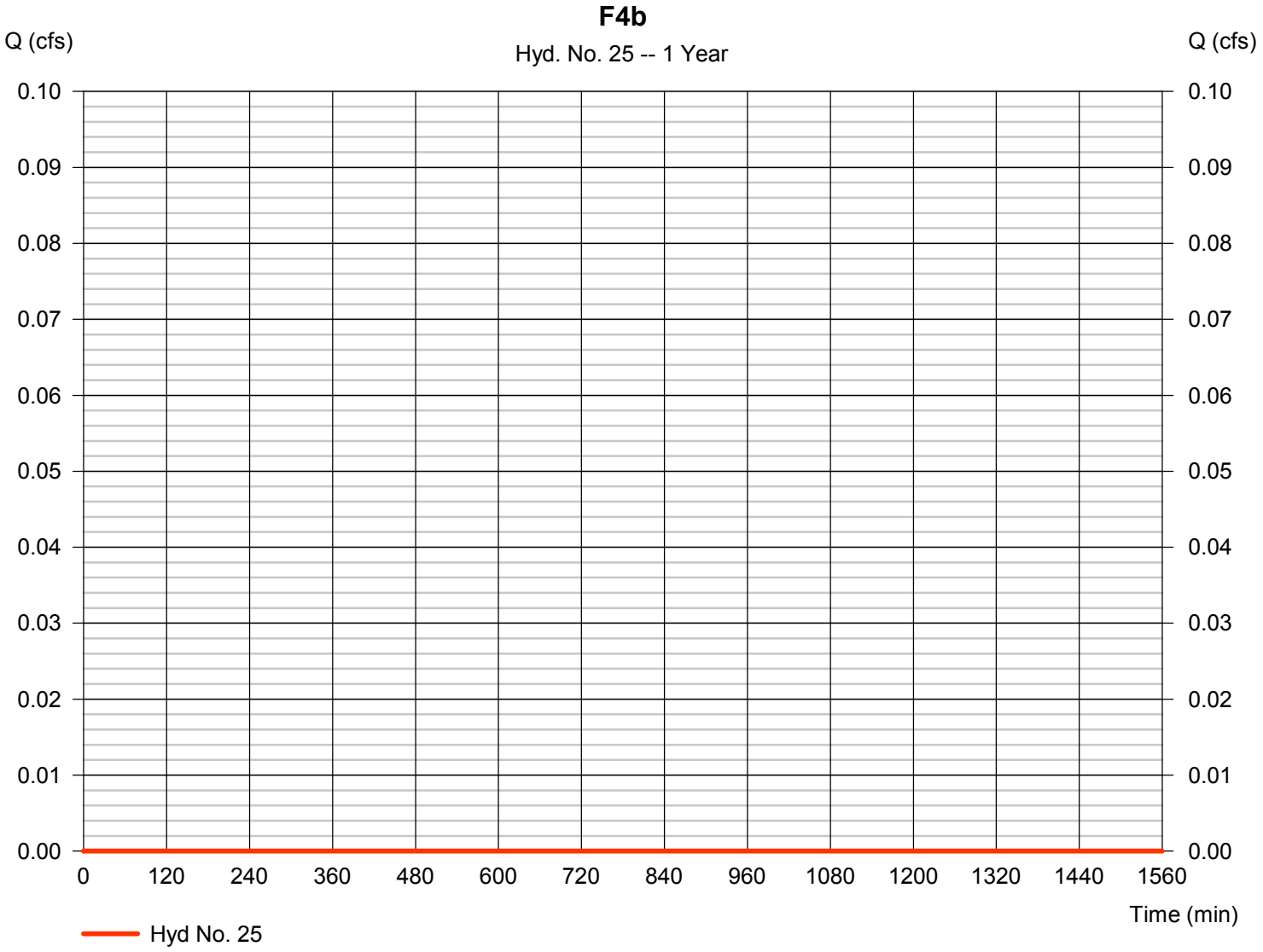
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 25

F4b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.010 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



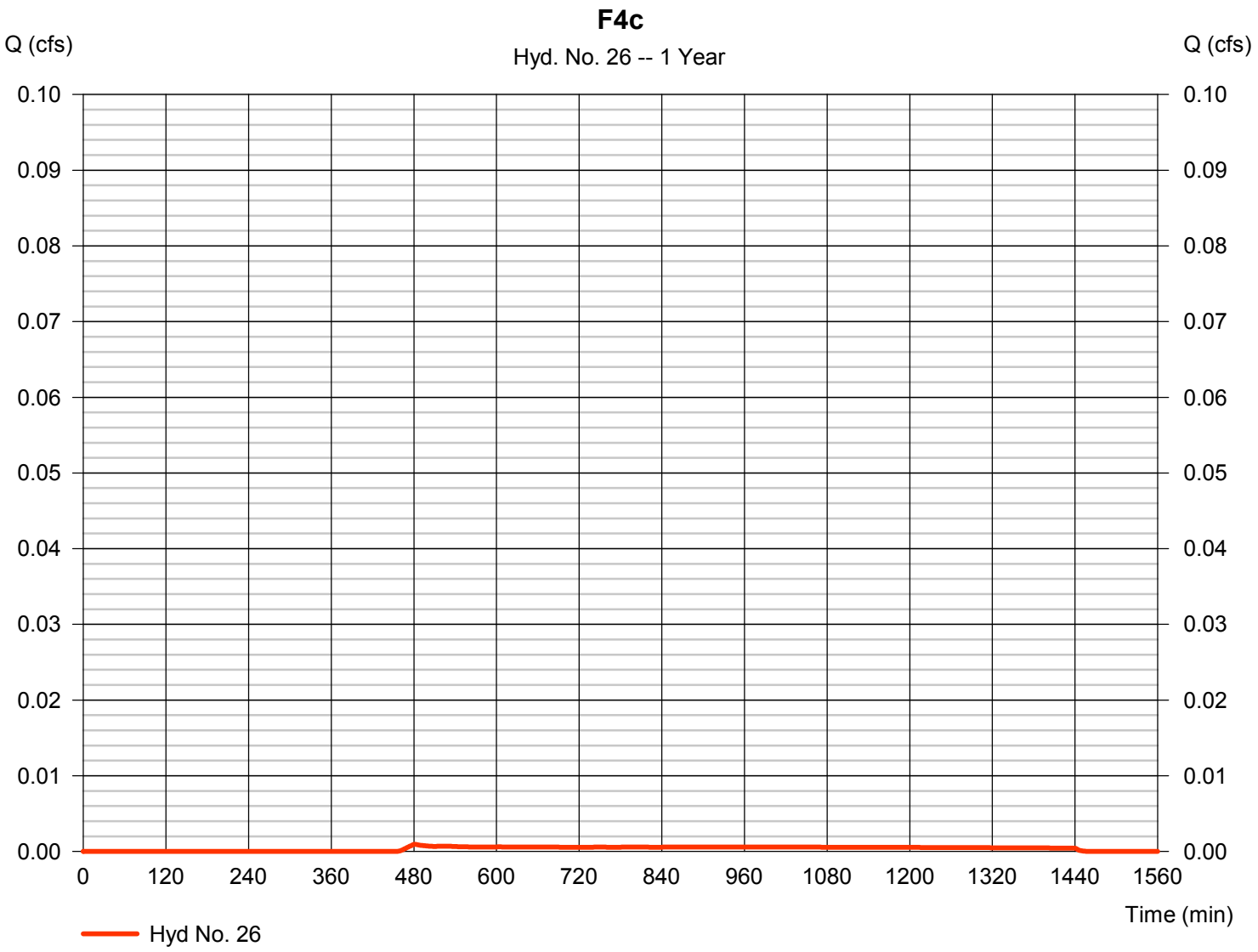
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 26

F4c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 33 cuft
Drainage area	= 0.046 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



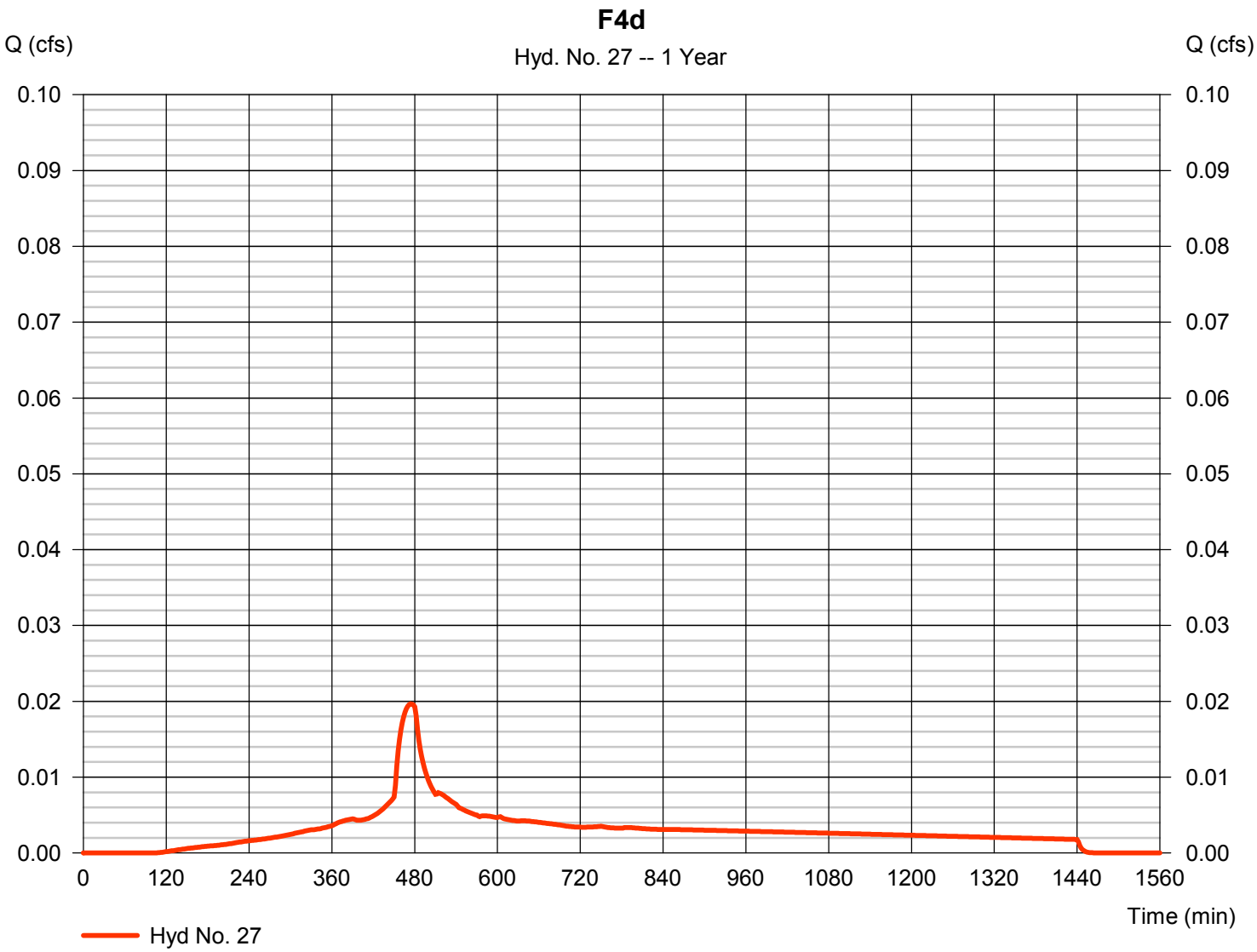
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 27

F4d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.020 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 276 cuft
Drainage area	= 0.096 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



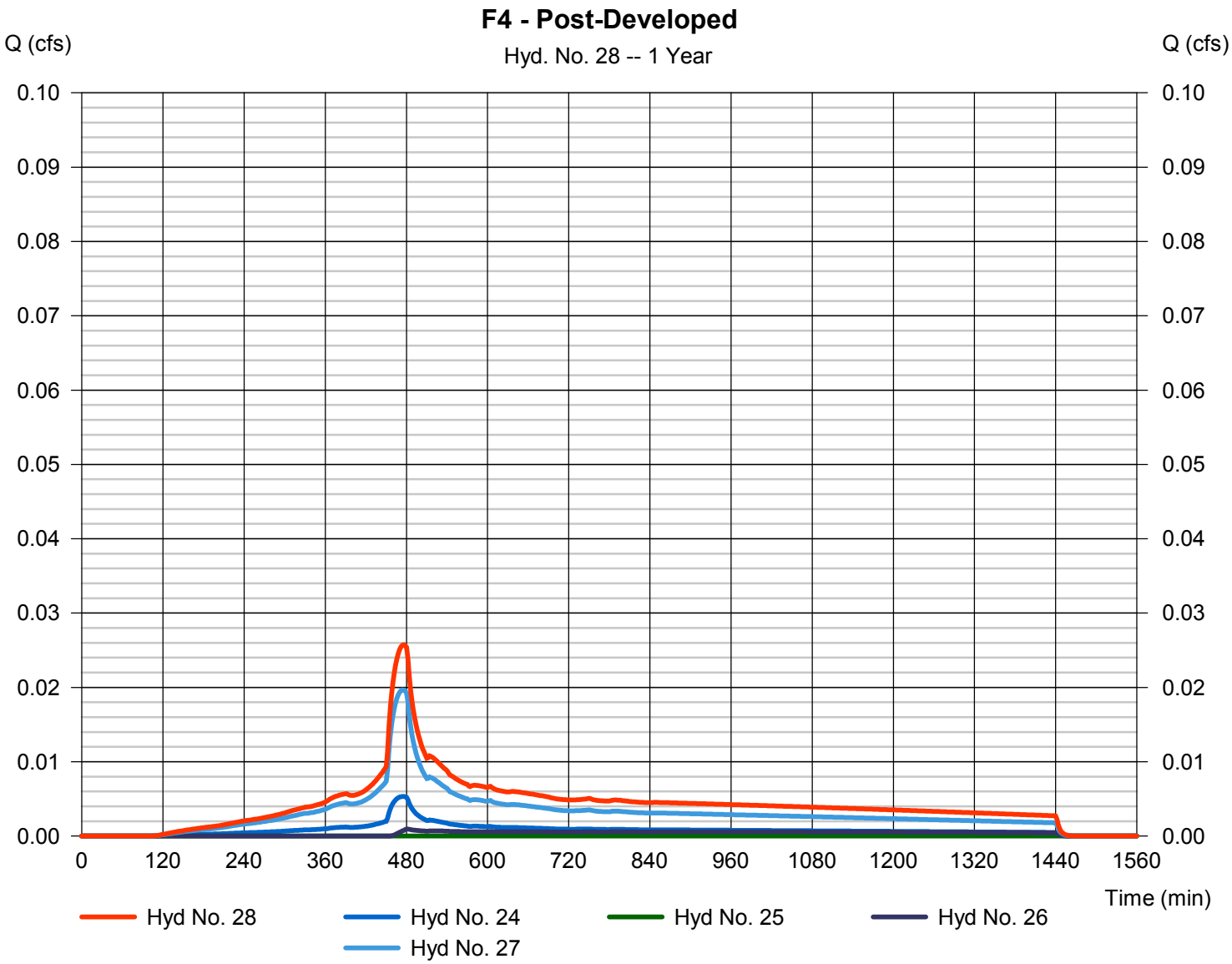
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 28

F4 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.026 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 384 cuft
Inflow hyds.	= 24, 25, 26, 27	Contrib. drain. area	= 0.178 ac



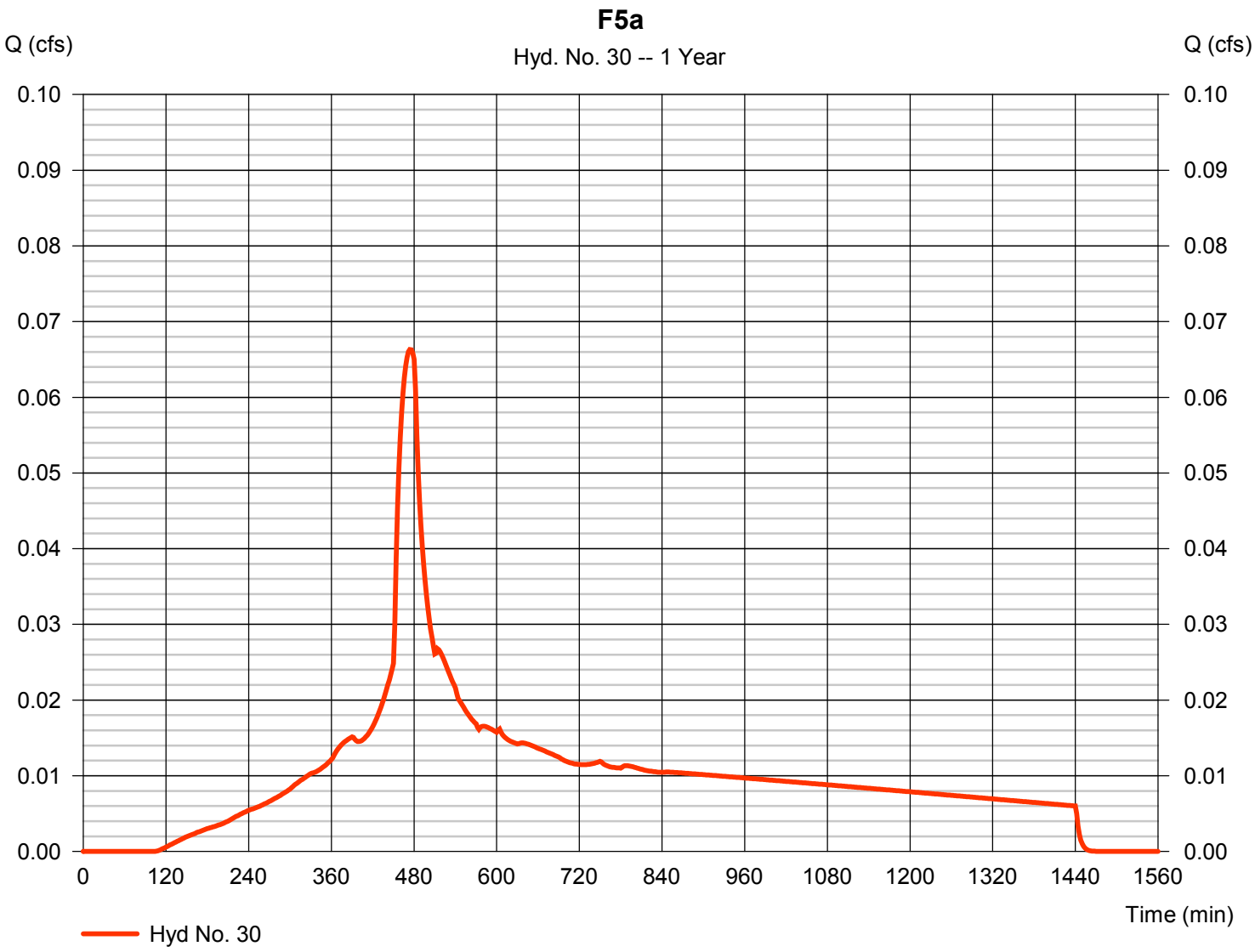
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 30

F5a

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.066 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 930 cuft
Drainage area	= 0.324 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



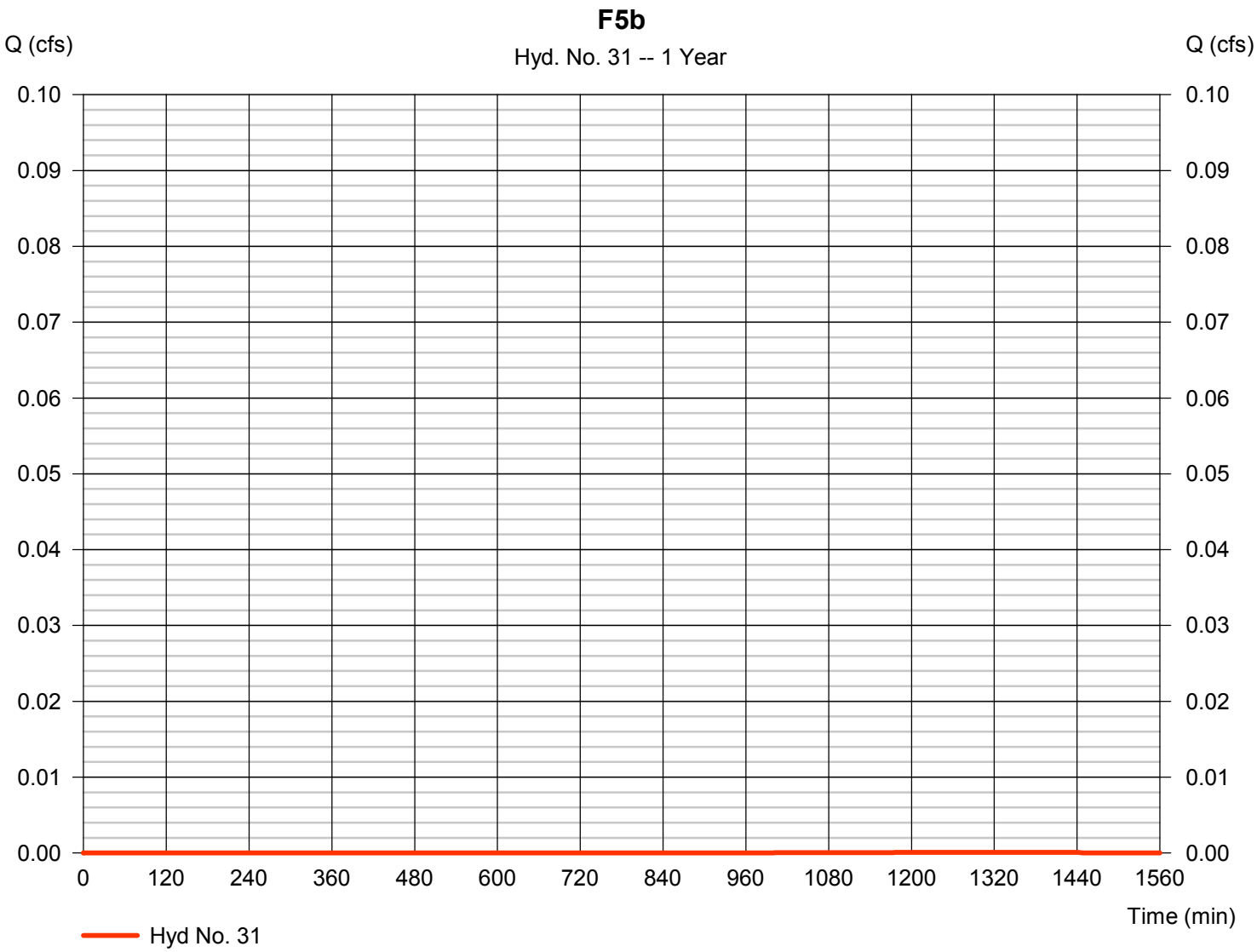
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 31

F5b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1436 min
Time interval	= 2 min	Hyd. volume	= 2 cuft
Drainage area	= 0.039 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



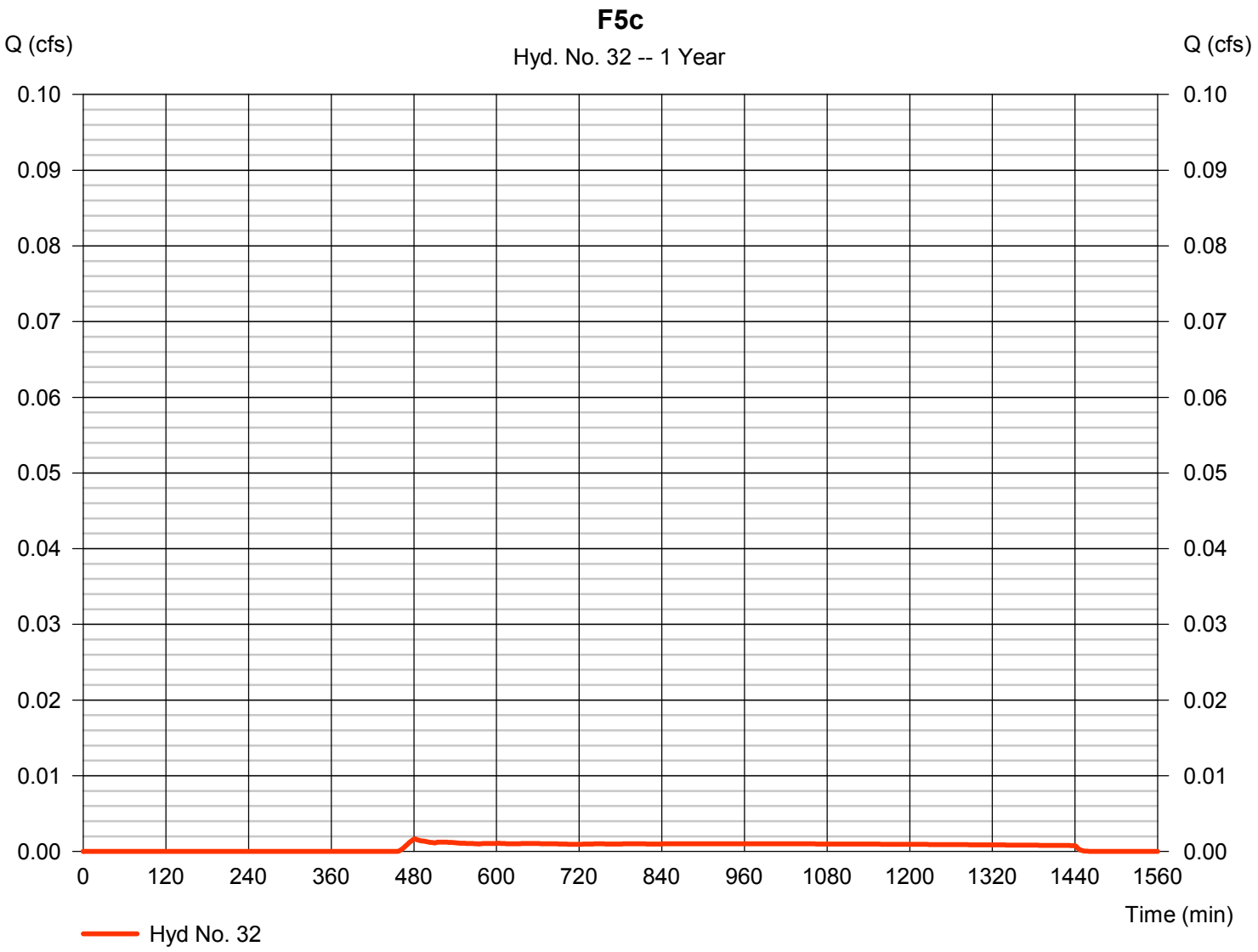
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 32

F5c

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 58 cuft
Drainage area	= 0.081 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



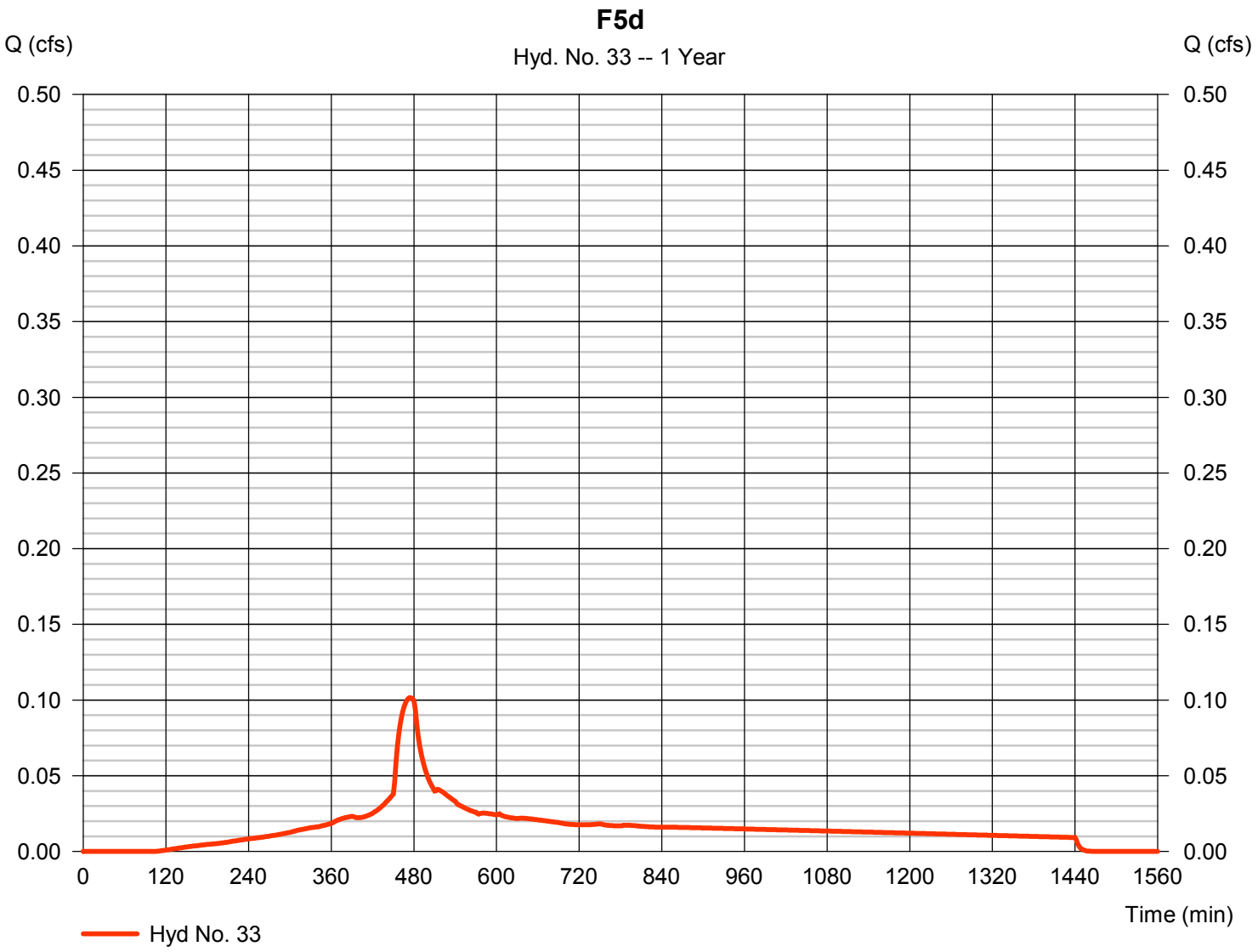
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 33

F5d

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.102 cfs
Storm frequency	= 1 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 1,424 cuft
Drainage area	= 0.496 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



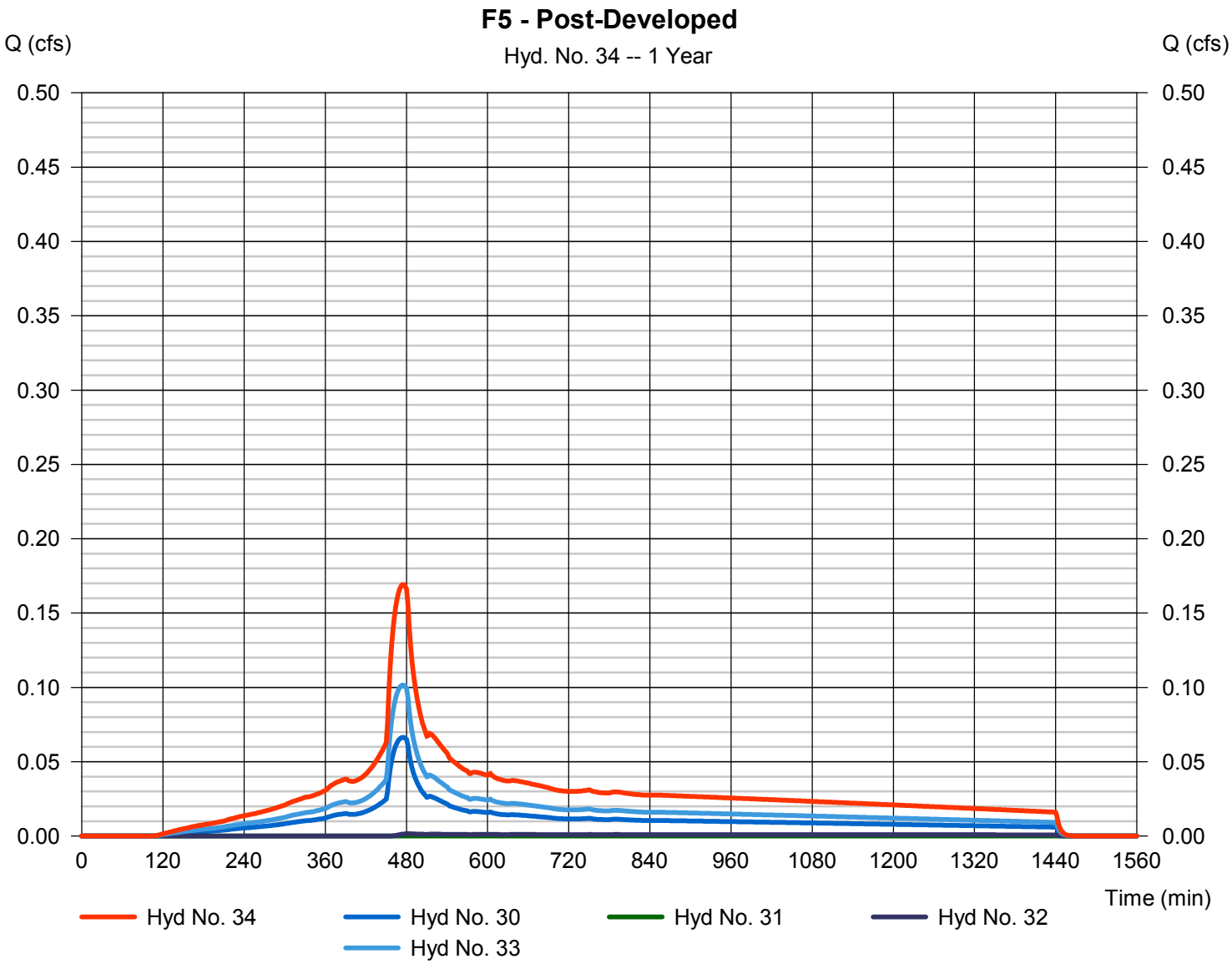
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 34

F5 - Post-Developed

Hydrograph type	= Combine	Peak discharge	= 0.169 cfs
Storm frequency	= 1 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 2,414 cuft
Inflow hyds.	= 30, 31, 32, 33	Contrib. drain. area	= 0.940 ac



Hydrograph Report

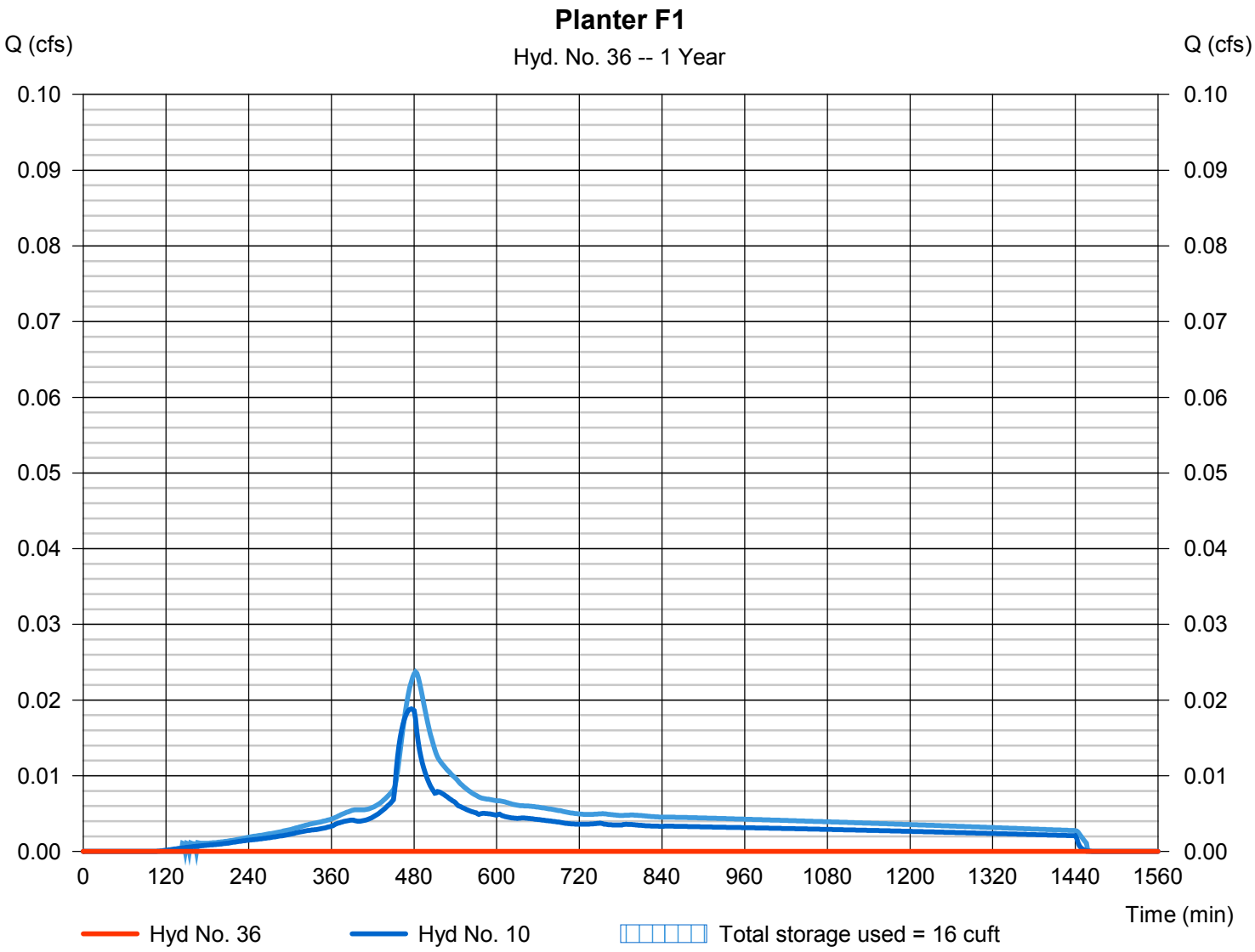
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 36

Planter F1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 504 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 10 - F1 - Post Developed	Max. Elevation	= 97.52 ft
Reservoir name	= Planter F1	Max. Storage	= 16 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

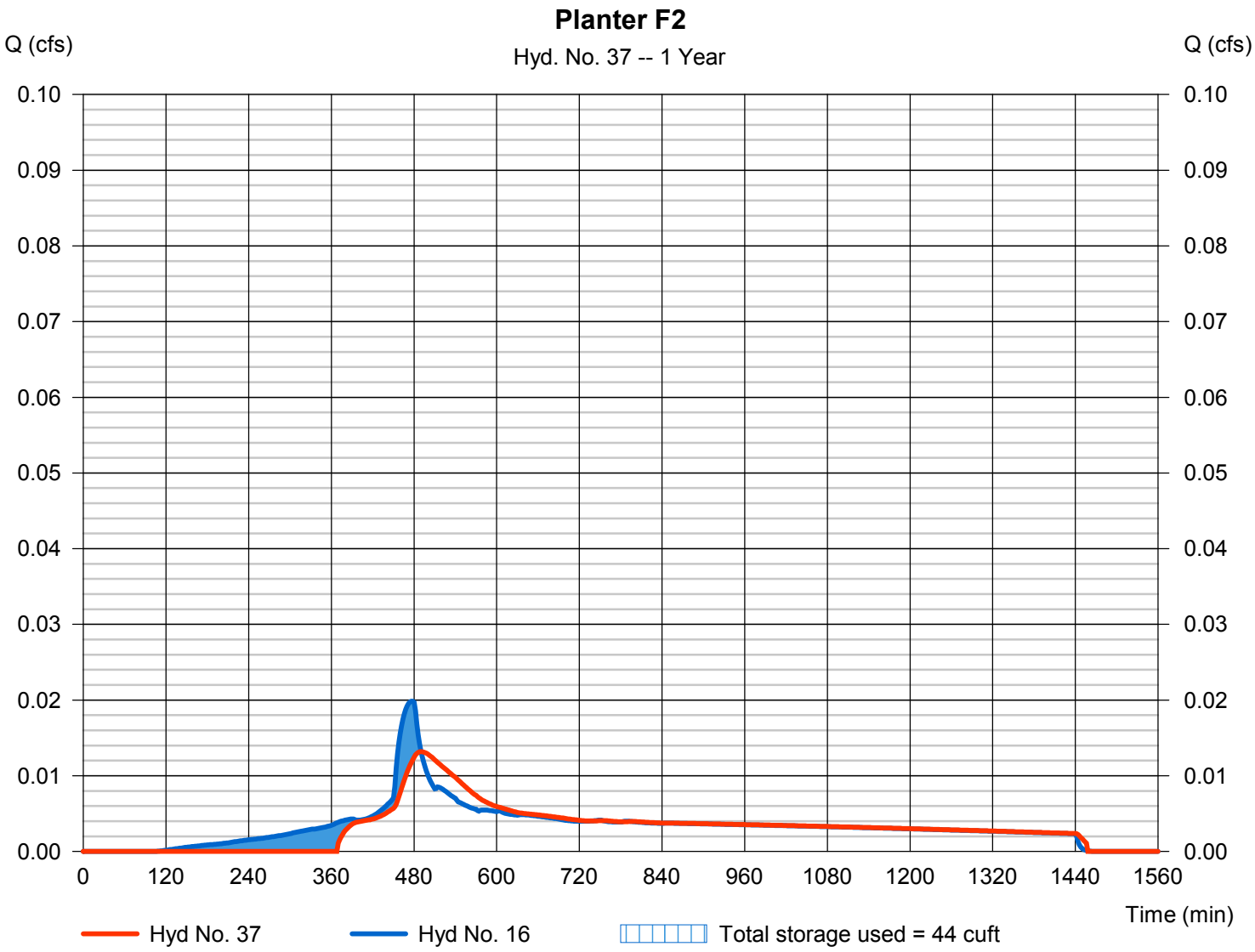
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 37

Planter F2

Hydrograph type	= Reservoir	Peak discharge	= 0.013 cfs
Storm frequency	= 1 yrs	Time to peak	= 490 min
Time interval	= 2 min	Hyd. volume	= 283 cuft
Inflow hyd. No.	= 16 - F2 - Post-Developed	Max. Elevation	= 98.17 ft
Reservoir name	= Planter F2	Max. Storage	= 44 cuft

Storage Indication method used.



Hydrograph Report

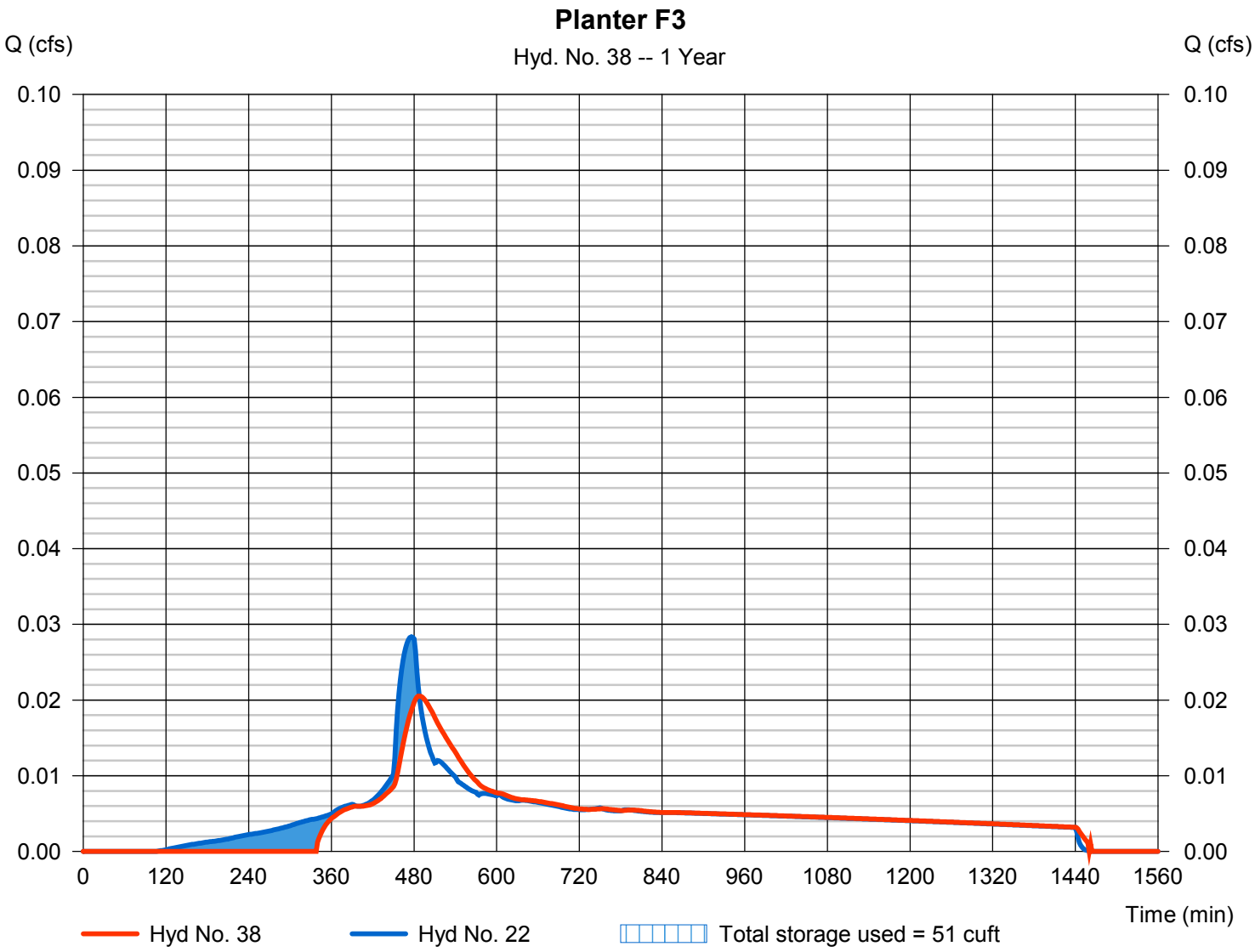
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 38

Planter F3

Hydrograph type	= Reservoir	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 488 min
Time interval	= 2 min	Hyd. volume	= 404 cuft
Inflow hyd. No.	= 22 - F3 - Post-Developed	Max. Elevation	= 98.21 ft
Reservoir name	= Planter F3	Max. Storage	= 51 cuft

Storage Indication method used.



Hydrograph Report

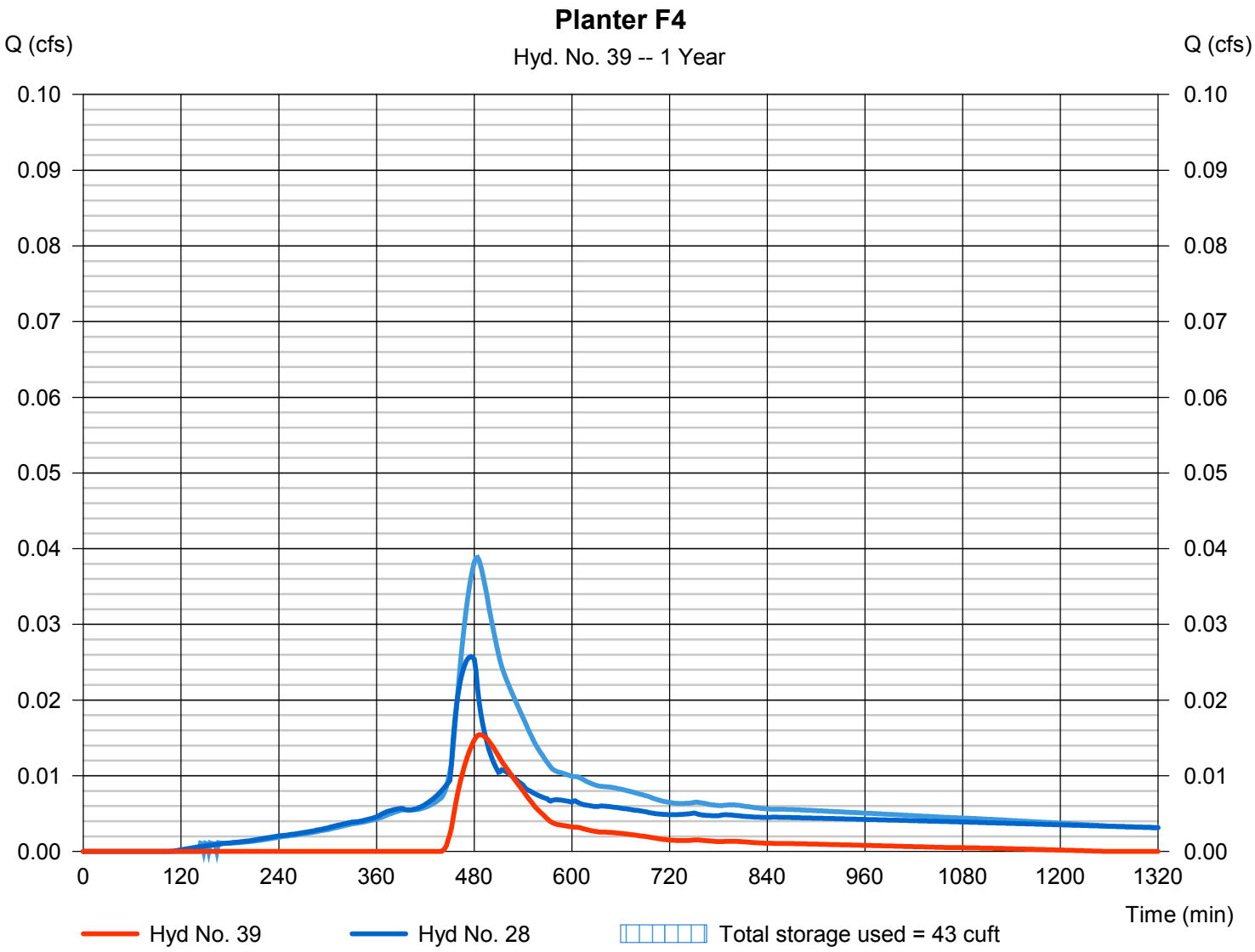
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 39

Planter F4

Hydrograph type	= Reservoir	Peak discharge	= 0.015 cfs
Storm frequency	= 1 yrs	Time to peak	= 488 min
Time interval	= 2 min	Hyd. volume	= 120 cuft
Inflow hyd. No.	= 28 - F4 - Post-Developed	Max. Elevation	= 98.14 ft
Reservoir name	= Planter F4	Max. Storage	= 43 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

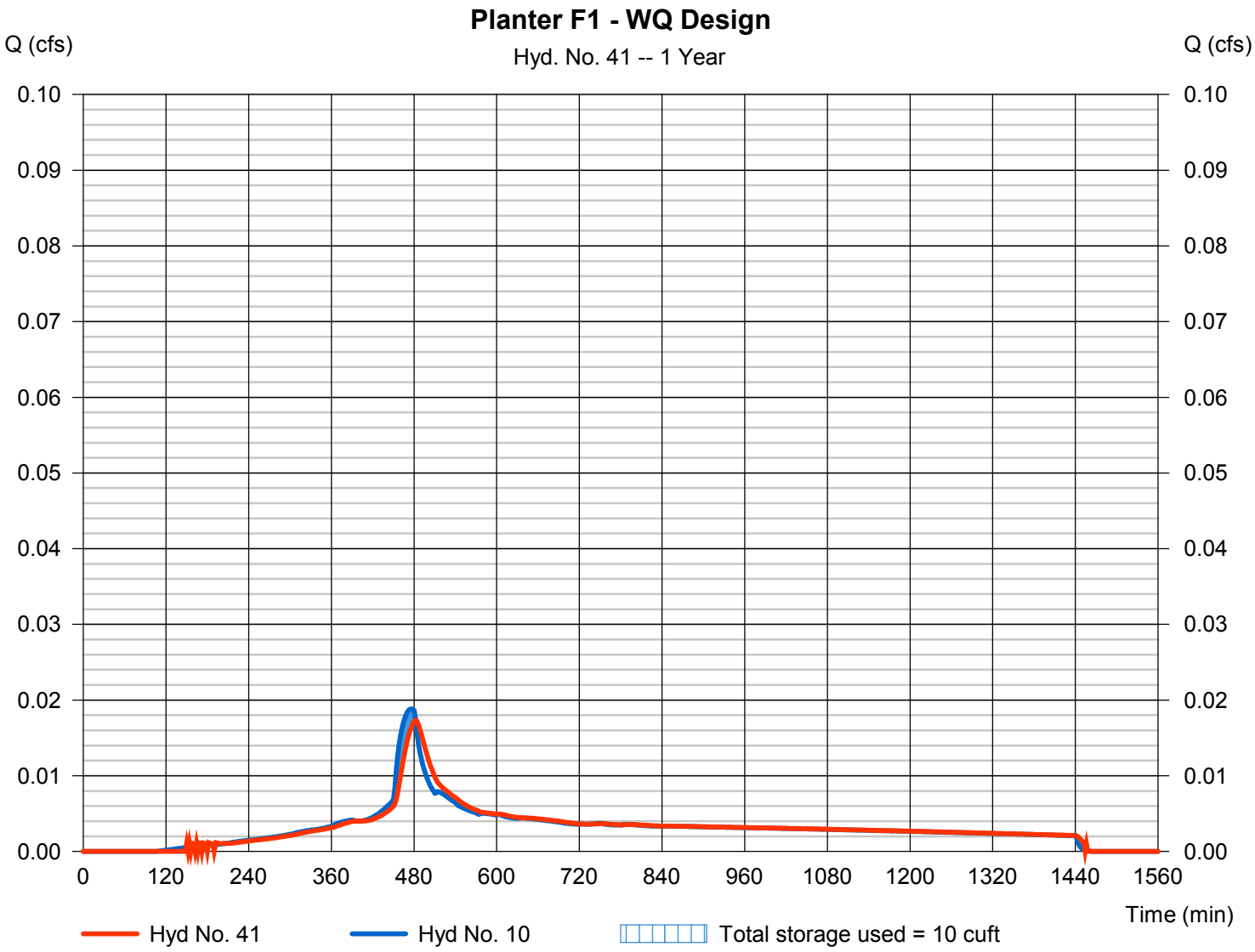
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 41

Planter F1 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.017 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 283 cuft
Inflow hyd. No.	= 10 - F1 - Post Developed	Max. Elevation	= 100.04 ft
Reservoir name	= Planter F1 - WQ	Max. Storage	= 10 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 6 - Planter F1 - WQ

Pond Data

Trapezoid -Bottom L x W = 69.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	276	0	0
0.08	100.08	276	23	23
0.17	100.17	276	23	46
0.25	100.25	276	23	69
0.33	100.33	276	23	92
0.41	100.42	276	23	115
0.50	100.50	276	23	137
0.58	100.58	276	23	160
0.66	100.66	276	23	183
0.75	100.75	276	23	206
0.83	100.83	276	23	229

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.80	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	23	100.08	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.17	46	100.17	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.25	69	100.25	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.33	92	100.33	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.41	115	100.42	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.50	137	100.50	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.58	160	100.58	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.66	183	100.66	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.75	206	100.75	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.83	229	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.038	---	0.393

Hydrograph Report

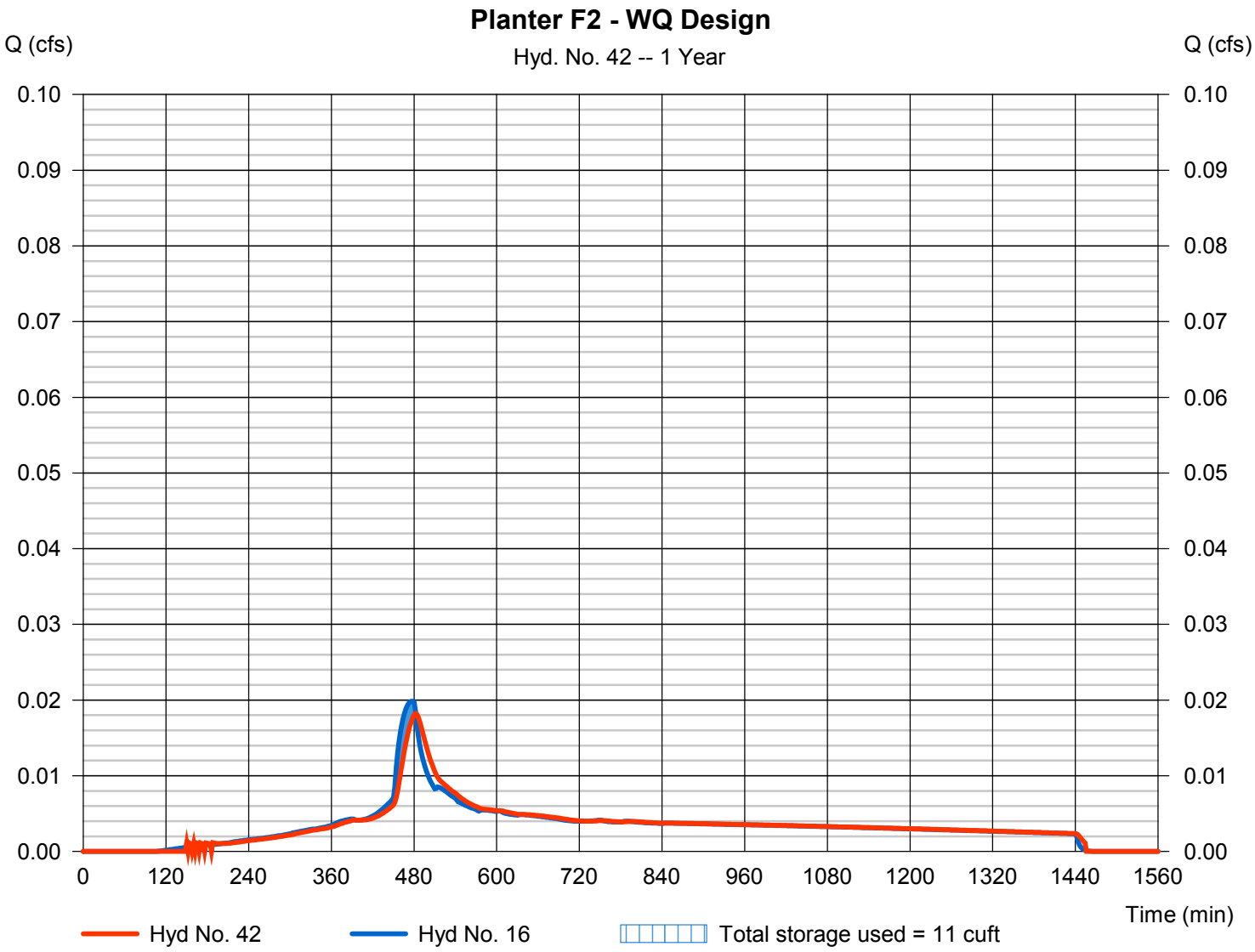
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 42

Planter F2 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.018 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 308 cuft
Inflow hyd. No.	= 16 - F2 - Post-Developed	Max. Elevation	= 100.04 ft
Reservoir name	= Planter F2 - WQ	Max. Storage	= 11 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 20 - Planter F2 - WQ

Pond Data

Trapezoid -Bottom L x W = 67.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	268	0	0
0.08	100.08	268	22	22
0.17	100.17	268	22	44
0.25	100.25	268	22	67
0.33	100.33	268	22	89
0.41	100.42	268	22	111
0.50	100.50	268	22	133
0.58	100.58	268	22	156
0.66	100.66	268	22	178
0.75	100.75	268	22	200
0.83	100.83	268	22	222

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.80	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	22	100.08	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.17	44	100.17	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.25	67	100.25	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.33	89	100.33	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.41	111	100.42	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.50	133	100.50	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.58	156	100.58	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.66	178	100.66	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.75	200	100.75	0.00	0.00	---	---	0.00	---	---	---	0.037	---	0.037
0.83	222	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.037	---	0.392

Hydrograph Report

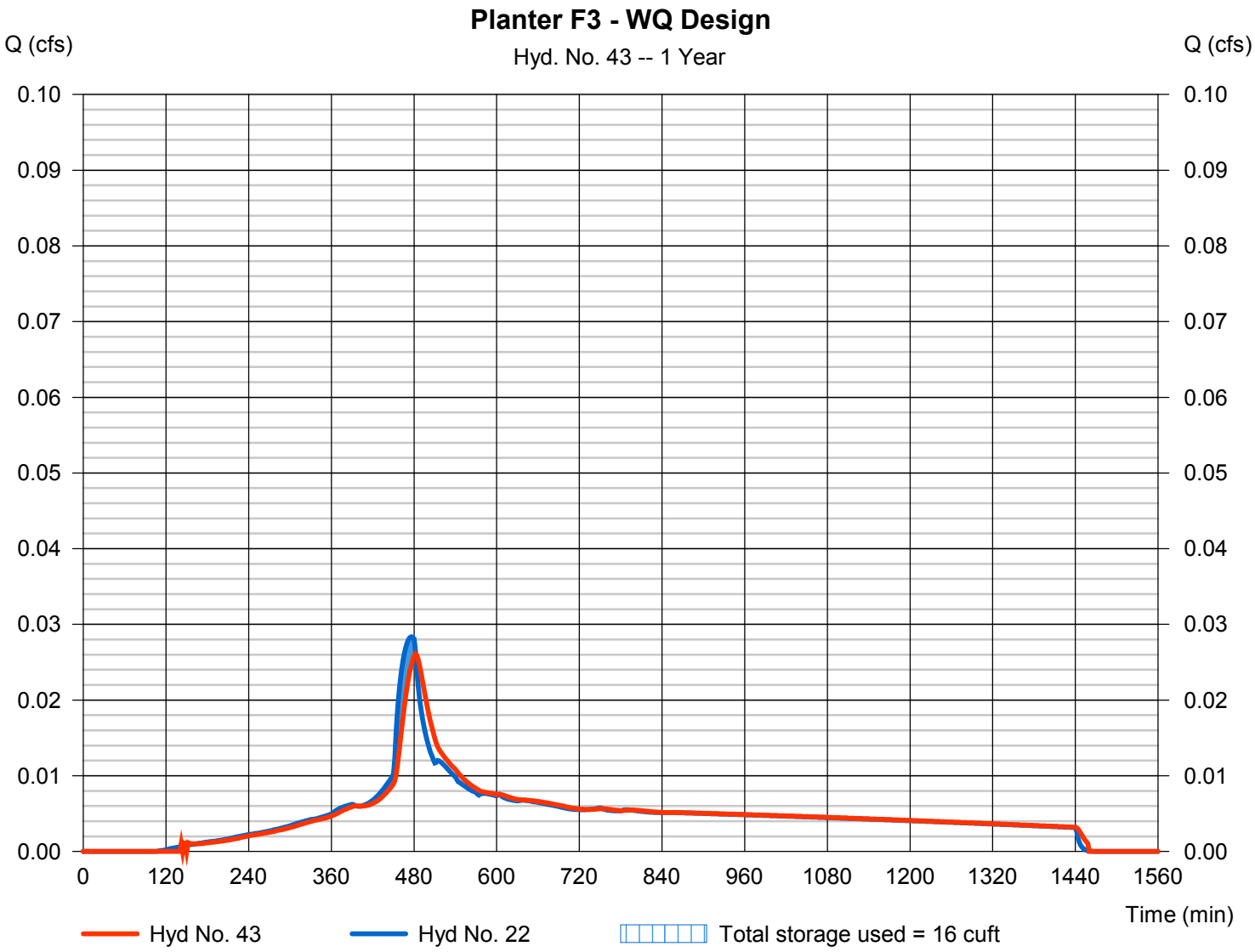
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 43

Planter F3 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.026 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 431 cuft
Inflow hyd. No.	= 22 - F3 - Post-Developed	Max. Elevation	= 100.05 ft
Reservoir name	= Planter F3 - WQ	Max. Storage	= 16 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 21 - Planter F3 - WQ

Pond Data

Trapezoid -Bottom L x W = 74.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	296	0	0
0.08	100.08	296	25	25
0.17	100.17	296	25	49
0.25	100.25	296	25	74
0.33	100.33	296	25	98
0.41	100.42	296	25	123
0.50	100.50	296	25	147
0.58	100.58	296	25	172
0.66	100.66	296	25	197
0.75	100.75	296	25	221
0.83	100.83	296	25	246

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.80	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	25	100.08	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.17	49	100.17	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.25	74	100.25	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.33	98	100.33	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.41	123	100.42	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.50	147	100.50	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.58	172	100.58	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.66	197	100.66	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.75	221	100.75	0.00	0.00	---	---	0.00	---	---	---	0.041	---	0.041
0.83	246	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.041	---	0.396

Hydrograph Report

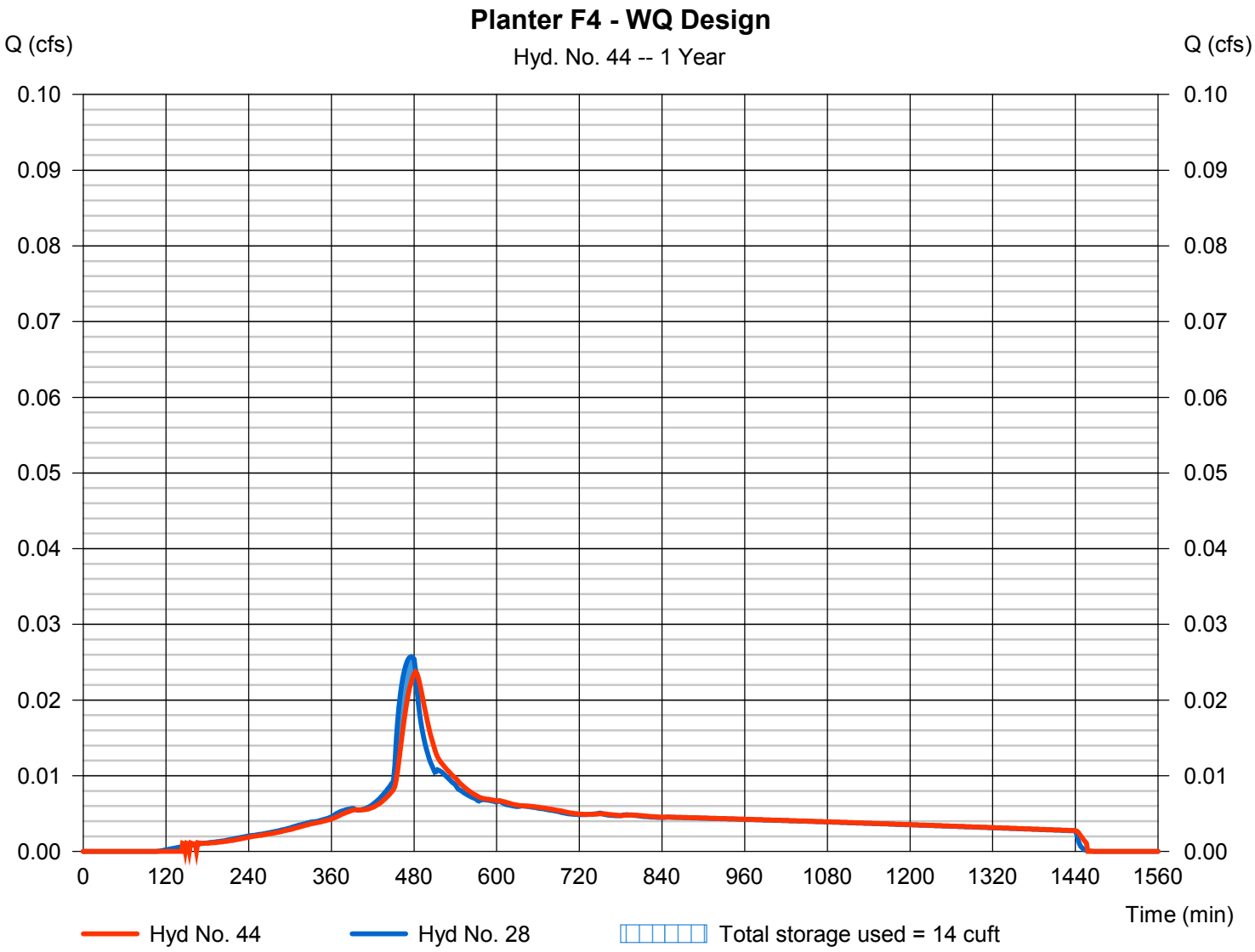
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Hyd. No. 44

Planter F4 - WQ Design

Hydrograph type	= Reservoir	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 383 cuft
Inflow hyd. No.	= 28 - F4 - Post-Developed	Max. Elevation	= 100.05 ft
Reservoir name	= Planter F4 - WQ	Max. Storage	= 14 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Pond No. 22 - Planter F4 - WQ

Pond Data

Trapezoid -Bottom L x W = 68.0 x 4.0 ft, Side slope = 0.00:1, Bottom elev. = 100.00 ft, Depth = 0.83 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	272	0	0
0.08	100.08	272	23	23
0.17	100.17	272	23	45
0.25	100.25	272	23	68
0.33	100.33	272	23	90
0.41	100.42	272	23	113
0.50	100.50	272	23	135
0.58	100.58	272	23	158
0.66	100.66	272	23	181
0.75	100.75	272	23	203
0.83	100.83	272	23	226

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	0.00	0.00
Span (in)	= 12.00	0.80	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 100.00	100.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.71	0.00	0.00	0.00
Crest El. (ft)	= 100.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 6.000 (by Contour)			
TW Elev. (ft)	= 0.00			

not extracted from model. Soil media design infiltration rate

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
0.08	23	100.08	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.17	45	100.17	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.25	68	100.25	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.33	90	100.33	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.41	113	100.42	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.50	135	100.50	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.58	158	100.58	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.66	181	100.66	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.75	203	100.75	0.00	0.00	---	---	0.00	---	---	---	0.038	---	0.038
0.83	226	100.83	0.35 ic	0.00	---	---	0.35	---	---	---	0.038	---	0.393

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.218	2	478	3,368	------	------	------	exFa
2	SBUH Runoff	0.065	2	478	1,006	------	------	------	exFb
3	SBUH Runoff	0.493	2	474	7,055	------	------	------	exFd
4	Combine	0.772	2	476	11,429	1, 2, 3	------	------	exF - Pre-Developed
6	SBUH Runoff	0.013	2	474	189	------	------	------	F1a
7	SBUH Runoff	0.003	2	480	78	------	------	------	F1b
8	SBUH Runoff	0.012	2	478	178	------	------	------	F1c
9	SBUH Runoff	0.040	2	474	576	------	------	------	F1d
10	Combine	0.067	2	476	1,022	6, 7, 8, 9	------	------	F1 - Post Developed
12	SBUH Runoff	0.013	2	474	181	------	------	------	F2a
13	SBUH Runoff	0.002	2	480	49	------	------	------	F2b
14	SBUH Runoff	0.019	2	478	294	------	------	------	F2c
15	SBUH Runoff	0.043	2	474	611	------	------	------	F2d
16	Combine	0.075	2	476	1,134	12, 13, 14, 15	------	------	F2 - Post-Developed
18	SBUH Runoff	0.026	2	474	370	------	------	------	F3a
19	SBUH Runoff	0.002	2	480	51	------	------	------	F3b
20	SBUH Runoff	0.021	2	478	327	------	------	------	F3c
21	SBUH Runoff	0.054	2	474	774	------	------	------	F3d
22	Combine	0.102	2	476	1,522	18, 19, 20, 21	------	------	F3 - Post-Developed
24	SBUH Runoff	0.016	2	474	224	------	------	------	F4a
25	SBUH Runoff	0.001	2	480	21	------	------	------	F4b
26	SBUH Runoff	0.014	2	478	221	------	------	------	F4c
27	SBUH Runoff	0.058	2	474	826	------	------	------	F4d
28	Combine	0.088	2	474	1,292	24, 25, 26, 27	------	------	F4 - Post-Developed
30	SBUH Runoff	0.195	2	474	2,788	------	------	------	F5a
31	SBUH Runoff	0.003	2	480	82	------	------	------	F5b
32	SBUH Runoff	0.025	2	478	390	------	------	------	F5c
33	SBUH Runoff	0.298	2	474	4,267	------	------	------	F5d
34	Combine	0.520	2	474	7,527	30, 31, 32, 33	------	------	F5 - Post-Developed
36	Reservoir	0.009	2	534	146	10	99.83	128	Planter F1
37	Reservoir	0.032	2	506	1,108	16	100.08	156	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.048	2	502	1,494	22	100.11	181	Planter F3
39	Reservoir	0.039	2	500	988	28	100.05	151	Planter F4
41	Reservoir	0.038	2	466	1,021	10	100.10	62.4	Planter F1 - WQ Design
42	Reservoir	0.037	2	484	1,133	16	100.24	83.1	Planter F2 - WQ Design
43	Reservoir	0.041	2	482	1,522	22	100.34	140	Planter F3 - WQ Design
44	Reservoir	0.038	2	468	1,292	28	100.17	113	Planter F4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.001	2	1294	43	------	------	------	exFa
2	SBUH Runoff	0.000	2	1294	13	------	------	------	exFb
3	SBUH Runoff	0.065	2	476	946	------	------	------	exFd
4	Combine	0.065	2	476	1,002	1, 2, 3	------	------	exF - Pre-Developed
6	SBUH Runoff	0.002	2	476	25	------	------	------	F1a
7	SBUH Runoff	0.000	2	n/a	0	------	------	------	F1b
8	SBUH Runoff	0.000	2	1294	2	------	------	------	F1c
9	SBUH Runoff	0.005	2	476	77	------	------	------	F1d
10	Combine	0.007	2	476	105	6, 7, 8, 9	------	------	F1 - Post Developed
12	SBUH Runoff	0.002	2	476	24	------	------	------	F2a
13	SBUH Runoff	0.000	2	n/a	0	------	------	------	F2b
14	SBUH Runoff	0.000	2	1294	4	------	------	------	F2c
15	SBUH Runoff	0.006	2	476	82	------	------	------	F2d
16	Combine	0.007	2	476	110	12, 13, 14, 15	------	------	F2 - Post-Developed
18	SBUH Runoff	0.003	2	476	50	------	------	------	F3a
19	SBUH Runoff	0.000	2	n/a	0	------	------	------	F3b
20	SBUH Runoff	0.000	2	1294	4	------	------	------	F3c
21	SBUH Runoff	0.007	2	476	104	------	------	------	F3d
22	Combine	0.011	2	476	158	18, 19, 20, 21	------	------	F3 - Post-Developed
24	SBUH Runoff	0.002	2	476	30	------	------	------	F4a
25	SBUH Runoff	0.000	2	n/a	0	------	------	------	F4b
26	SBUH Runoff	0.000	2	1294	3	------	------	------	F4c
27	SBUH Runoff	0.008	2	476	111	------	------	------	F4d
28	Combine	0.010	2	476	144	24, 25, 26, 27	------	------	F4 - Post-Developed
30	SBUH Runoff	0.026	2	476	374	------	------	------	F5a
31	SBUH Runoff	0.000	2	n/a	0	------	------	------	F5b
32	SBUH Runoff	0.000	2	1294	5	------	------	------	F5c
33	SBUH Runoff	0.040	2	476	572	------	------	------	F5d
34	Combine	0.065	2	476	951	30, 31, 32, 33	------	------	F5 - Post-Developed
36	Reservoir	0.000	2	458	0	10	97.36	5.62	Planter F1
37	Reservoir	0.004	2	502	84	16	97.82	27.3	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.008	2	488	130	22	97.86	32.3	Planter F3
39	Reservoir	0.000	2	482	0	28	97.61	22.1	Planter F4
41	Reservoir	0.007	2	482	104	10	100.01	3.89	Planter F1 - WQ Design
42	Reservoir	0.007	2	482	109	16	100.01	4.02	Planter F2 - WQ Design
43	Reservoir	0.010	2	482	157	22	100.02	5.81	Planter F3 - WQ Design
44	Reservoir	0.009	2	482	143	28	100.02	5.33	Planter F4 - WQ Design

Infiltration Event - 0.5" Storm

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.447	2	476	6,470	------	------	------	exFa
2	SBUH Runoff	0.134	2	476	1,932	------	------	------	exFb
3	SBUH Runoff	0.771	2	474	11,207	------	------	------	exFd
4	Combine	1.349	2	474	19,609	1, 2, 3	------	------	exF - Pre-Developed
6	SBUH Runoff	0.021	2	474	301	------	------	------	F1a
7	SBUH Runoff	0.011	2	480	196	------	------	------	F1b
8	SBUH Runoff	0.024	2	476	342	------	------	------	F1c
9	SBUH Runoff	0.063	2	474	916	------	------	------	F1d
10	Combine	0.118	2	474	1,754	6, 7, 8, 9	------	------	F1 - Post Developed
12	SBUH Runoff	0.020	2	474	287	------	------	------	F2a
13	SBUH Runoff	0.007	2	480	122	------	------	------	F2b
14	SBUH Runoff	0.039	2	476	564	------	------	------	F2c
15	SBUH Runoff	0.067	2	474	970	------	------	------	F2d
16	Combine	0.132	2	474	1,943	12, 13, 14, 15	------	------	F2 - Post-Developed
18	SBUH Runoff	0.040	2	474	588	------	------	------	F3a
19	SBUH Runoff	0.007	2	480	127	------	------	------	F3b
20	SBUH Runoff	0.043	2	476	629	------	------	------	F3c
21	SBUH Runoff	0.085	2	474	1,230	------	------	------	F3d
22	Combine	0.175	2	474	2,573	18, 19, 20, 21	------	------	F3 - Post-Developed
24	SBUH Runoff	0.024	2	474	355	------	------	------	F4a
25	SBUH Runoff	0.003	2	480	53	------	------	------	F4b
26	SBUH Runoff	0.029	2	476	425	------	------	------	F4c
27	SBUH Runoff	0.090	2	474	1,312	------	------	------	F4d
28	Combine	0.147	2	474	2,146	24, 25, 26, 27	------	------	F4 - Post-Developed
30	SBUH Runoff	0.305	2	474	4,428	------	------	------	F5a
31	SBUH Runoff	0.012	2	480	207	------	------	------	F5b
32	SBUH Runoff	0.052	2	476	749	------	------	------	F5c
33	SBUH Runoff	0.466	2	474	6,779	------	------	------	F5d
34	Combine	0.833	2	474	12,163	30, 31, 32, 33	------	------	F5 - Post-Developed
36	Reservoir	0.017	2	562	615	10	100.75	347	Planter F1
37	Reservoir	0.052	2	520	1,918	16	100.76	338	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.085	2	500	2,545	22	100.77	376	Planter F3
39	Reservoir	0.045	2	538	1,833	28	100.72	333	Planter F4
41	Reservoir	0.038	2	474	1,754	10	100.36	202	Planter F1 - WQ Design
42	Reservoir	0.076	2	494	1,943	16	100.77	206	Planter F2 - WQ Design
43	Reservoir	0.165	2	482	2,573	22	100.79	234	Planter F3 - WQ Design
44	Reservoir	0.115	2	486	2,145	28	100.78	212	Planter F4 - WQ Design

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.585	2	476	8,336	------	------	------	exFa
2	SBUH Runoff	0.175	2	476	2,489	------	------	------	exFb
3	SBUH Runoff	0.929	2	474	13,584	------	------	------	exFd
4	Combine	1.686	2	474	24,409	1, 2, 3	------	------	exF - Pre-Developed
6	SBUH Runoff	0.025	2	474	364	------	------	------	F1a
7	SBUH Runoff	0.017	2	480	275	------	------	------	F1b
8	SBUH Runoff	0.031	2	476	441	------	------	------	F1c
9	SBUH Runoff	0.076	2	474	1,110	------	------	------	F1d
10	Combine	0.148	2	474	2,190	6, 7, 8, 9	------	------	F1 - Post Developed
12	SBUH Runoff	0.024	2	474	348	------	------	------	F2a
13	SBUH Runoff	0.010	2	480	171	------	------	------	F2b
14	SBUH Runoff	0.051	2	476	726	------	------	------	F2c
15	SBUH Runoff	0.080	2	474	1,176	------	------	------	F2d
16	Combine	0.165	2	474	2,421	12, 13, 14, 15	------	------	F2 - Post-Developed
18	SBUH Runoff	0.049	2	474	712	------	------	------	F3a
19	SBUH Runoff	0.011	2	480	178	------	------	------	F3b
20	SBUH Runoff	0.057	2	476	810	------	------	------	F3c
21	SBUH Runoff	0.102	2	474	1,491	------	------	------	F3d
22	Combine	0.218	2	474	3,191	18, 19, 20, 21	------	------	F3 - Post-Developed
24	SBUH Runoff	0.029	2	474	431	------	------	------	F4a
25	SBUH Runoff	0.004	2	480	74	------	------	------	F4b
26	SBUH Runoff	0.038	2	476	548	------	------	------	F4c
27	SBUH Runoff	0.109	2	474	1,590	------	------	------	F4d
28	Combine	0.181	2	474	2,643	24, 25, 26, 27	------	------	F4 - Post-Developed
30	SBUH Runoff	0.367	2	474	5,367	------	------	------	F5a
31	SBUH Runoff	0.017	2	480	290	------	------	------	F5b
32	SBUH Runoff	0.068	2	476	965	------	------	------	F5c
33	SBUH Runoff	0.562	2	474	8,216	------	------	------	F5d
34	Combine	1.013	2	474	14,838	30, 31, 32, 33	------	------	F5 - Post-Developed
36	Reservoir	0.087	2	488	951	10	100.78	354	Planter F1
37	Reservoir	0.154	2	482	2,396	16	100.79	346	Planter F2

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	Reservoir	0.214	2	480	3,163	22	100.80	385	Planter F3
39	Reservoir	0.149	2	484	2,328	28	100.79	350	Planter F4
41	Reservoir	0.110	2	486	2,189	10	100.78	215	Planter F1 - WQ Design
42	Reservoir	0.163	2	480	2,421	16	100.79	212	Planter F2 - WQ Design
43	Reservoir	0.218	2	476	3,191	22	100.80	237	Planter F3 - WQ Design
44	Reservoir	0.181	2	476	2,642	28	100.79	216	Planter F4 - WQ Design

Proposed Planters capable of conveying 100 Year storm flows

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

UNMANAGED BASINS

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.009	2	480	158	------	------	------	exHa
2	SBUH Runoff	0.003	2	480	56	------	------	------	exHb
3	SBUH Runoff	0.031	2	474	447	------	------	------	exHd
4	Combine	0.042	2	476	661	1, 2, 3	------	------	exH - Pre-Developed
6	SBUH Runoff	0.040	2	480	825	------	------	------	exA1a
7	SBUH Runoff	0.003	2	480	53	------	------	------	exA1b
8	SBUH Runoff	0.139	2	480	2,142	------	------	------	exA1d
9	SBUH Runoff	0.001	2	480	23	------	------	------	exA1e
10	Combine	0.182	2	480	3,042	6, 7, 8, 9	------	------	exA1 - Pre-Developed
12	SBUH Runoff	0.000	2	480	7	------	------	------	exA2a
13	SBUH Runoff	0.006	2	480	112	------	------	------	exA2b
14	SBUH Runoff	0.019	2	474	267	------	------	------	exA2d
15	Combine	0.025	2	476	385	12, 13, 14	------	------	exA2 - Pre-Developed
17	SBUH Runoff	0.011	2	480	204	------	------	------	exBa
18	SBUH Runoff	0.006	2	480	112	------	------	------	exBb
19	SBUH Runoff	0.021	2	474	301	------	------	------	exBd
20	Combine	0.038	2	478	617	17, 18, 19	------	------	exB - Pre Developed
22	SBUH Runoff	0.014	2	478	217	------	------	------	exGa
23	SBUH Runoff	0.002	2	478	38	------	------	------	exGb
24	SBUH Runoff	0.022	2	474	310	------	------	------	exGd
25	Combine	0.038	2	476	565	22, 23, 24	------	------	exG - Pre-Developed
27	SBUH Runoff	0.039	2	474	559	------	------	------	Ha
28	Combine	0.070	2	474	1,007	3, 27	------	------	H - Post Developed Project Limits
30	SBUH Runoff	0.054	2	480	835	------	------	------	A1a
31	SBUH Runoff	0.001	2	1198	27	------	------	------	A1b
32	SBUH Runoff	0.020	2	480	407	------	------	------	A1c
33	SBUH Runoff	0.001	2	480	23	------	------	------	A1e
34	Combine	0.075	2	480	1,292	30, 31, 32, 33	------	------	A1 - Post-Developed Project Limits
35	Combine	0.214	2	480	3,434	8, 34	------	------	A1 - Post-Developed CIA
37	SBUH Runoff	0.013	2	480	198	------	------	------	A2a

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	SBUH Runoff	0.000	2	1198	8	------	------	------	A2b
39	Combine	0.013	2	480	206	37, 38	------	------	A2 - Post-Developed Project Limits
40	Combine	0.031	2	476	473	14, 39	------	------	A2 - Post Developed CIA
42	SBUH Runoff	0.047	2	474	680	------	------	------	Ba
43	SBUH Runoff	0.000	2	1196	5	------	------	------	Bb
44	SBUH Runoff	0.002	2	480	33	------	------	------	Bc
45	Combine	0.049	2	474	717	42, 43, 44	------	------	B - Post-Developed Project Limits
46	Combine	0.070	2	474	1,018	19, 45	------	------	B - Post Developed CIA
48	SBUH Runoff	0.025	2	474	353	------	------	------	Ga
49	SBUH Runoff	0.000	2	480	8	------	------	------	Gb
50	SBUH Runoff	0.003	2	478	43	------	------	------	Gc
51	Combine	0.028	2	474	405	48, 49, 50	------	------	G - Post-Developed Project Limits
52	Combine	0.049	2	474	714	24, 51	------	------	G - Post-Developed CIA

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.022	2	480	342	------	------	------	exHa
2	SBUH Runoff	0.008	2	480	121	------	------	------	exHb
3	SBUH Runoff	0.049	2	474	711	------	------	------	exHd
4	Combine	0.078	2	476	1,174	1, 2, 3	------	------	exH - Pre-Developed
6	SBUH Runoff	0.105	2	480	1,789	------	------	------	exA1a
7	SBUH Runoff	0.007	2	480	114	------	------	------	exA1b
8	SBUH Runoff	0.217	2	480	3,403	------	------	------	exA1d
9	SBUH Runoff	0.003	2	480	45	------	------	------	exA1e
10	Combine	0.331	2	480	5,351	6, 7, 8, 9	------	------	exA1 - Pre-Developed
12	SBUH Runoff	0.001	2	480	14	------	------	------	exA2a
13	SBUH Runoff	0.015	2	480	242	------	------	------	exA2b
14	SBUH Runoff	0.029	2	474	424	------	------	------	exA2d
15	Combine	0.045	2	476	680	12, 13, 14	------	------	exA2 - Pre-Developed
17	SBUH Runoff	0.028	2	480	442	------	------	------	exBa
18	SBUH Runoff	0.015	2	480	242	------	------	------	exBb
19	SBUH Runoff	0.033	2	474	478	------	------	------	exBd
20	Combine	0.076	2	476	1,163	17, 18, 19	------	------	exB - Pre Developed
22	SBUH Runoff	0.029	2	476	416	------	------	------	exGa
23	SBUH Runoff	0.005	2	476	74	------	------	------	exGb
24	SBUH Runoff	0.034	2	474	492	------	------	------	exGd
25	Combine	0.068	2	476	982	22, 23, 24	------	------	exG - Pre-Developed
27	SBUH Runoff	0.061	2	474	888	------	------	------	Ha
28	Combine	0.110	2	474	1,599	3, 27	------	------	H - Post Developed Project Limits
30	SBUH Runoff	0.085	2	480	1,326	------	------	------	A1a
31	SBUH Runoff	0.002	2	982	113	------	------	------	A1b
32	SBUH Runoff	0.052	2	480	884	------	------	------	A1c
33	SBUH Runoff	0.003	2	480	45	------	------	------	A1e
34	Combine	0.140	2	480	2,368	30, 31, 32, 33	------	------	A1 - Post-Developed Project Limits
35	Combine	0.358	2	480	5,771	8, 34	------	------	A1 - Post-Developed CIA
37	SBUH Runoff	0.020	2	480	314	------	------	------	A2a

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
38	SBUH Runoff	0.001	2	982	34	------	------	------	A2b
39	Combine	0.020	2	480	348	37, 38	------	------	A2 - Post-Developed Project Limits
40	Combine	0.049	2	476	772	14, 39	------	------	A2 - Post Developed CIA
42	SBUH Runoff	0.074	2	474	1,080	------	------	------	Ba
43	SBUH Runoff	0.000	2	526	19	------	------	------	Bb
44	SBUH Runoff	0.005	2	480	71	------	------	------	Bc
45	Combine	0.079	2	474	1,170	42, 43, 44	------	------	B - Post-Developed Project Limits
46	Combine	0.112	2	474	1,649	19, 45	------	------	B - Post Developed CIA
48	SBUH Runoff	0.039	2	474	560	------	------	------	Ga
49	SBUH Runoff	0.001	2	480	21	------	------	------	Gb
50	SBUH Runoff	0.006	2	476	83	------	------	------	Gc
51	Combine	0.045	2	474	665	48, 49, 50	------	------	G - Post-Developed Project Limits
52	Combine	0.079	2	474	1,157	24, 51	------	------	G - Post-Developed CIA

a- impervious
b- pervious landscape
c- pervious sidewalk
d- overlay CIA
e - gravel

Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Tuesday, 11 / 8 / 2022

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.2000	0.1000	0.0000	--------
2	71.8477	13.3000	0.8718	--------
3	0.0000	0.0000	0.0000	--------
5	75.7517	14.2000	0.8271	--------
10	86.7192	15.3000	0.8244	--------
25	103.3028	16.6000	0.8227	--------
50	116.5747	17.3000	0.8234	--------
100	124.5731	17.6000	0.8144	--------

File name: WQ Rational.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
2	5.70	4.62	3.90	3.38	2.99	2.69	2.45	2.24	2.08	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.58	5.43	4.65	4.08	3.64	3.30	3.02	2.79	2.59	2.42	2.28	2.15
10	7.25	6.05	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.81	4.38	4.03	3.73	3.48	3.26	3.08	2.91
50	9.05	7.66	6.67	5.92	5.34	4.87	4.48	4.16	3.88	3.64	3.43	3.25
100	9.83	8.35	7.30	6.49	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DOCS\REPORTS\STORM - (Storm Report)\Calcs\WES.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.00	2.60	0.50	3.00	3.50	4.00	4.20	4.80
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix D – Conveyance/ Downstream Analysis

Linwood Avenue

Conveyance Pipe Characteristics

Prepared by Harper Houf Peterson Righellis Inc.

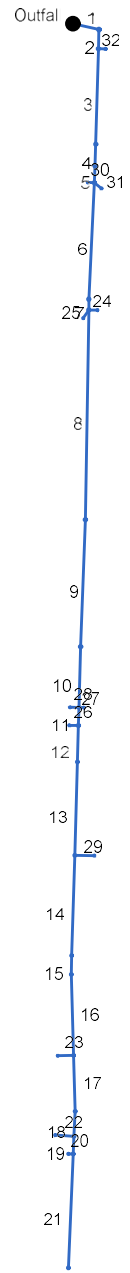
Job No. CLA-93

November 2022

PIPE #	EXISTING OR PROPOSED	PIPE SIZE (IN)	PIPE AREA (SF)	PER. (FT)	N	$Q_{CAPACITY}$ (cfs)	Q_{25} (cfs)	MIN. SLOPE (%)	SLOPE (%)	VELOCITY (FPS)	CAPACITY MET?
1	EXISTING	56	17.10	14.65	0.013	286.7	92.18	0.18	1.75	5.39	YES
2	EXISTING	48	12.57	12.56	0.013	134.8	92.18	0.41	0.88	7.34	YES
3	EXISTING	48	12.57	12.56	0.013	134.8	87.27	0.37	0.88	6.94	YES
4	EXISTING	48	12.57	12.56	0.013	68.9	83.09	0.33	0.23	6.61	NO
5	EXISTING	18	1.77	4.71	0.013	14.4	12.82	1.49	1.87	7.25	YES
6	EXISTING	12	0.79	3.14	0.013	2.2	0.36	0.01	0.38	0.46	YES

Refer to Appendix A Basin Map exhibits for pipe # identified in plan view. Offsite conveyance basins draining more than 10 acres. Q25 flow obtained from SBUH Method.

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: CLA93_Linwood Ave.stm	Number of lines: 32	Date: 7/27/2021

MyReport

Line No.	Line ID	Line Size (in)	Line Slope (%)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	Flow Rate (cfs)	DnStm Ln No
32	C1	12	0.73	149.92	149.62	145.77	145.88	145.95	146.08	0.32	2
31	D2	12	10.73	153.24	153.21	147.76	150.03	147.84	150.20	0.15	5
30	D1	12	14.58	153.24	152.92	147.76	149.74	147.84	149.91	0.17	5
29	JCB3	48	0.20	163.98	162.08	151.24	151.32	157.72	157.78	61.99	13
28	E3	12	8.61	158.27	158.06	152.93	154.55	155.64	155.64	0.11	10
27	E4	12	15.90	158.27	157.97	152.93	154.55	155.64	155.64	0.12	10
26	E5	12	9.68	158.77	158.20	152.93	154.77	156.31	156.32	0.19	11
25	D3	12	23.04	163.27	163.73	154.57	160.15	154.64	160.32	0.17	7
24	D4	12	26.32	163.27	162.97	154.57	159.35	154.64	159.54	0.19	7
23	F1	12	13.32	172.01	171.73	164.17	168.55	164.73	168.69	0.12	16
22	F3	12	3.48	173.09	172.93	166.88	168.25	167.46	168.42	0.17	18
21	F4&F5, JCB1	15	1.30	173.76	177.83	167.47	171.29	168.15	171.95	2.90	19
20	F2	12	3.15	173.76	173.46	167.72	168.04	168.15	168.19	0.13	19
19	19	15	1.31	173.09	173.76	166.88	167.47	167.46	168.15	3.03	18
18	18	15	0.51	172.18	173.09	166.15	166.48	166.97	167.18	3.20	17
17	17	15	1.63	172.01	172.18	163.92	166.27	164.73	166.97	3.20	16
16	JCB2	15	1.63	169.22	172.01	160.52	163.92	161.83	164.73	12.82	15
15	(Pipe 5)	18	1.87	168.32	169.22	159.56	160.47	160.82	161.83	12.82	14
14	14	24	2.37	163.98	168.32	153.24	159.36	157.72	160.82	12.82	13
13	E8	48	0.42	159.74	163.98	150.24	151.24	156.62	157.17	75.54	12
12	E6	48	0.25	158.77	159.74	149.99	150.22	156.31	156.53	75.61	11
11	11	48	0.24	158.27	158.77	149.88	149.99	155.64	155.75	75.80	10
10	10	48	0.25	158.72	158.27	149.49	149.88	154.70	155.08	76.03	9

Project File: CLA93_Linwood Ave.stm | Number of lines: 32 | Date: 7/7/2022

NOTES: ** Critical depth

MyReport

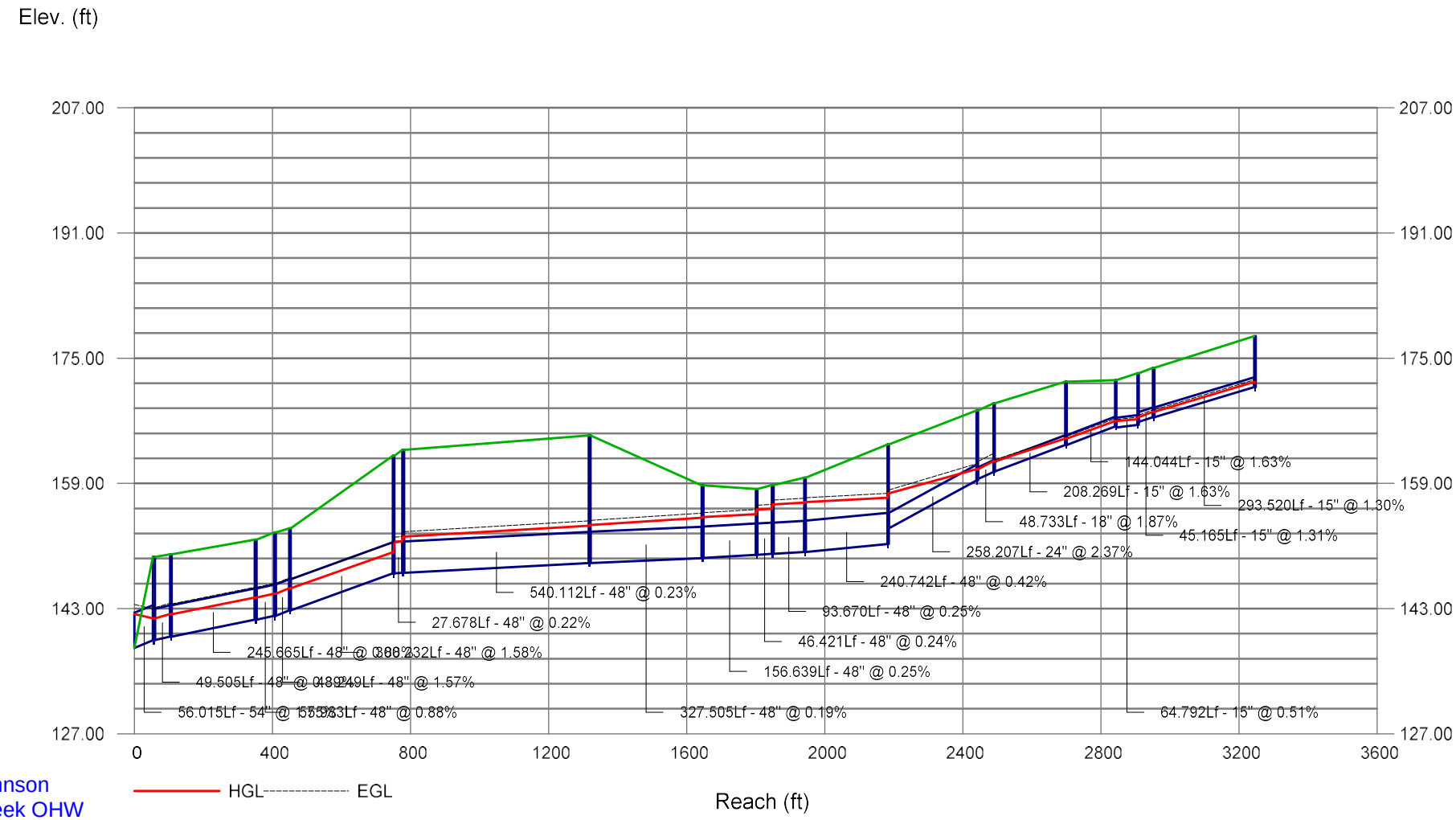
Line No.	Line ID	Line Size (in)	Line Slope (%)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	Flow Rate (cfs)	DnStm Ln No
9	E1, E2, E7	48	0.19	165.13	158.72	148.83	149.45	153.69	154.62	76.45	8
8	(Pipe 4) JCB4, JCB5	48	0.23	163.27	165.13	147.57	148.81	152.20	153.60	86.52	7
7	7	48	0.22	162.54	163.27	147.51	147.57	151.51	151.57	86.88	6
6	D5	48	1.58	153.24	162.54	142.76	147.49	145.60	150.19	86.95	5
5	5	48	1.57	152.73	153.24	142.08	142.76	144.90	145.60	87.27	4
4	(Pipe 3)	48	0.88	151.80	152.73	141.57	142.06	144.41	144.90	87.27	3
3	C2, JCB6	48	0.88	149.92	151.80	139.41	141.57	142.26	144.41	91.86	2
2	(Pipe 2)	48	0.89	149.61	149.92	138.97	139.41	141.75	142.32	92.18	1
1	Pipe 1 (Outfall)	54	1.75	138.00	149.61	137.96	138.94	142.32	141.75	92.18	Outfall

Project File: CLA93_Linwood Ave.stm | Number of lines: 32 | Date: 7/7/2022

NOTES: ** Critical depth

Storm Sewer Profile

Proj. file: CLA93_Linwood Ave.stm



Johnson Creek OHW Observed at 141.2

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	1.222	2	474	17,768	------	------	------	OFFSITE JCB1a
2	SBUH Runoff	0.726	2	480	14,253	------	------	------	OFFSITE JCB1b
3	Combine	1.917	2	478	32,021	1, 2	------	------	OFFSITE JCB1 -TOTAL
5	SBUH Runoff	7.547	2	474	110,705	------	------	------	OFFSITE JCB2a
6	SBUH Runoff	1.987	2	480	31,361	------	------	------	OFFSITE JCB2b
7	Combine	9.496	2	476	142,066	5, 6	------	------	OFFSITE JCB2 - TOTAL
9	SBUH Runoff	23.26	2	482	478,356	------	------	------	OFFSITE JCB3a - B SOIL
10	SBUH Runoff	6.022	2	494	196,787	------	------	------	OFFSITE JCB3b - B SOIL
11	SBUH Runoff	21.34	2	482	438,721	------	------	------	OFFSITE JCB3a - C SOIL
12	SBUH Runoff	11.66	2	486	280,109	------	------	------	OFFSITE JCB3b - C SOIL
13	Combine	61.99	2	482	1,393,976	9, 10, 11, 12	------	------	OFFSITE JCB3 -TOTAL
15	SBUH Runoff	2.110	2	476	31,435	------	------	------	OFFSITE JCB4a - B SOIL
16	SBUH Runoff	0.829	2	480	17,012	------	------	------	OFFSITE JCB4b - B SOIL
17	SBUH Runoff	2.110	2	476	31,435	------	------	------	OFFSITE JCB4a - C SOIL
18	SBUH Runoff	1.644	2	480	26,372	------	------	------	OFFSITE JCB4b - C SOIL
19	Combine	6.647	2	478	106,253	15, 16, 17, 18	------	------	OFFSITE JCB4 - TOTAL
21	SBUH Runoff	1.750	2	476	25,968	------	------	------	OFFSITE JCB5a - B SOIL
22	SBUH Runoff	0.700	2	480	14,253	------	------	------	OFFSITE JCB5b - B SOIL
23	SBUH Runoff	0.553	2	476	8,200	------	------	------	OFFSITE JCB5a - C SOIL
24	SBUH Runoff	0.446	2	480	7,127	------	------	------	OFFSITE JCB5b - C SOIL
25	Combine	3.421	2	478	55,549	21, 22, 23, 24	------	------	OFFSITE JCB5 - TOTAL
27	SBUH Runoff	2.229	2	474	32,802	------	------	------	OFFSITE JCB6a - B SOIL
28	SBUH Runoff	0.894	2	480	17,932	------	------	------	OFFSITE JCB6b - B SOIL
29	SBUH Runoff	0.836	2	474	12,301	------	------	------	OFFSITE JCB6a - C SOIL
30	SBUH Runoff	0.630	2	480	9,978	------	------	------	OFFSITE JCB6b - C SOIL
31	Combine	4.545	2	478	73,012	27, 28, 29, 30	------	------	OFFSITE JCB6 - TOTAL

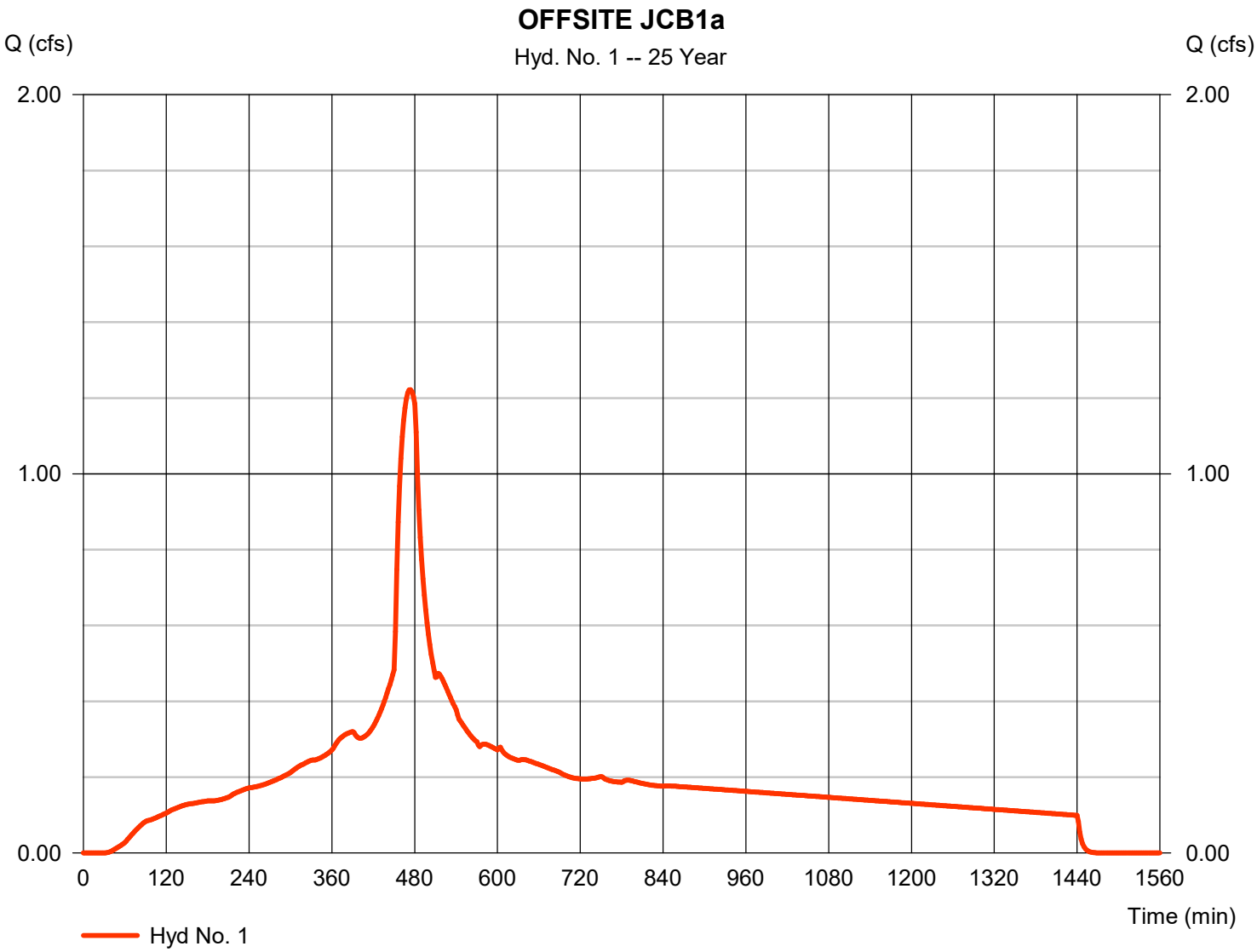
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 1

OFFSITE JCB1a

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.222 cfs
Storm frequency	= 25 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 17,768 cuft
Drainage area	= 1.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



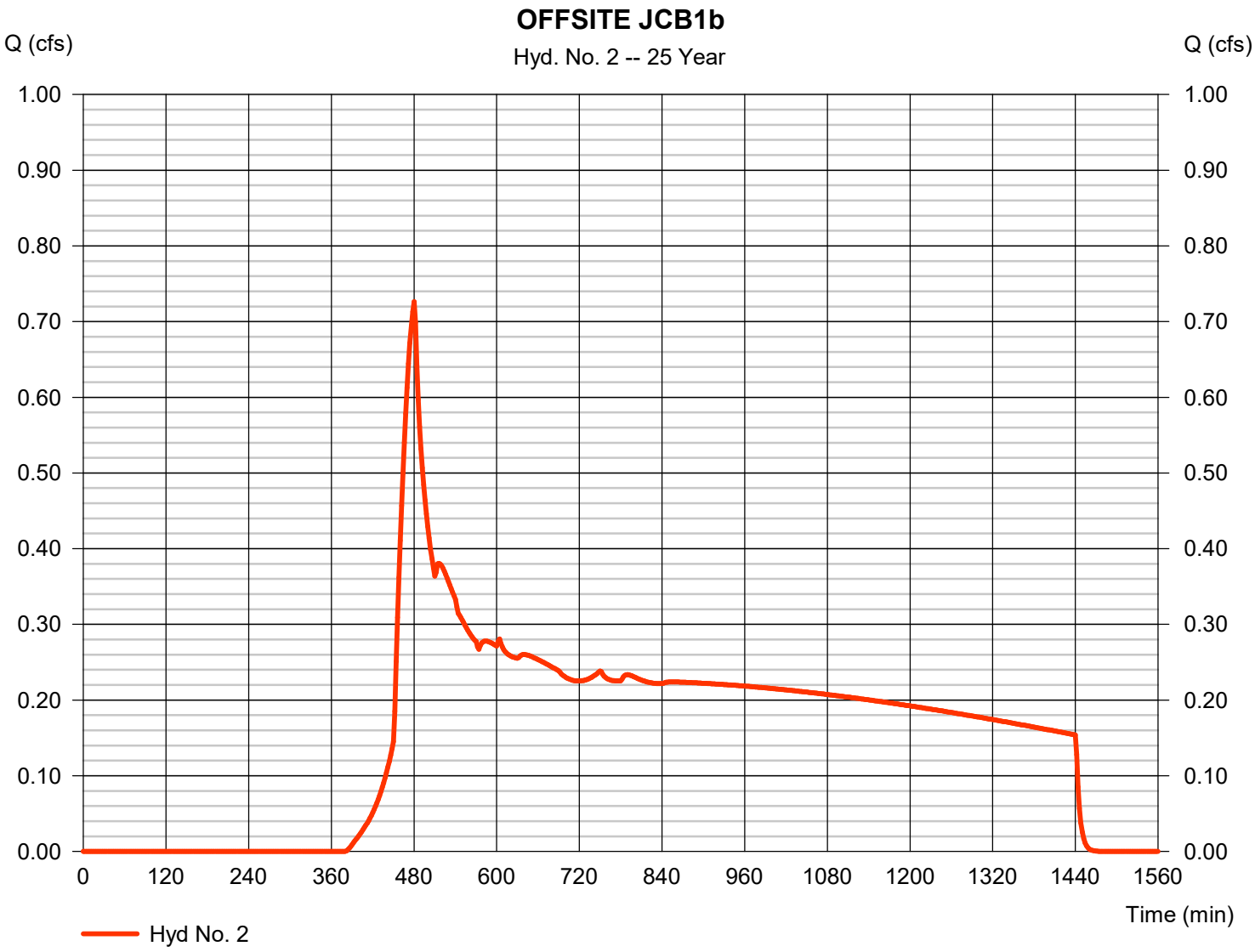
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 2

OFFSITE JCB1b

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.726 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 14,253 cuft
Drainage area	= 3.100 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



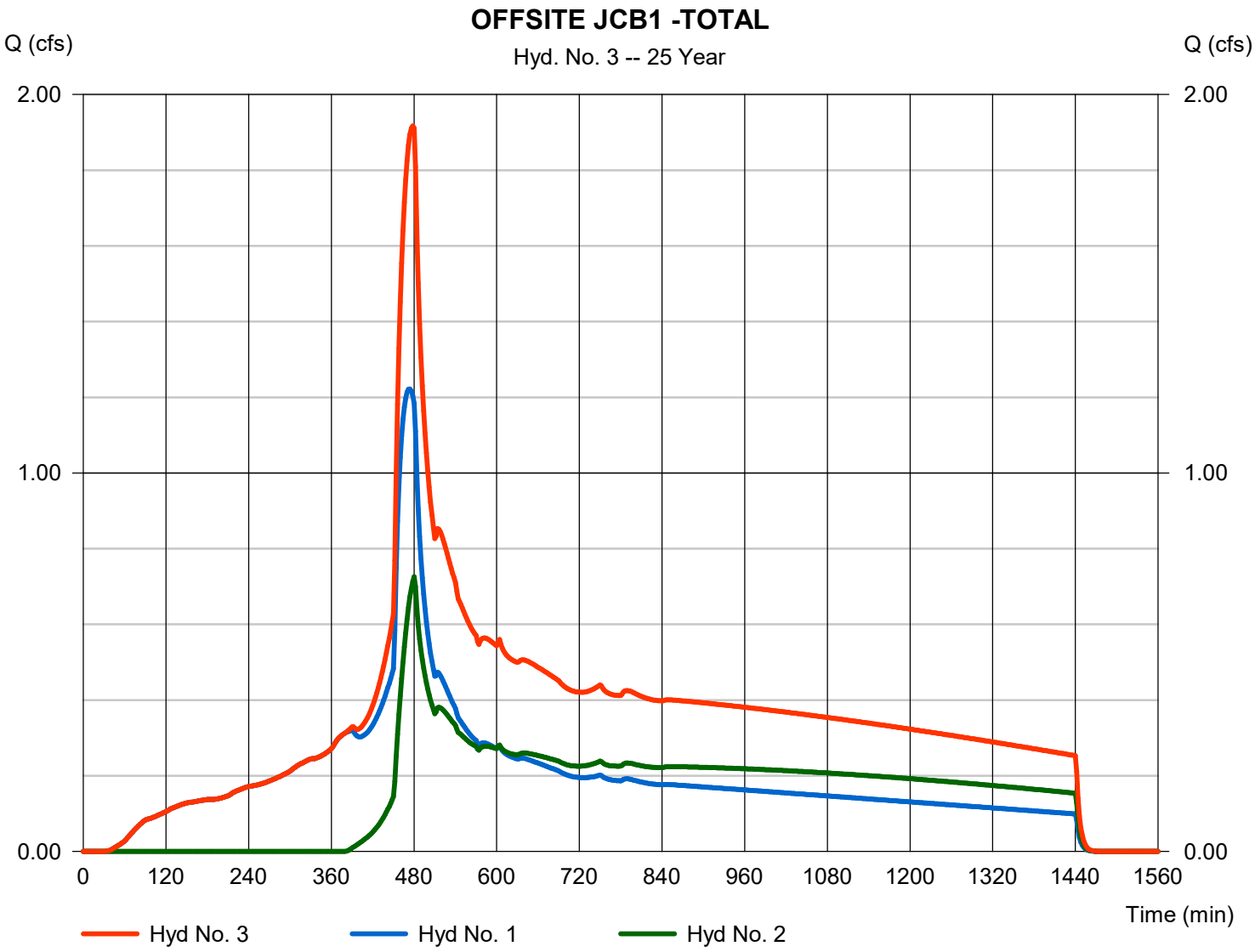
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 3

OFFSITE JCB1 -TOTAL

Hydrograph type	= Combine	Peak discharge	= 1.917 cfs
Storm frequency	= 25 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 32,021 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.400 ac



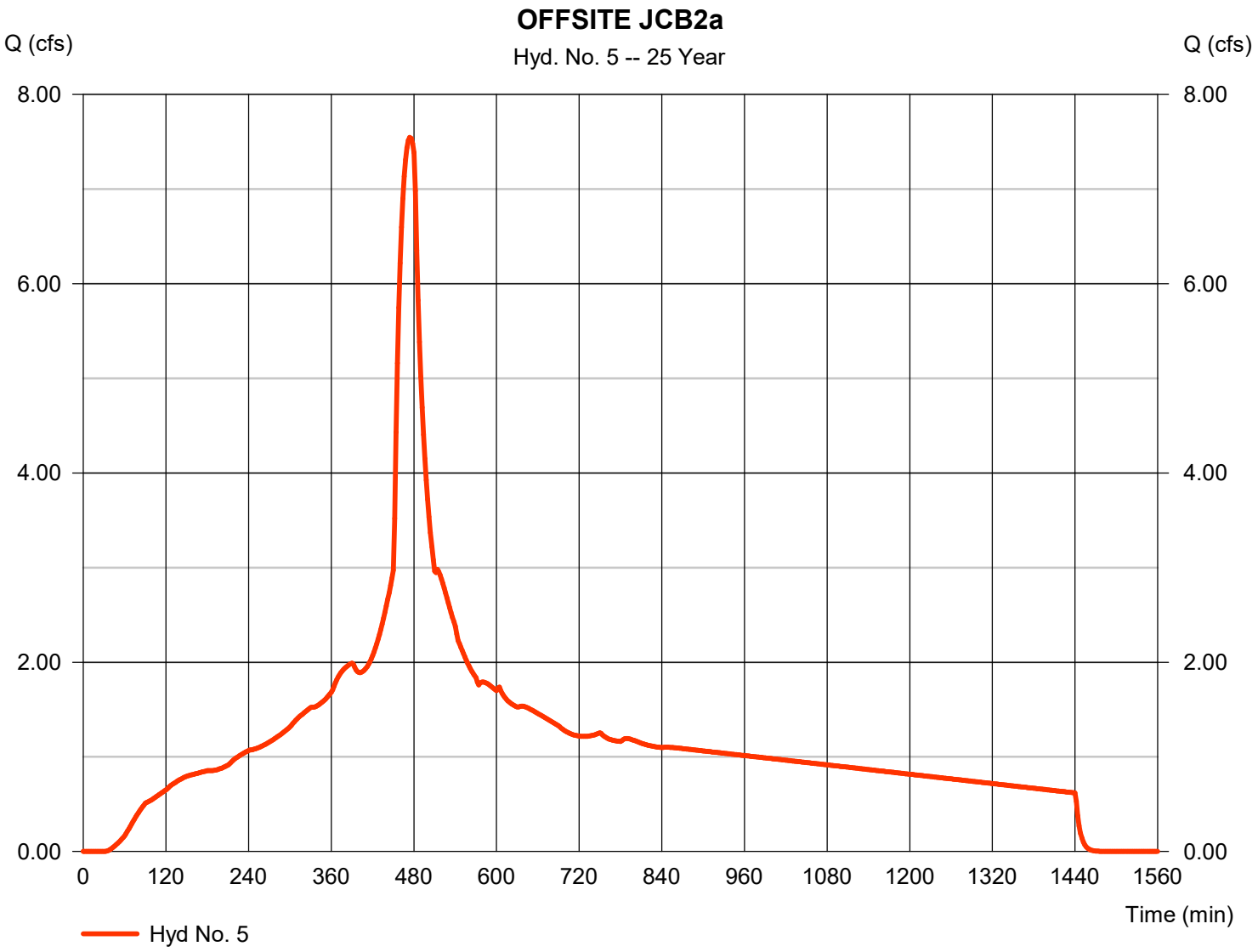
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 5

OFFSITE JCB2a

Hydrograph type	= SBUH Runoff	Peak discharge	= 7.547 cfs
Storm frequency	= 25 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 110,705 cuft
Drainage area	= 8.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 6

OFFSITE JCB2b

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.987 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 31,361 cuft
Drainage area	= 4.400 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

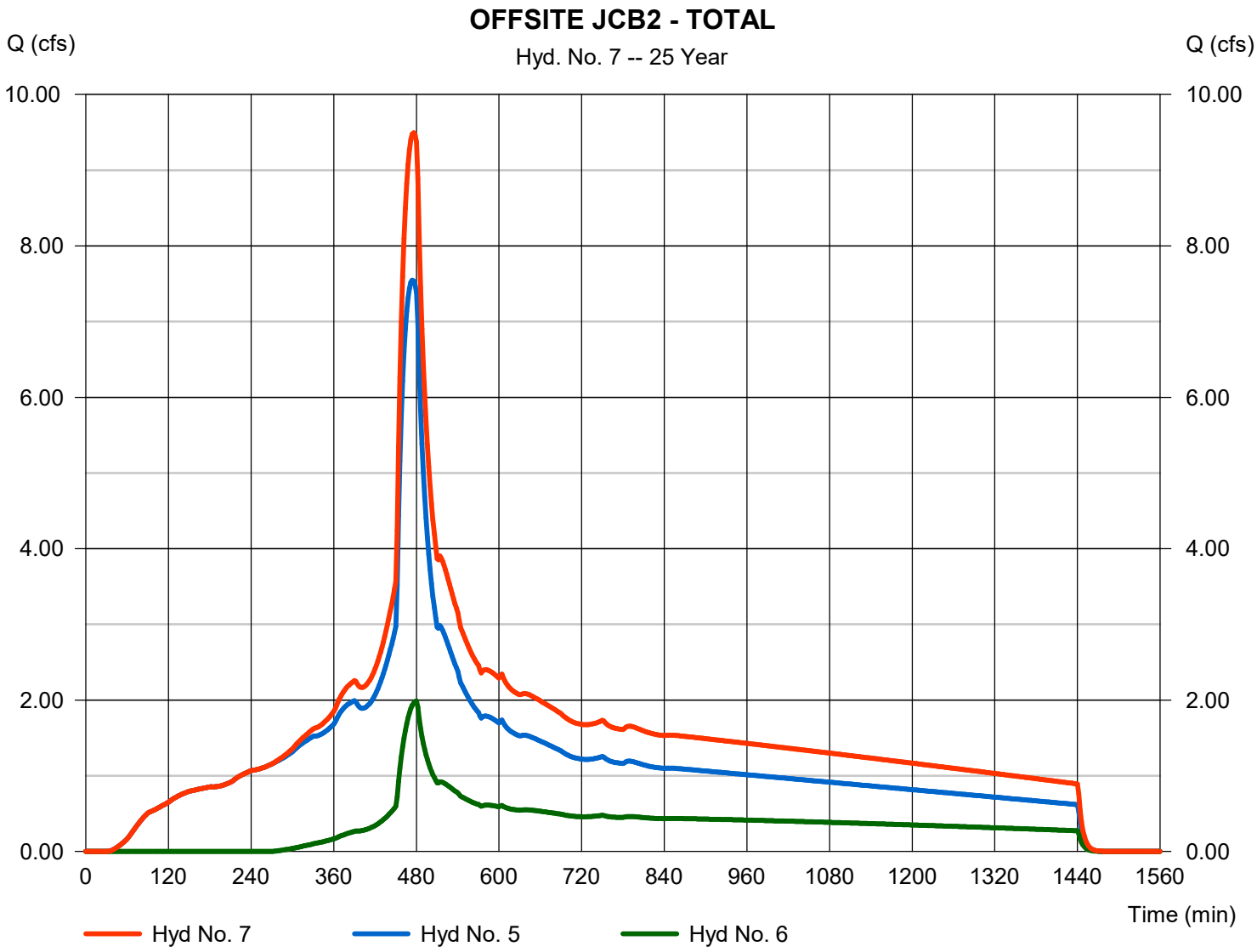
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 7

OFFSITE JCB2 - TOTAL

Hydrograph type	= Combine	Peak discharge	= 9.496 cfs
Storm frequency	= 25 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 142,066 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 12.500 ac



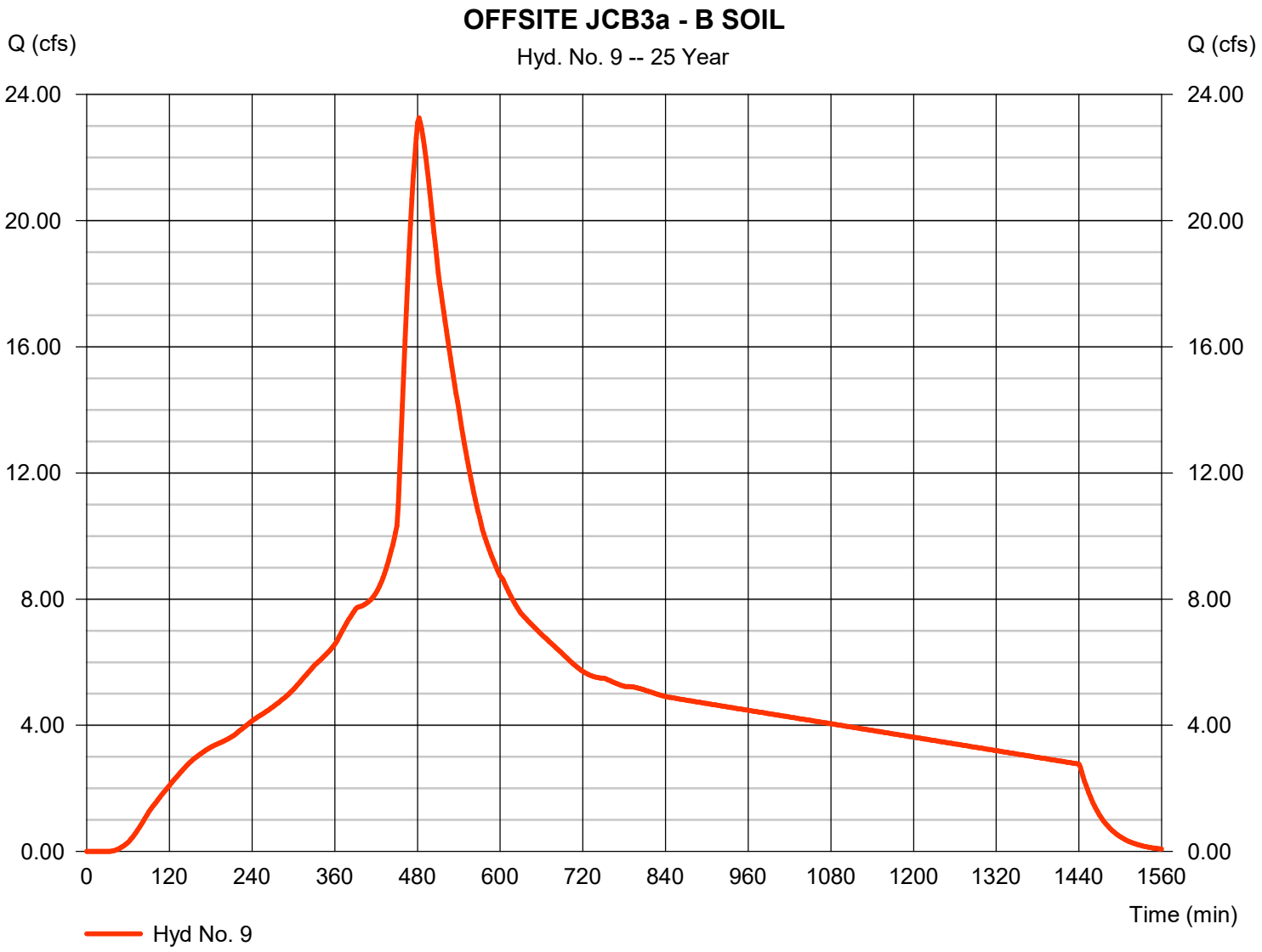
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 9

OFFSITE JCB3a - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 23.26 cfs
Storm frequency	= 25 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 478,356 cuft
Drainage area	= 35.000 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 33.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



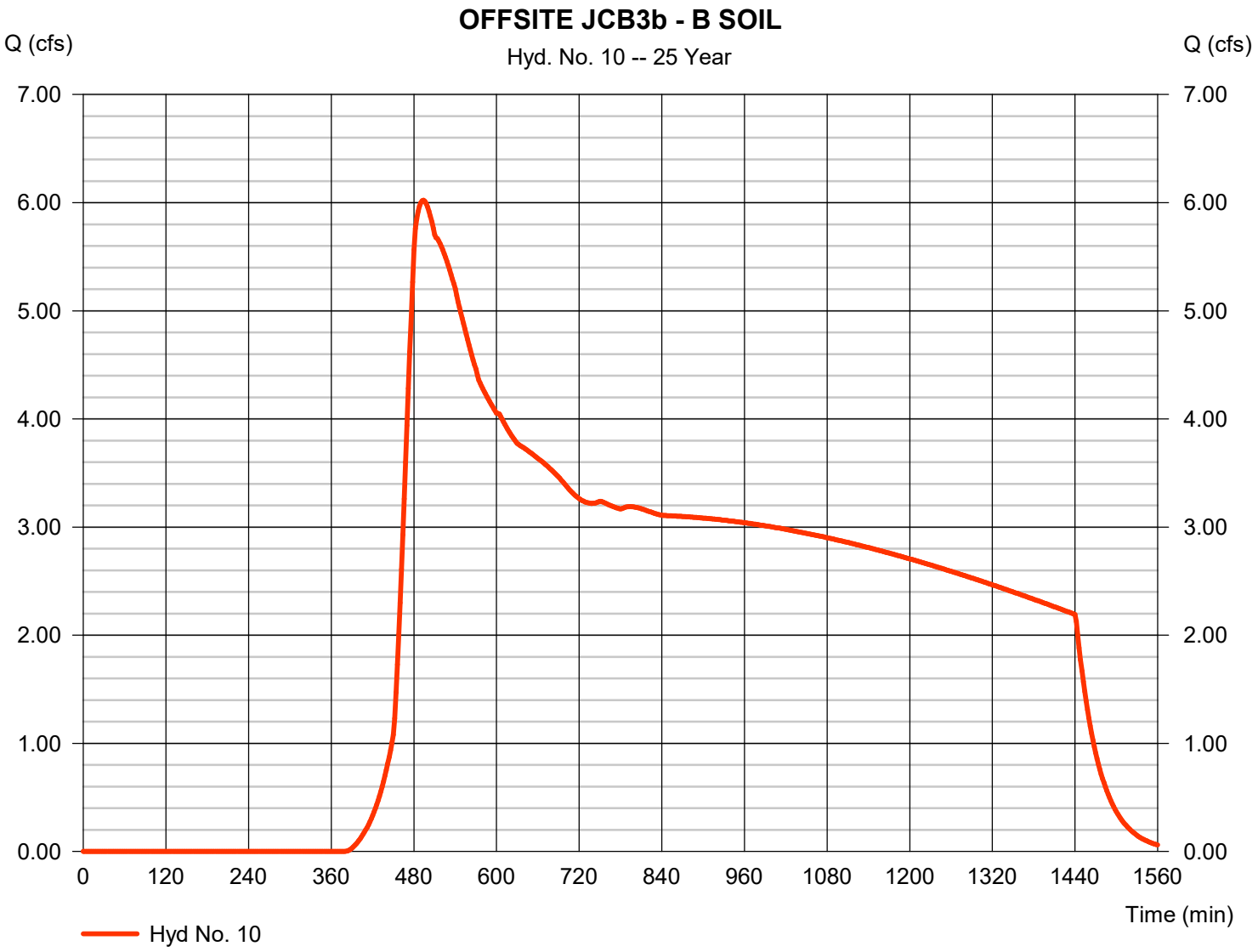
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 10

OFFSITE JCB3b - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 6.022 cfs
Storm frequency	= 25 yrs	Time to peak	= 494 min
Time interval	= 2 min	Hyd. volume	= 196,787 cuft
Drainage area	= 42.800 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 33.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



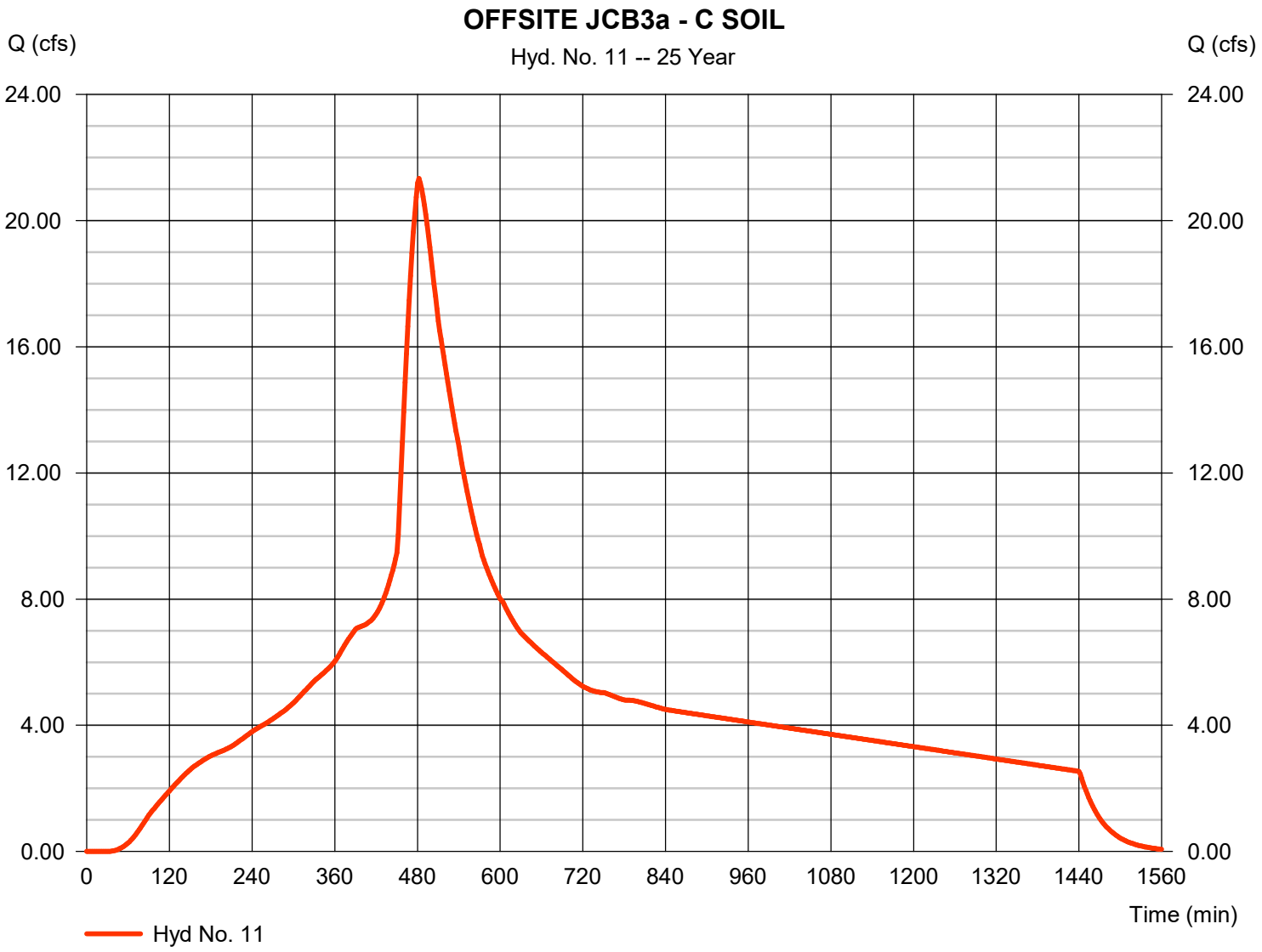
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 11

OFFSITE JCB3a - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 21.34 cfs
Storm frequency	= 25 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 438,721 cuft
Drainage area	= 32.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 33.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



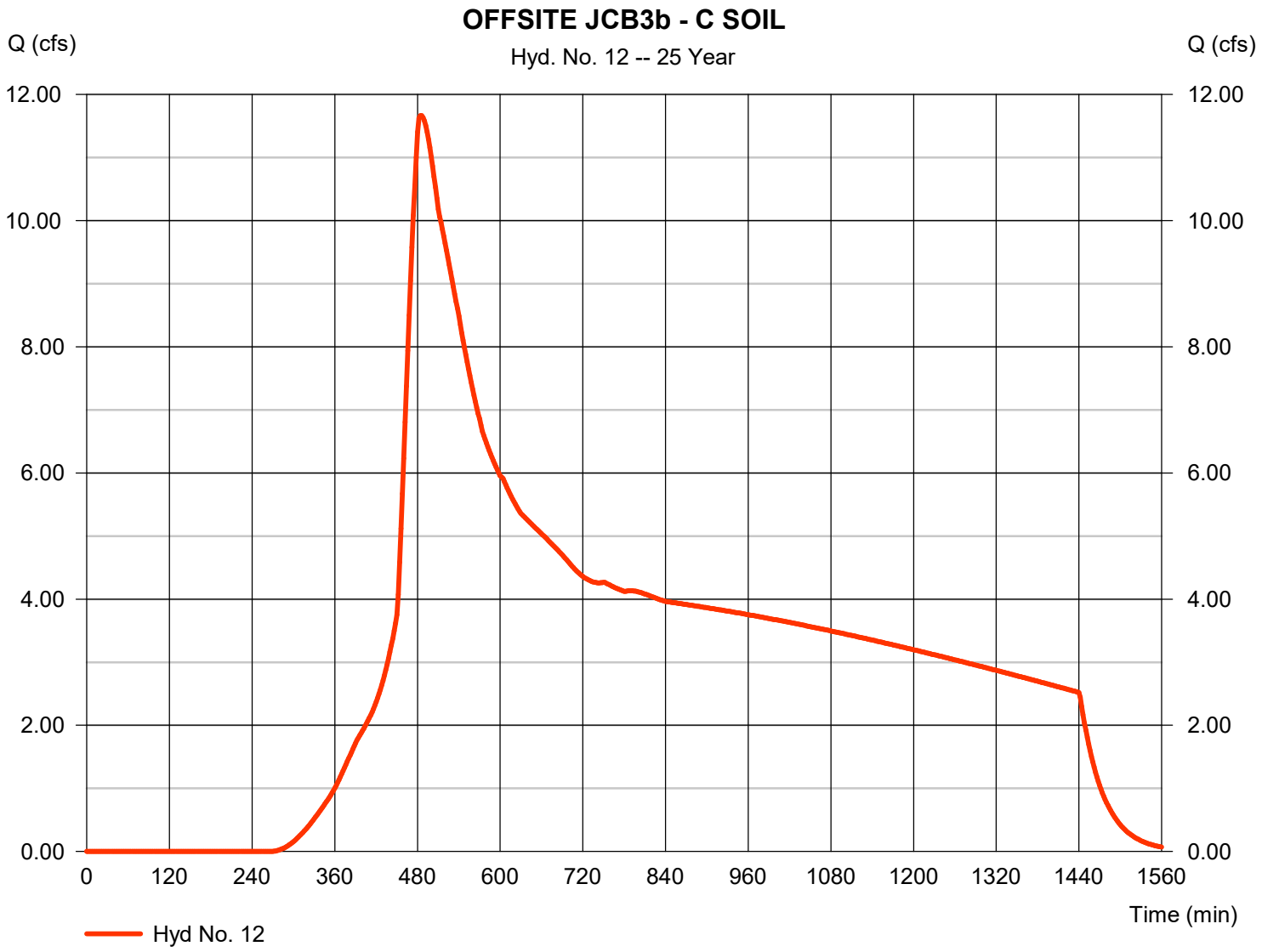
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 12

OFFSITE JCB3b - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 11.66 cfs
Storm frequency	= 25 yrs	Time to peak	= 486 min
Time interval	= 2 min	Hyd. volume	= 280,109 cuft
Drainage area	= 39.300 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 33.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



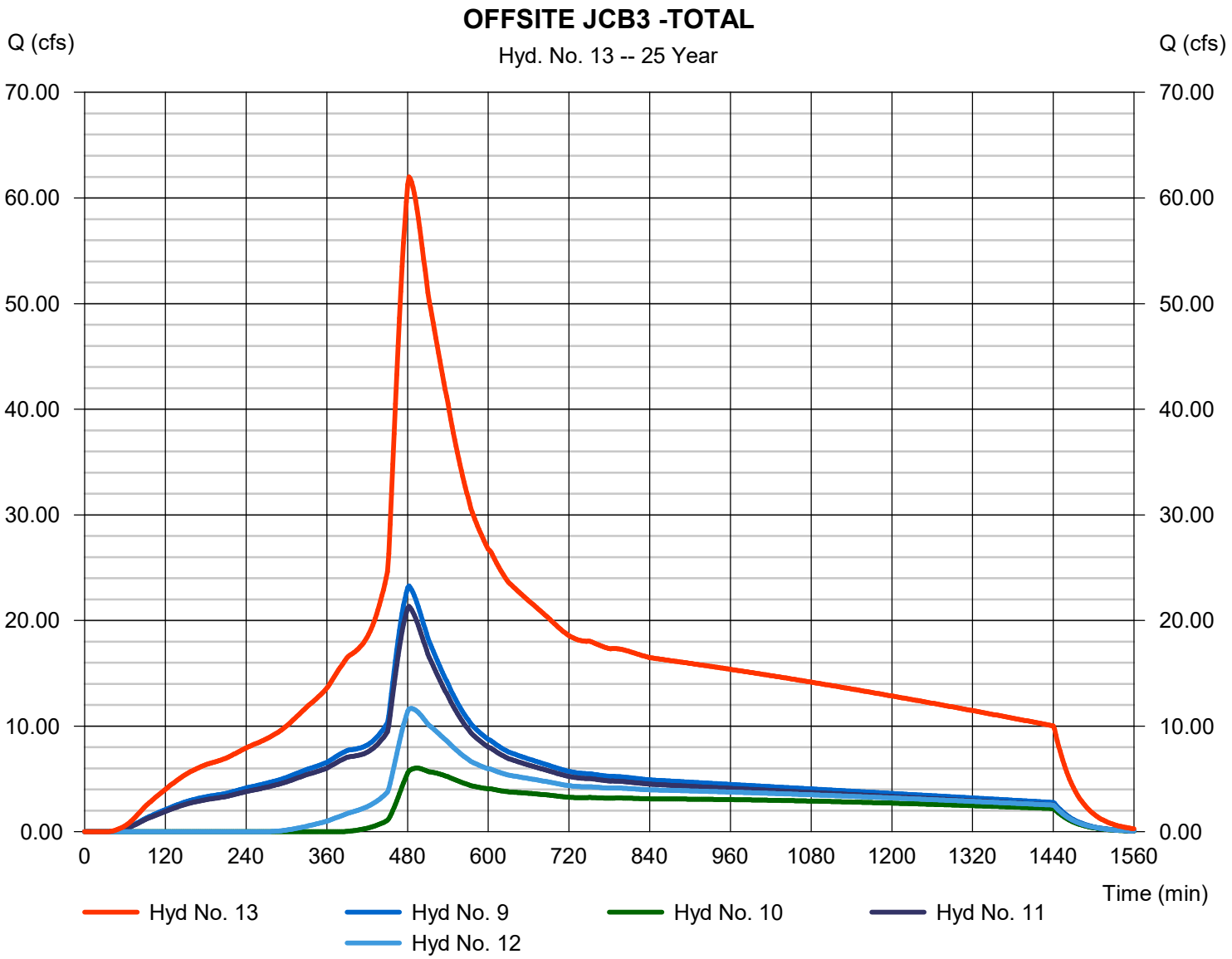
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 13

OFFSITE JCB3 -TOTAL

Hydrograph type	= Combine	Peak discharge	= 61.99 cfs
Storm frequency	= 25 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 1,393,976 cuft
Inflow hyds.	= 9, 10, 11, 12	Contrib. drain. area	= 149.200 ac



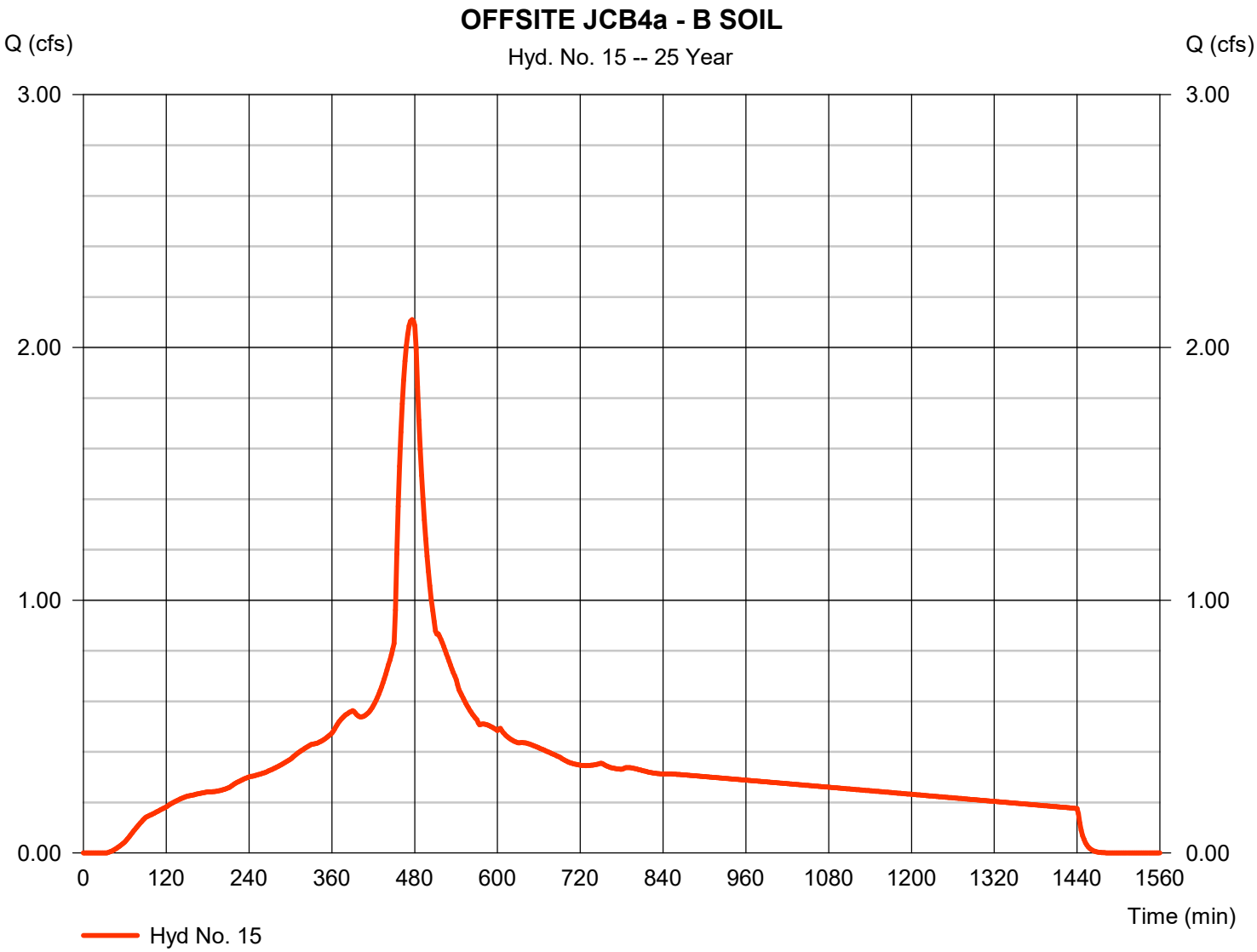
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 15

OFFSITE JCB4a - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.110 cfs
Storm frequency	= 25 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 31,435 cuft
Drainage area	= 2.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



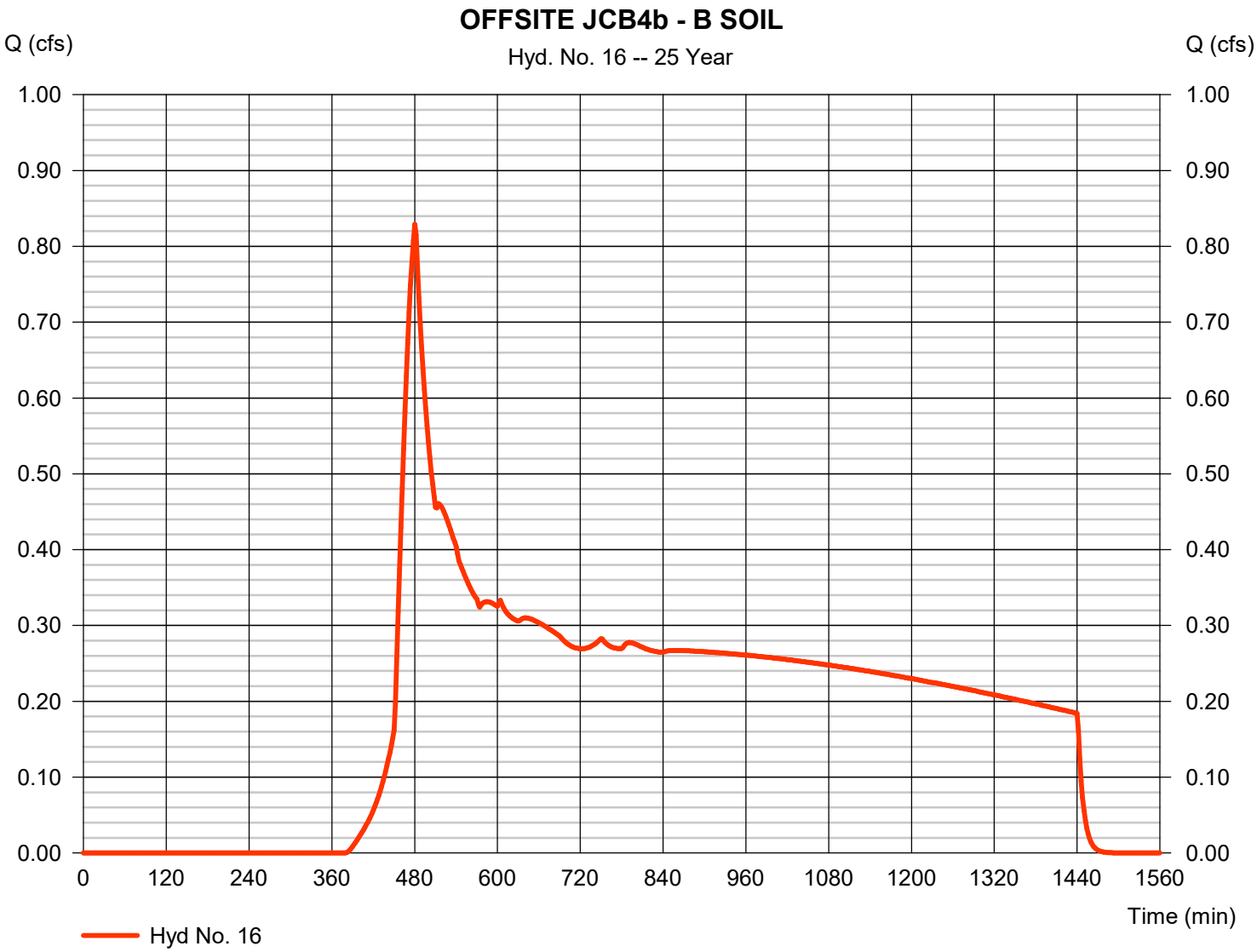
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 16

OFFSITE JCB4b - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.829 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 17,012 cuft
Drainage area	= 3.700 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



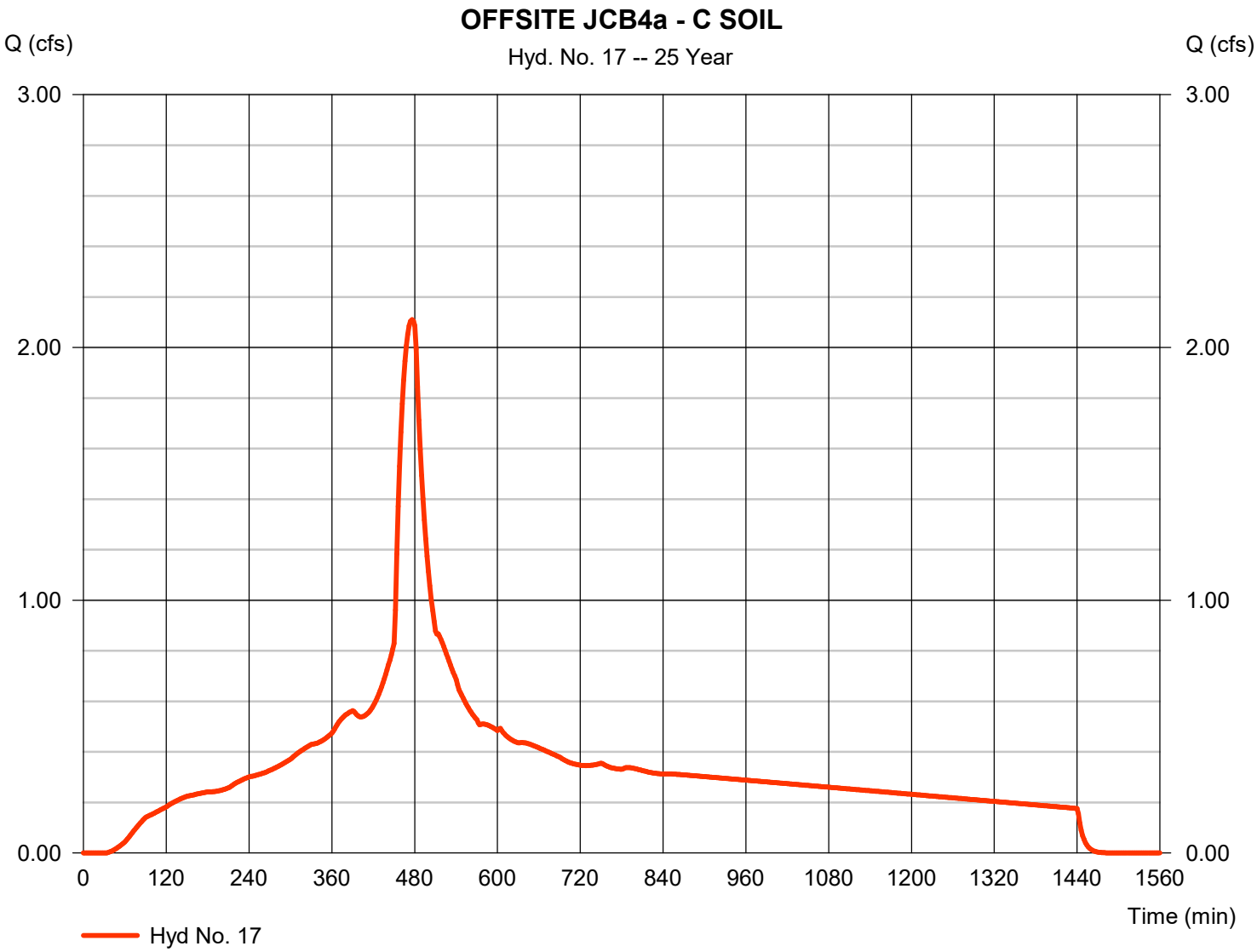
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 17

OFFSITE JCB4a - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.110 cfs
Storm frequency	= 25 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 31,435 cuft
Drainage area	= 2.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



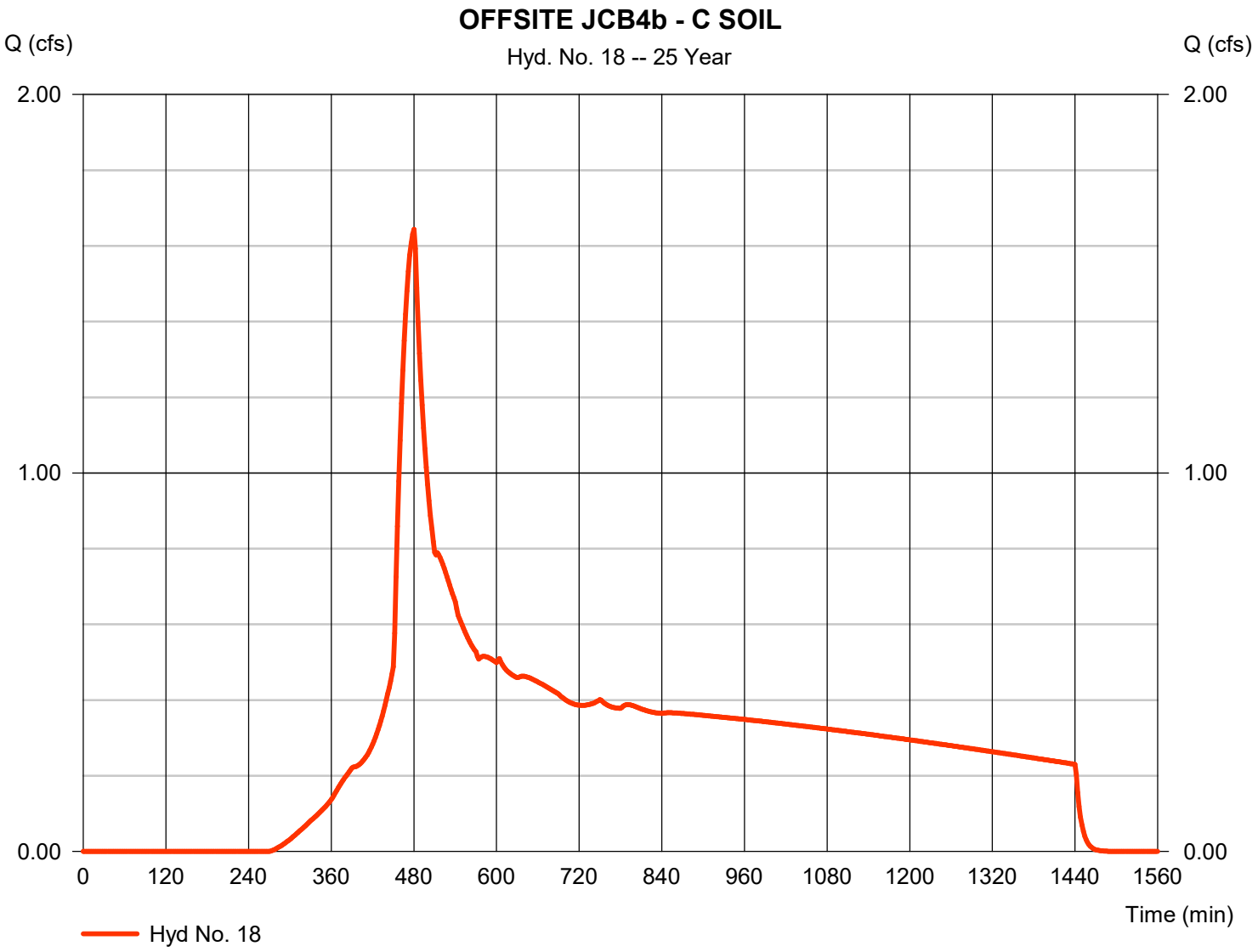
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 18

OFFSITE JCB4b - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.644 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 26,372 cuft
Drainage area	= 3.700 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



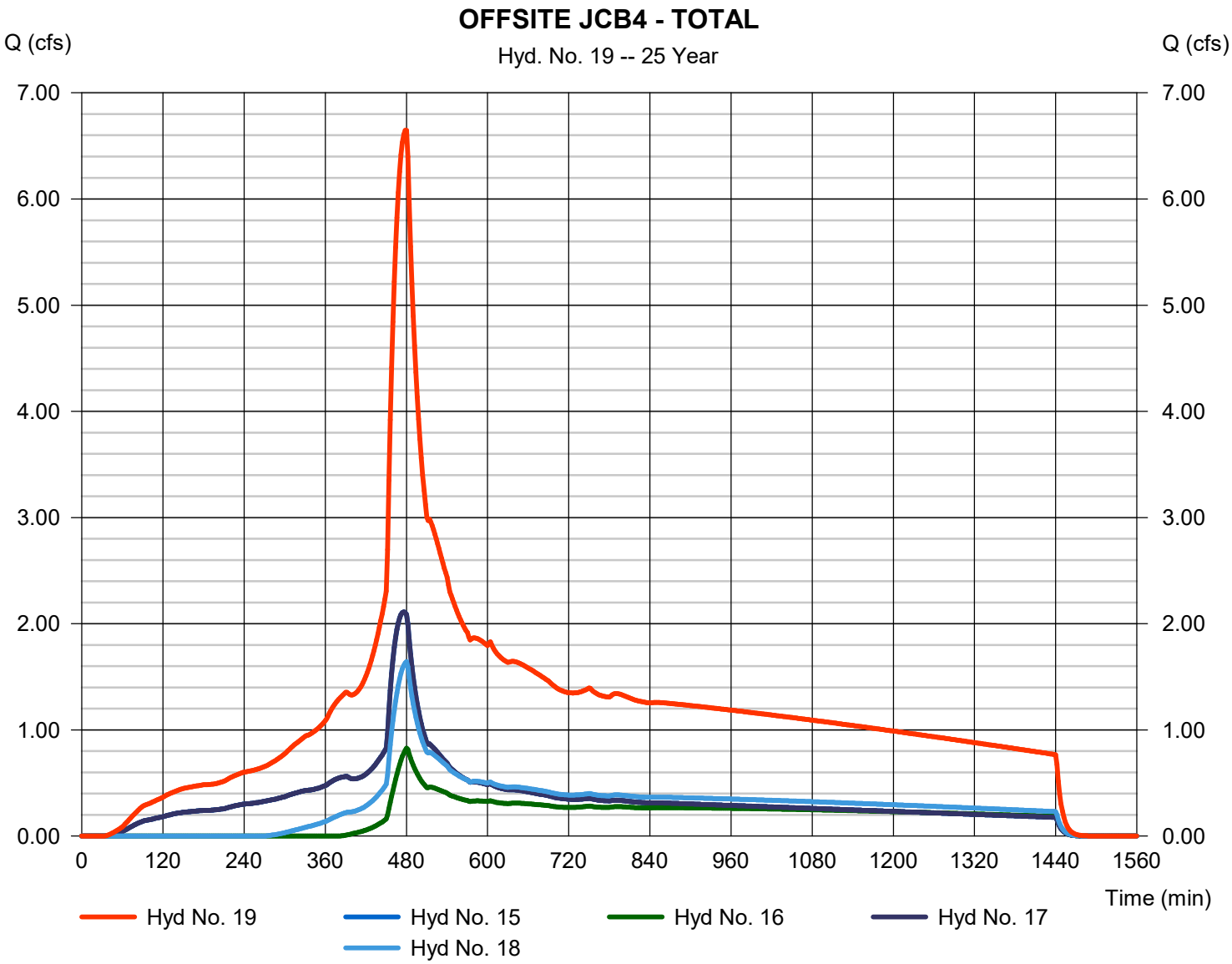
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 19

OFFSITE JCB4 - TOTAL

Hydrograph type	= Combine	Peak discharge	= 6.647 cfs
Storm frequency	= 25 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 106,253 cuft
Inflow hyds.	= 15, 16, 17, 18	Contrib. drain. area	= 12.000 ac



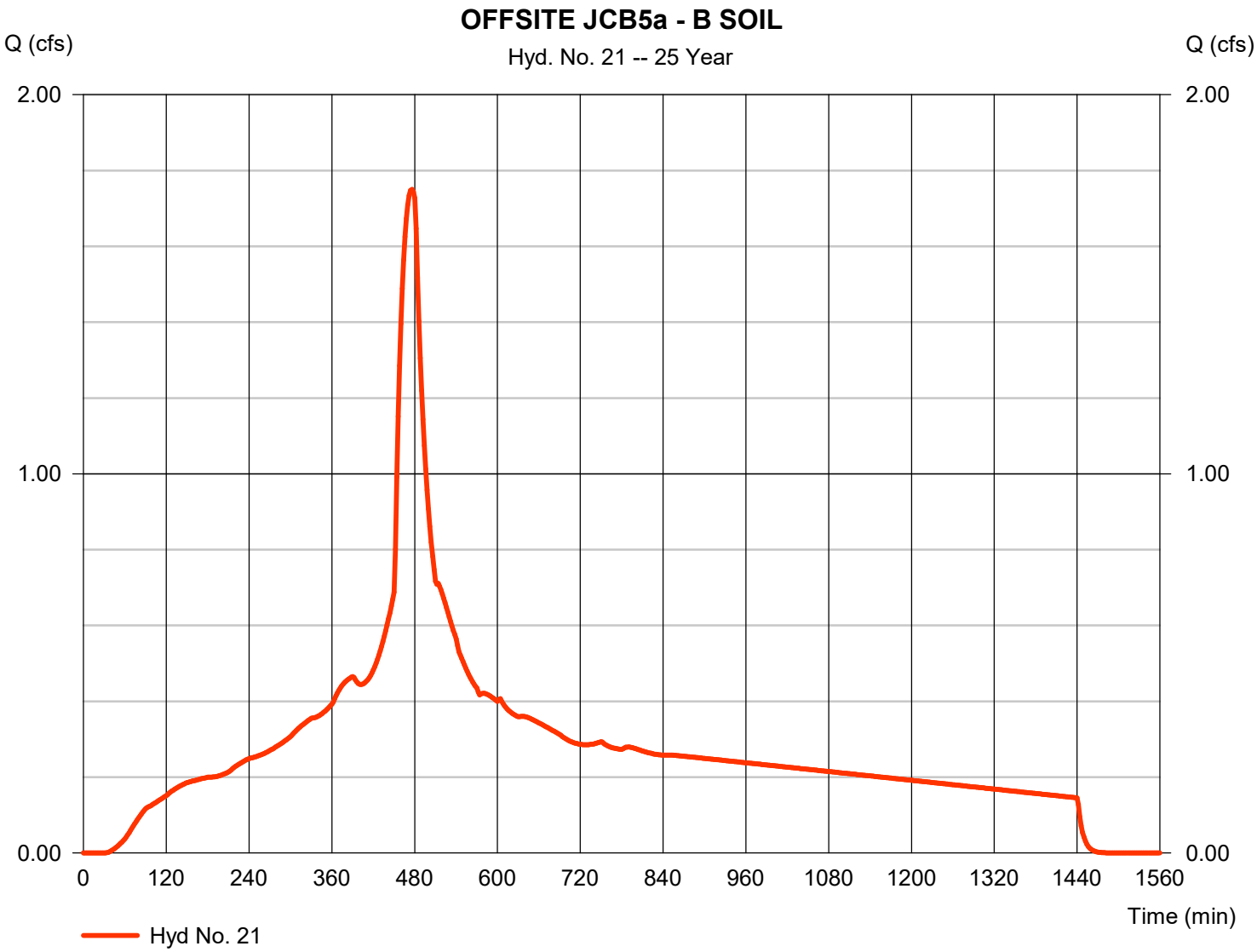
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 21

OFFSITE JCB5a - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.750 cfs
Storm frequency	= 25 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 25,968 cuft
Drainage area	= 1.900 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



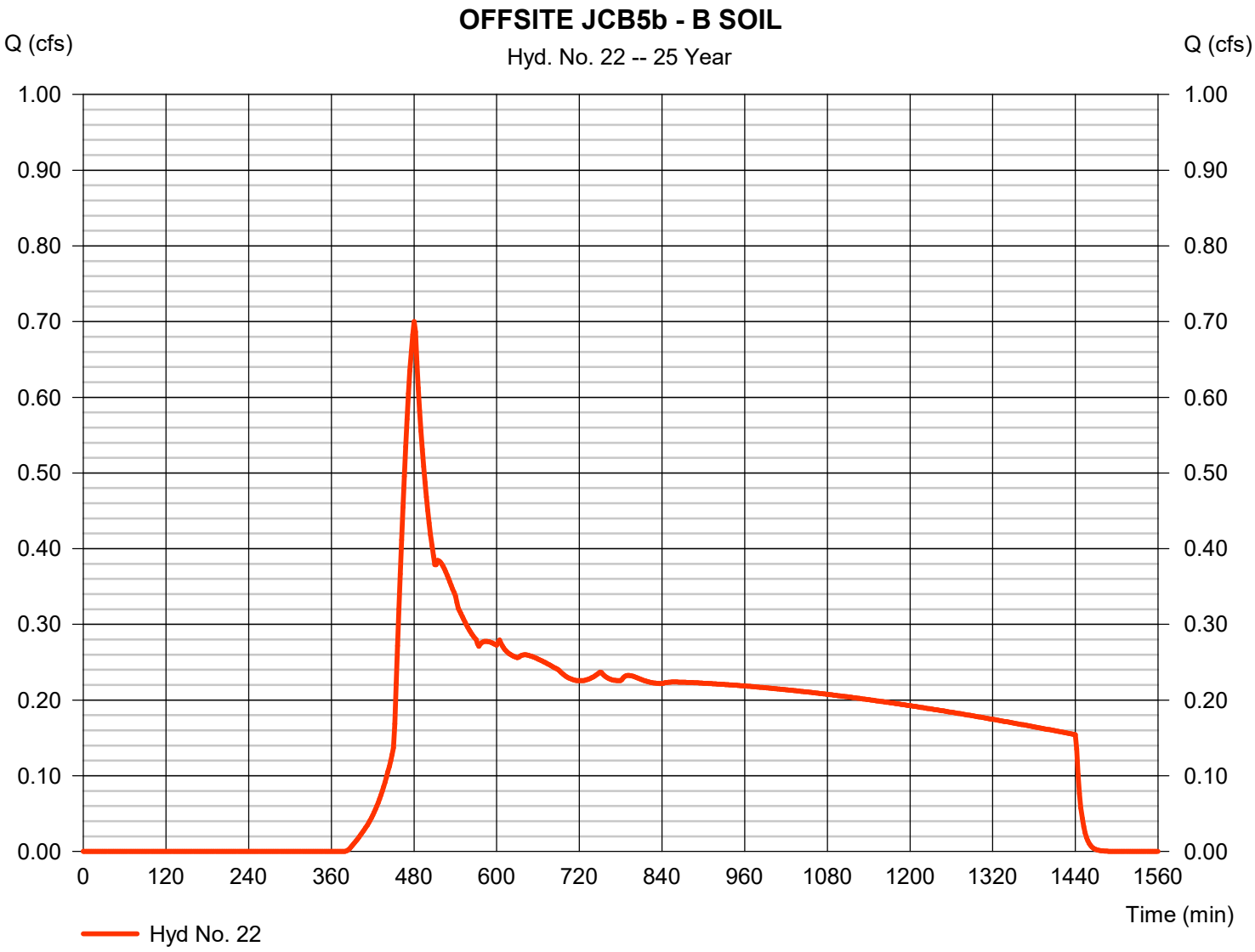
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 22

OFFSITE JCB5b - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.700 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 14,253 cuft
Drainage area	= 3.100 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



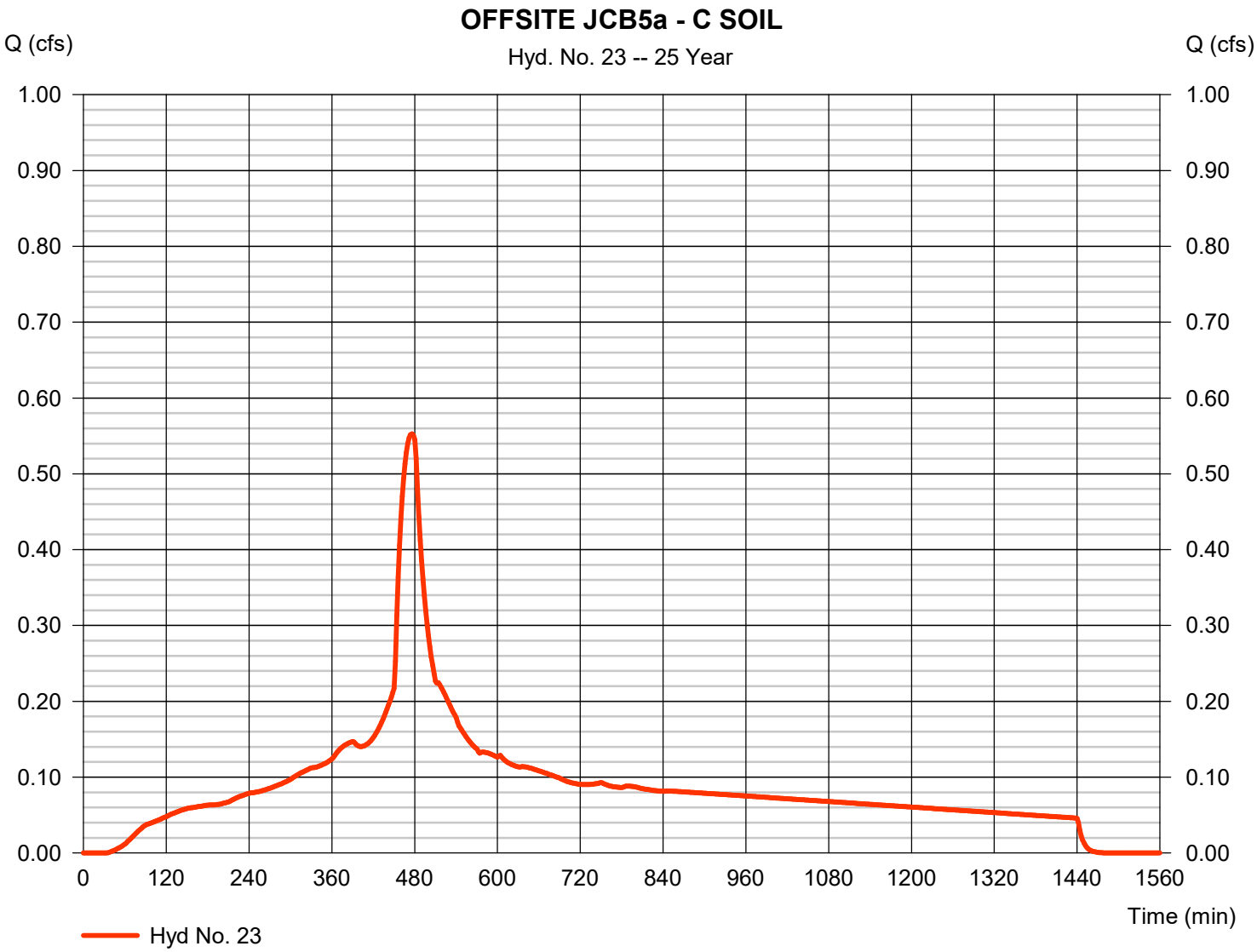
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 23

OFFSITE JCB5a - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.553 cfs
Storm frequency	= 25 yrs	Time to peak	= 476 min
Time interval	= 2 min	Hyd. volume	= 8,200 cuft
Drainage area	= 0.600 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



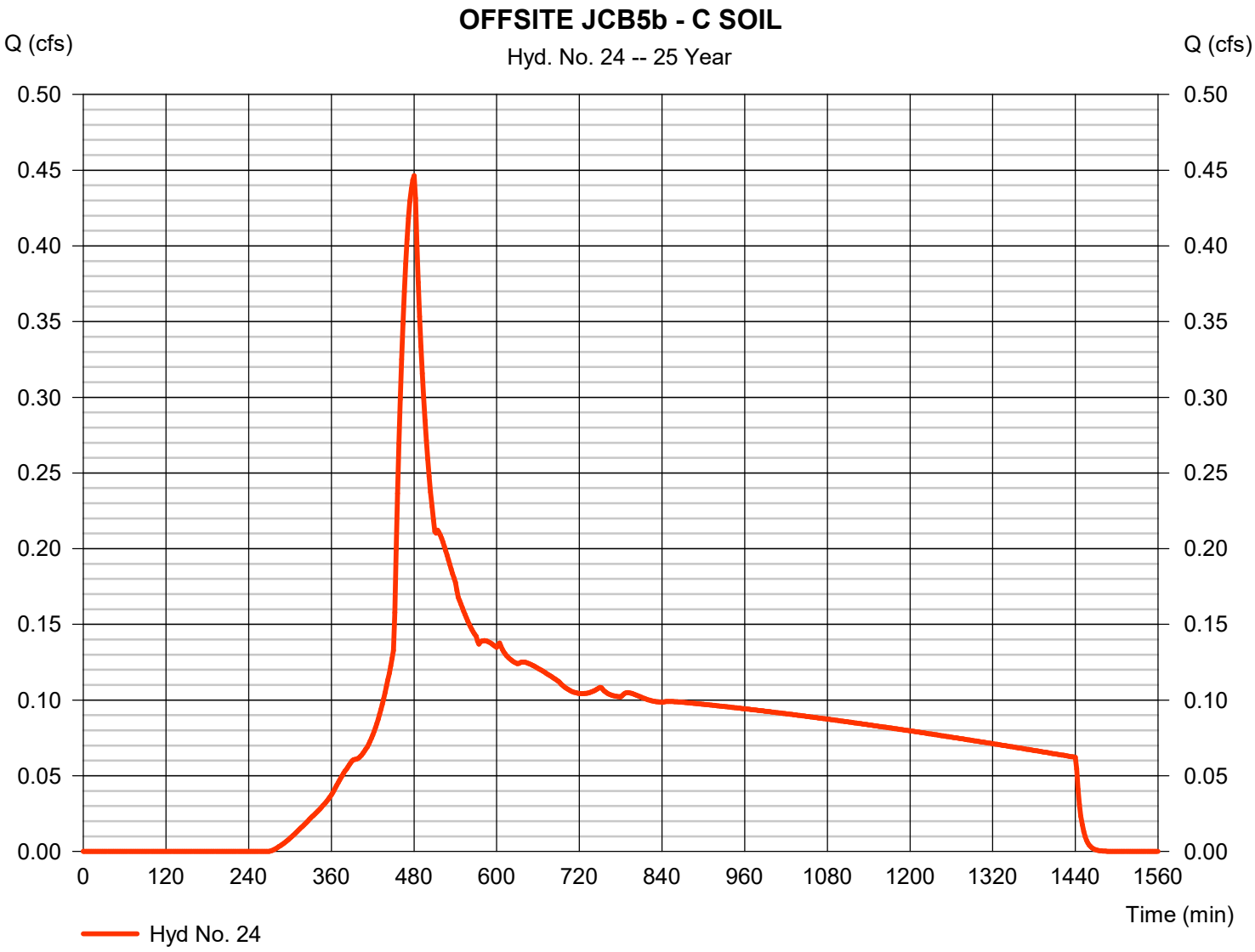
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 24

OFFSITE JCB5b - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.446 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 7,127 cuft
Drainage area	= 1.000 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.10 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



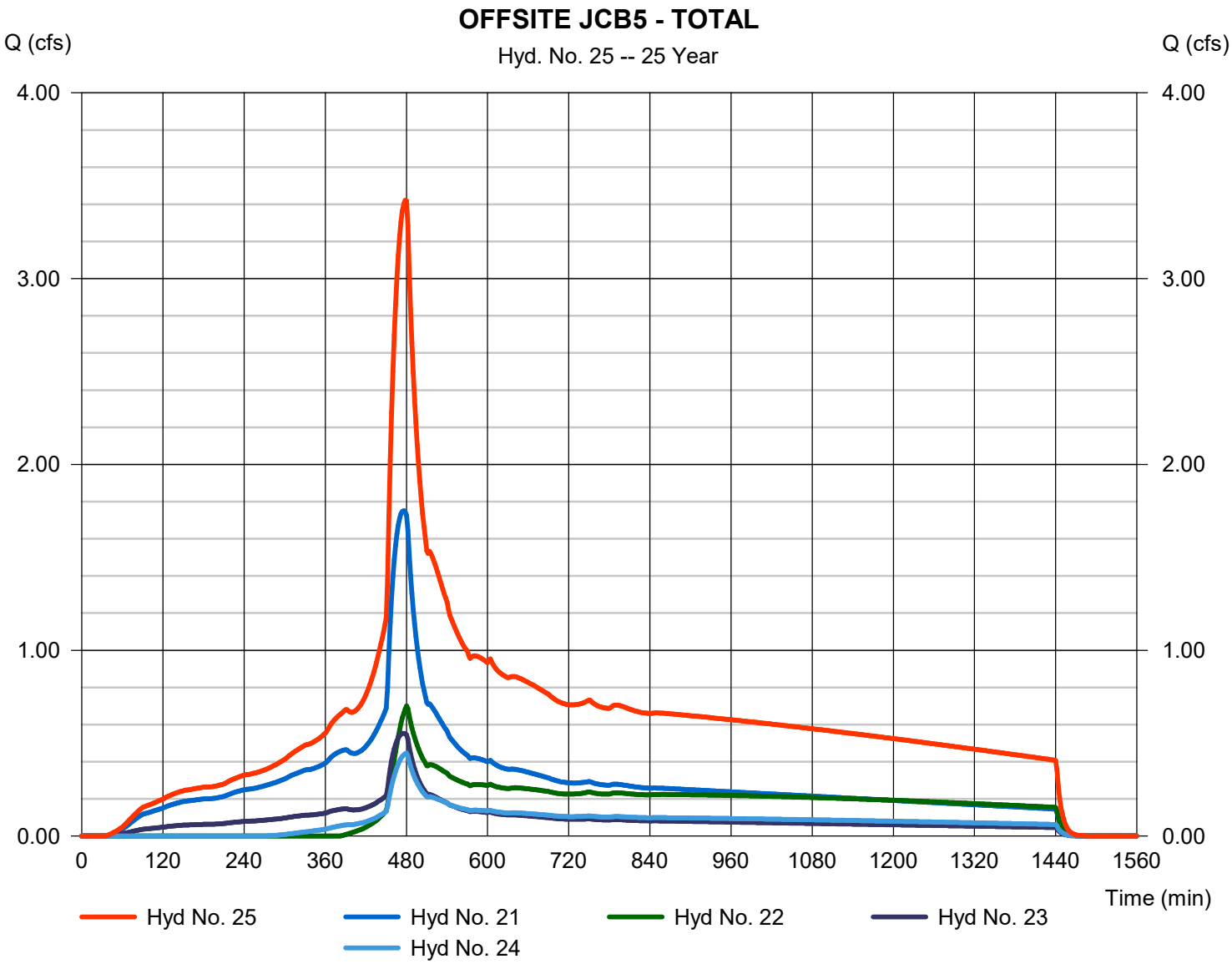
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 25

OFFSITE JCB5 - TOTAL

Hydrograph type	= Combine	Peak discharge	= 3.421 cfs
Storm frequency	= 25 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 55,549 cuft
Inflow hyds.	= 21, 22, 23, 24	Contrib. drain. area	= 6.600 ac



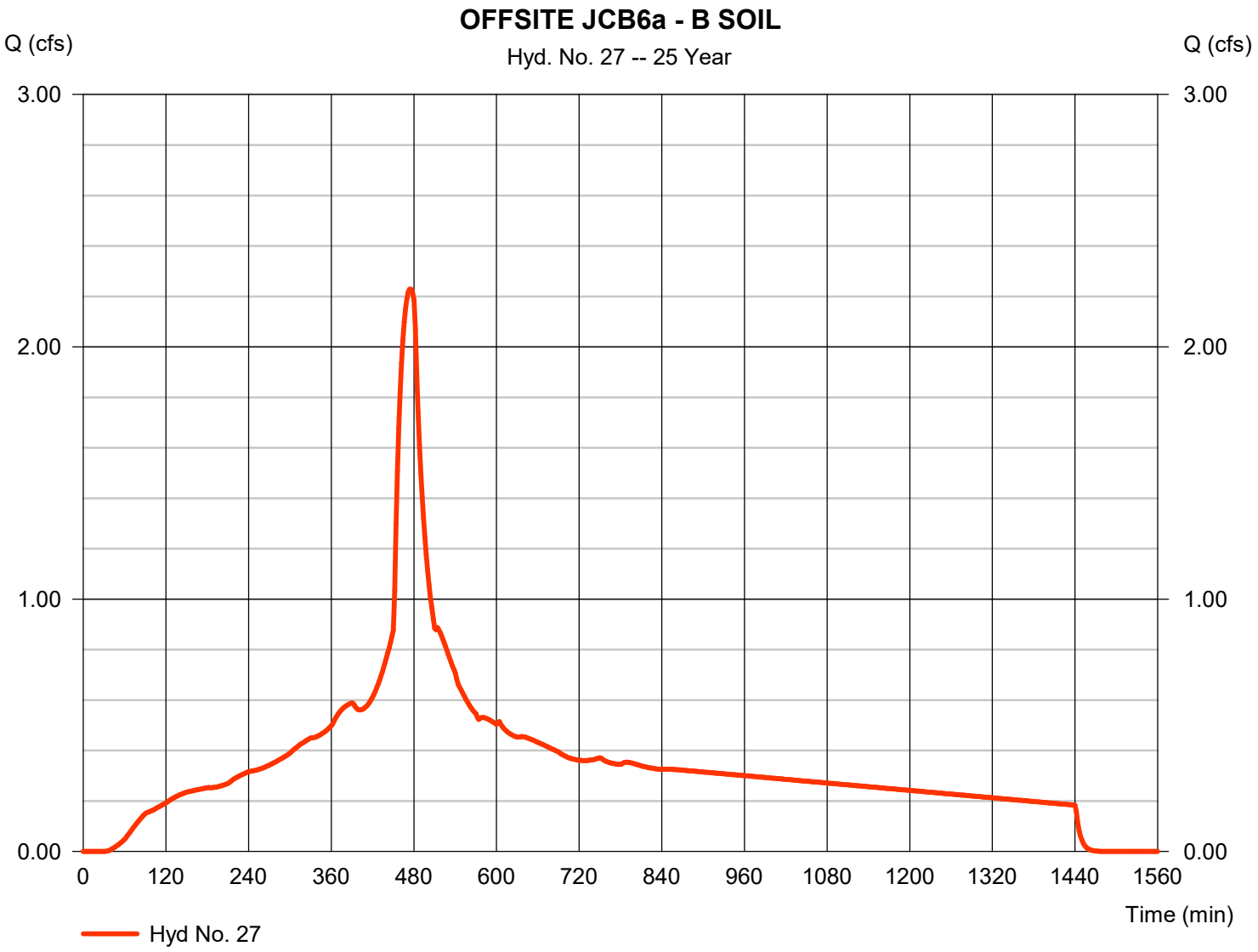
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 27

OFFSITE JCB6a - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.229 cfs
Storm frequency	= 25 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 32,802 cuft
Drainage area	= 2.400 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.30 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



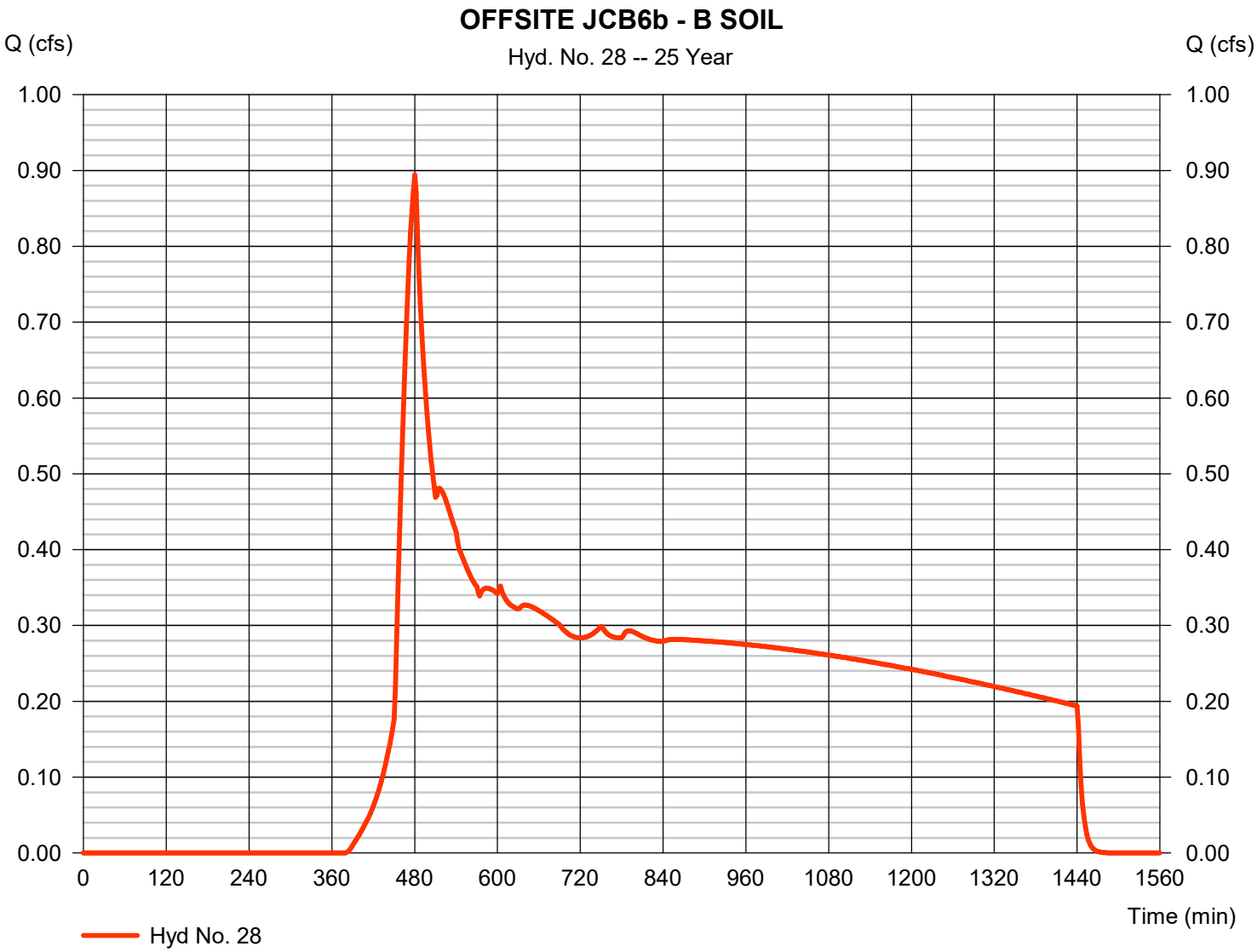
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 28

OFFSITE JCB6b - B SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.894 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 17,932 cuft
Drainage area	= 3.900 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.30 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



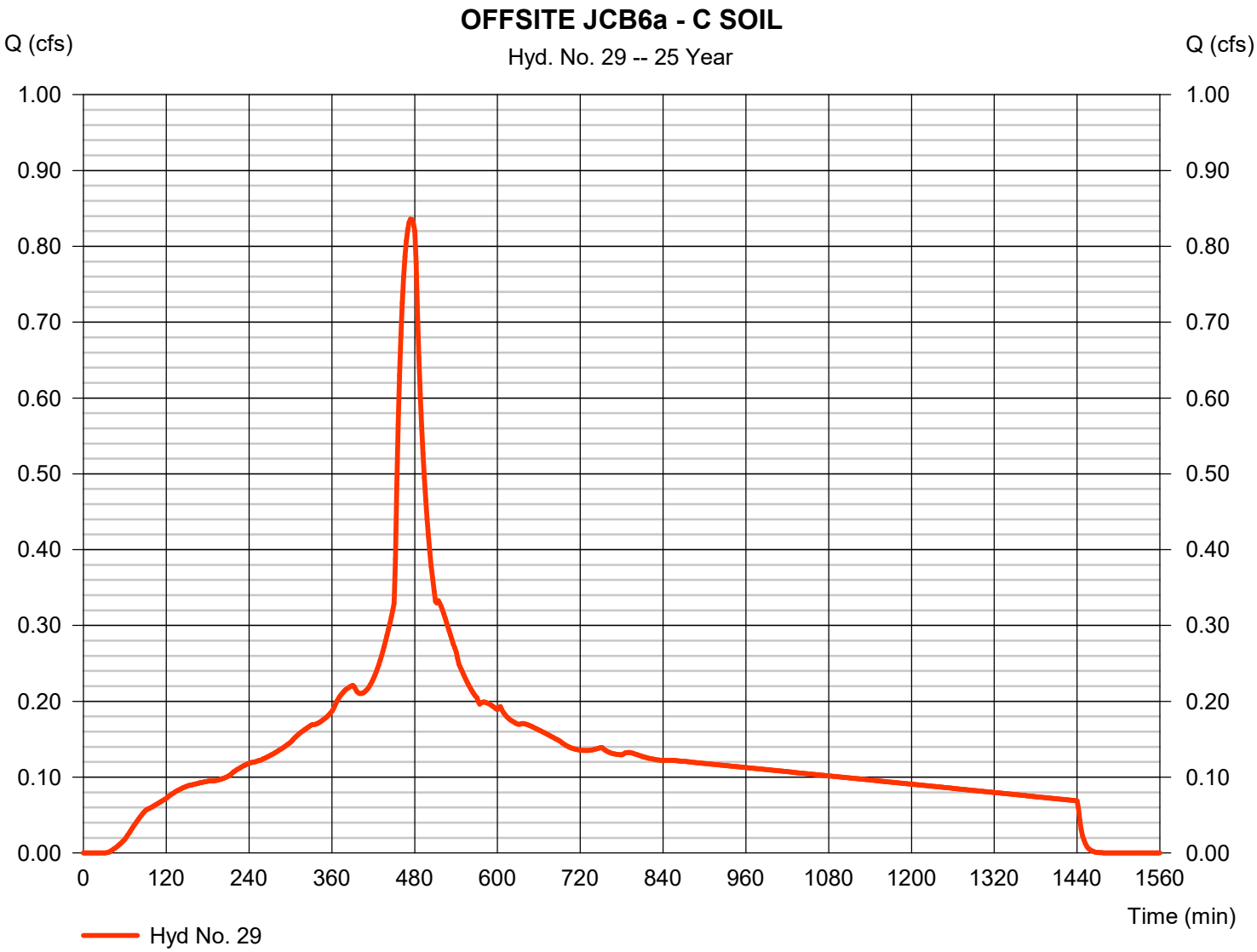
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 29

OFFSITE JCB6a - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.836 cfs
Storm frequency	= 25 yrs	Time to peak	= 474 min
Time interval	= 2 min	Hyd. volume	= 12,301 cuft
Drainage area	= 0.900 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.30 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



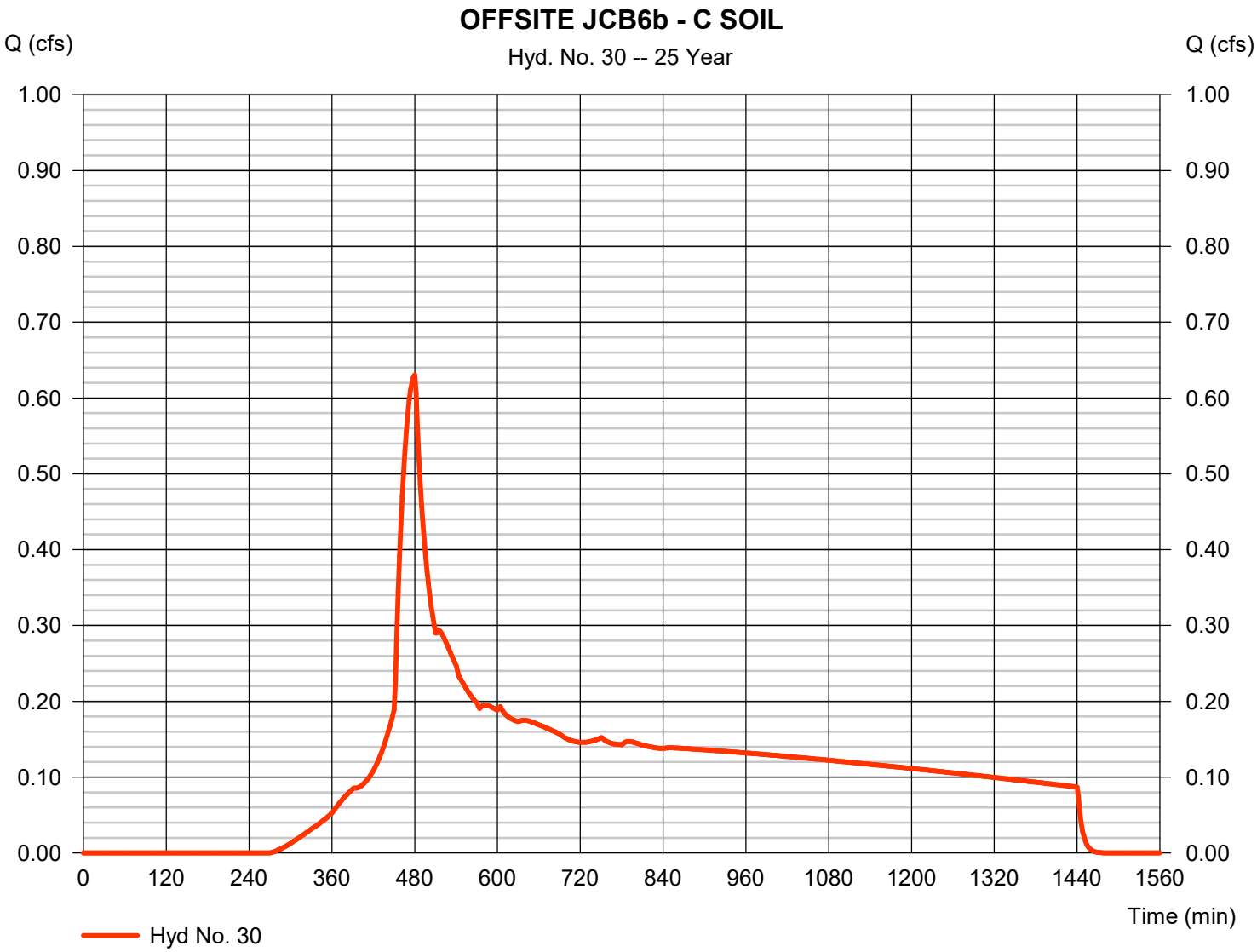
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 30

OFFSITE JCB6b - C SOIL

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.630 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 9,978 cuft
Drainage area	= 1.400 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.30 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



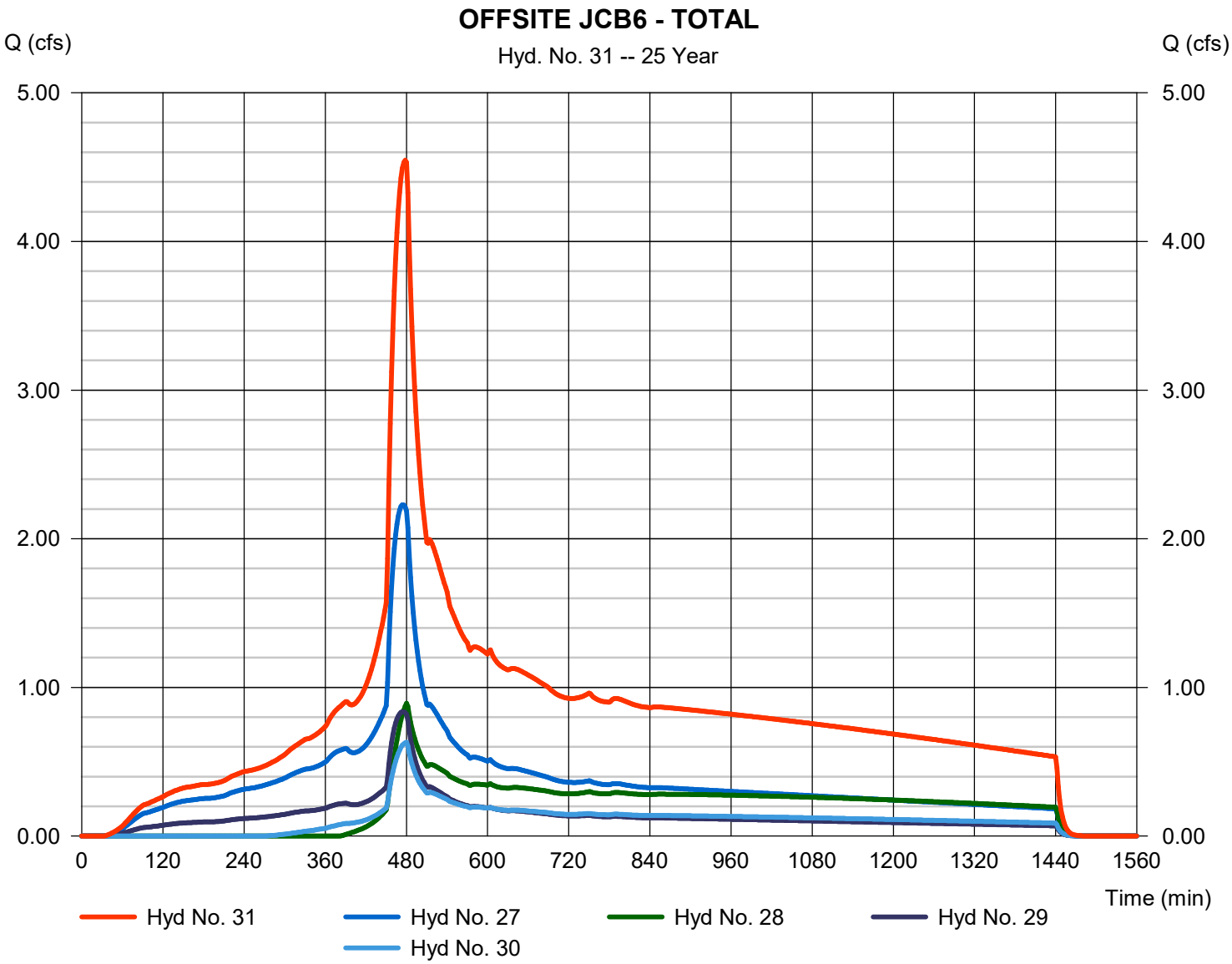
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Thursday, 07 / 7 / 2022

Hyd. No. 31

OFFSITE JCB6 - TOTAL

Hydrograph type	= Combine	Peak discharge	= 4.545 cfs
Storm frequency	= 25 yrs	Time to peak	= 478 min
Time interval	= 2 min	Hyd. volume	= 73,012 cuft
Inflow hyds.	= 27, 28, 29, 30	Contrib. drain. area	= 8.600 ac



FLOOD INSURANCE STUDY

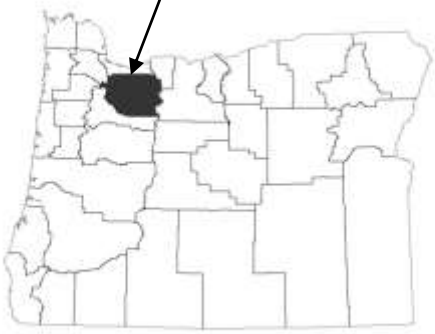
CLACKAMAS COUNTY, OREGON

AND INCORPORATED AREAS

Volume 1 of 3

Community Name	Community Number
BARLOW, CITY OF	410013
CANBY, CITY OF	410014
DAMASCUS, CITY OF	410006
*ESTACADA, CITY OF	410016
GLADSTONE, CITY OF	410017
HAPPY VALLEY, CITY OF	410026
*JOHNSON CITY, CITY OF	410267
LAKE OSWEGO, CITY OF	410018
MILWAUKIE, CITY OF	410019
*MOLALLA, CITY OF	410020
OREGON CITY, CITY OF	410021
RIVERGROVE, CITY OF	410022
SANDY, CITY OF	410023
WEST LINN, CITY OF	410024
WILSONVILLE, CITY OF	410025
CLACKAMAS COUNTY (UNINCORPORATED AREAS)	415588

Clackamas County



*No Special Flood Hazard Areas Identified

REVISED: JANUARY 18, 2019

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
41005CV001B

Table 5 - Summary of Discharges

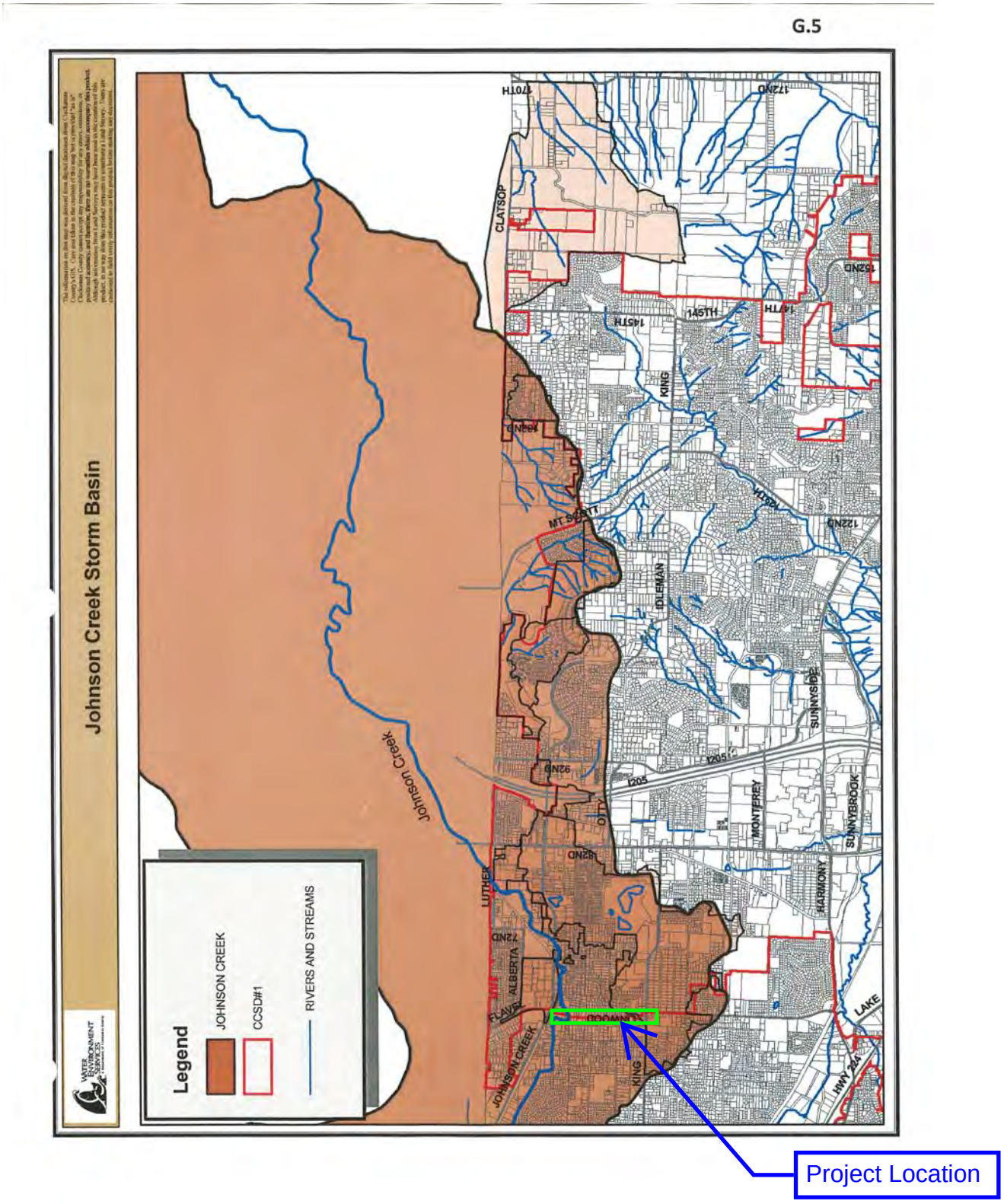
Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-Percent-Annual-Chance 10-yr	2-Percent-Annual-Chance 50-yr	1-Percent-Annual-Chance 100-yr	0.2-Percent-Annual-Chance 200-yr
Abernethy Creek					
At mouth	30.0	2,460	3,930	4,560	6,600
Cedar Creek					
At confluence with Sandy River	14.54	1,678	2, 360	2, 608	3, 230
Clackamas River					
At mouth	937.0	65,000	95,000	110,000	145,000
Upstream of confluence with Eagle Creek	683.0	46,900	68,900	78,700	102,800
Clear Creek					
At mouth	9.3	1,140	1,572	1,705	2,022
Deer Creek					
At mouth	1.5	130	220	285	405
Eagle Creek					
At mouth	83.0	6,800	10,000	11,500	15,100
Johnson Creek					
At mouth	54.0	1,900	2,600	2,900	3,390
At the upstream study limits	49.0	1,870	2,590	2,770	3,080
Kellogg Creek					
At mouth	16.6	1,290	1,780	1,990	2,500
Upstream of confluence with Mt. Scott Creek	2.8	[1]	[1]	555	[1]

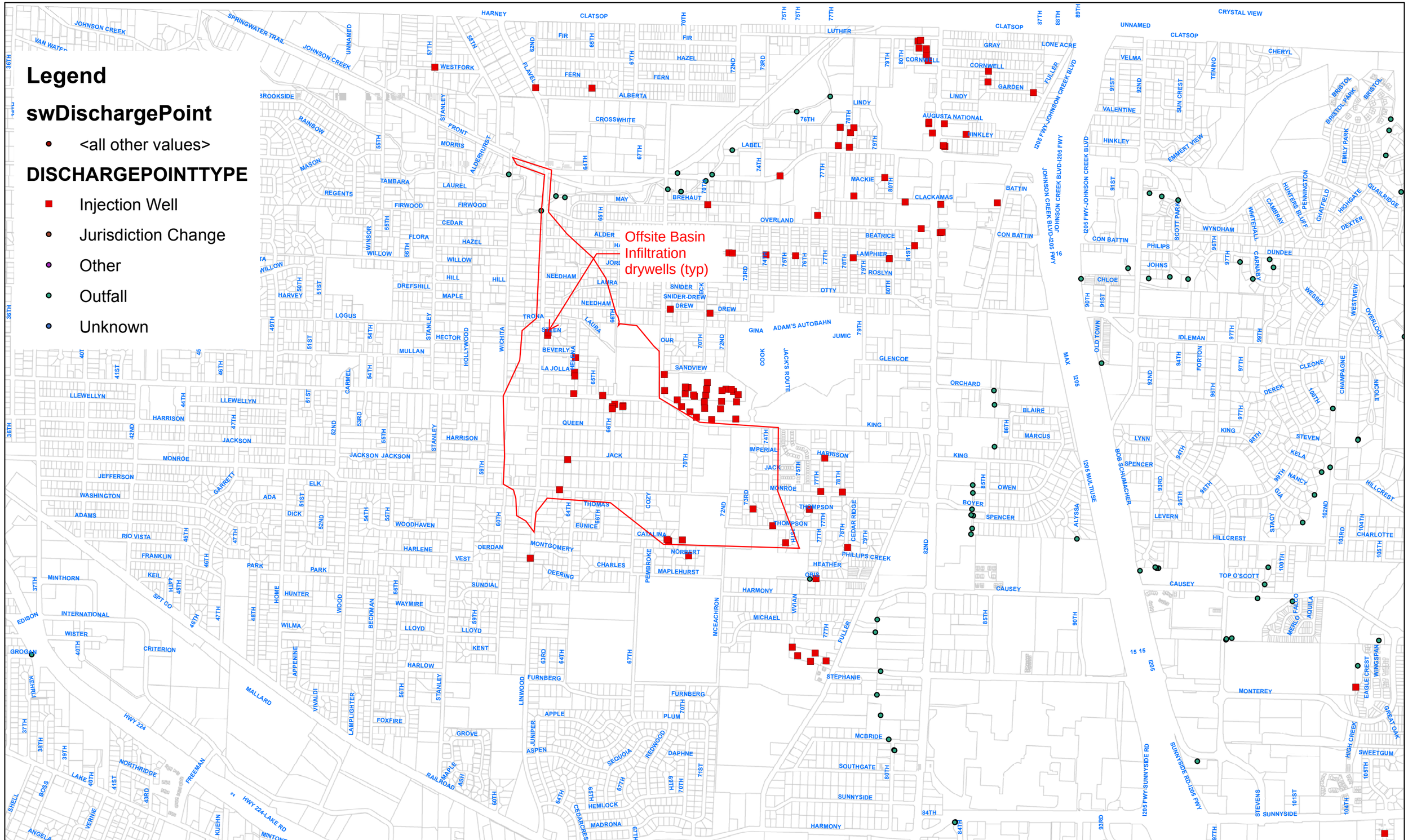
[1] Data not available

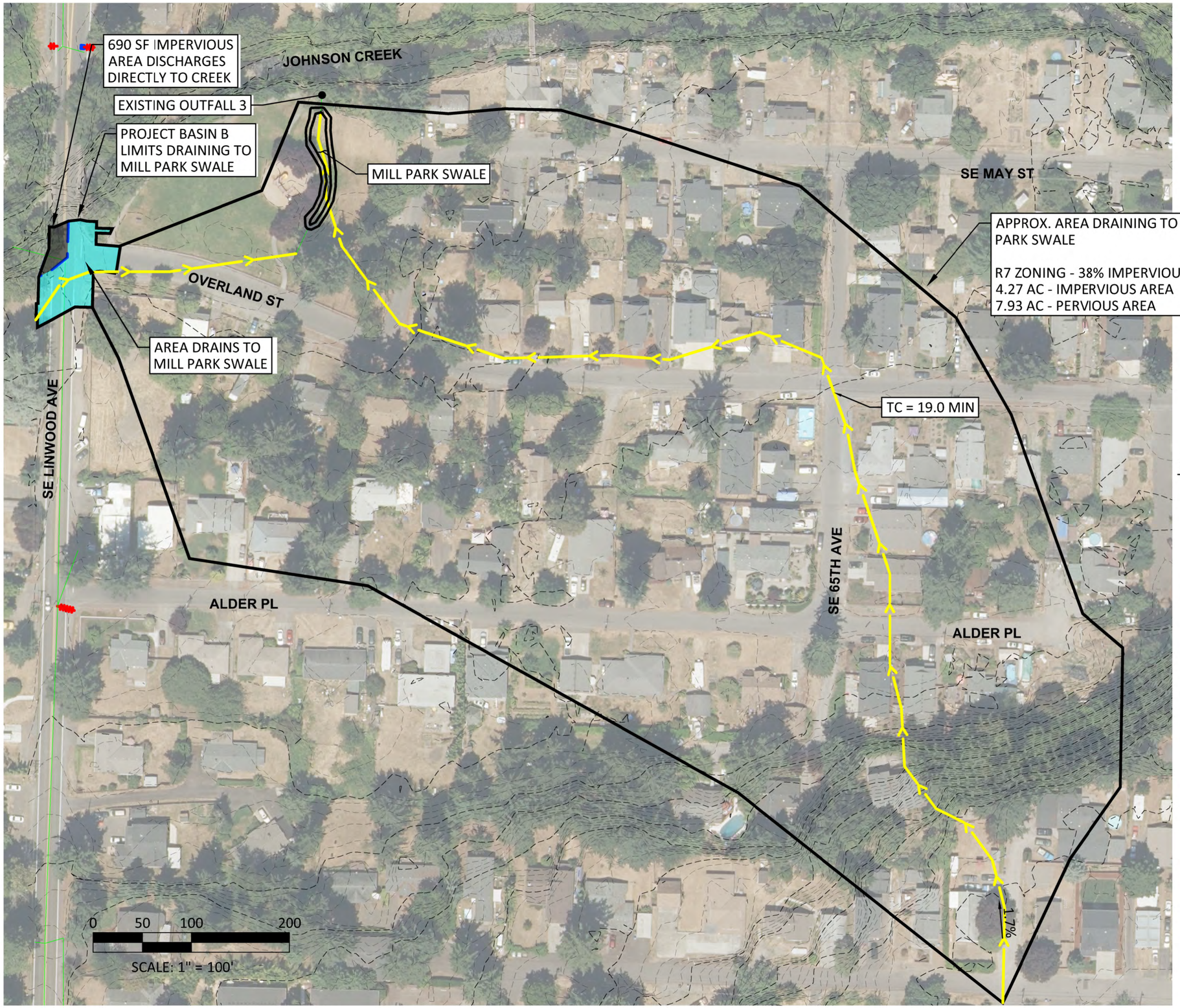
[2] Data not computed

Excerpt from Flood Insurance Study dated January 18, 2019

G.5 Johnson Creek Basin

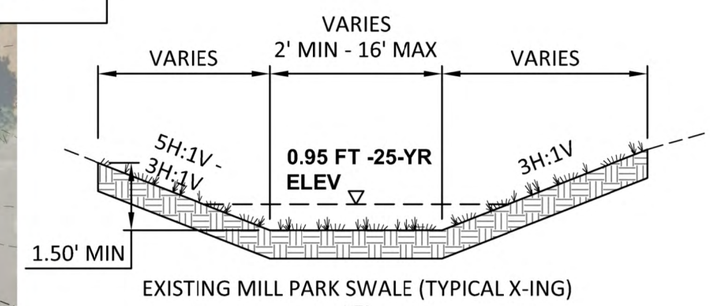



Legend
swDischargePoint
<all other values>
DISCHARGEPOINTTYPE
Injection Well
Jurisdiction Change
Other
Outfall
Unknown
Offsite Basin
Infiltration
drywells (typ)



LEGEND

- STORM SEWER PIPES
- PROPOSED BASIN LINE
- TIME OF CONCENTRATION PATH



EXISTING MILL PARK SWALE (TYPICAL X-ING)
NTS

DOWNSTREAM ANALYSIS
CLACKAMAS COUNTY, OREGON
NOVEMBER 2022

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

GENERAL NOTES

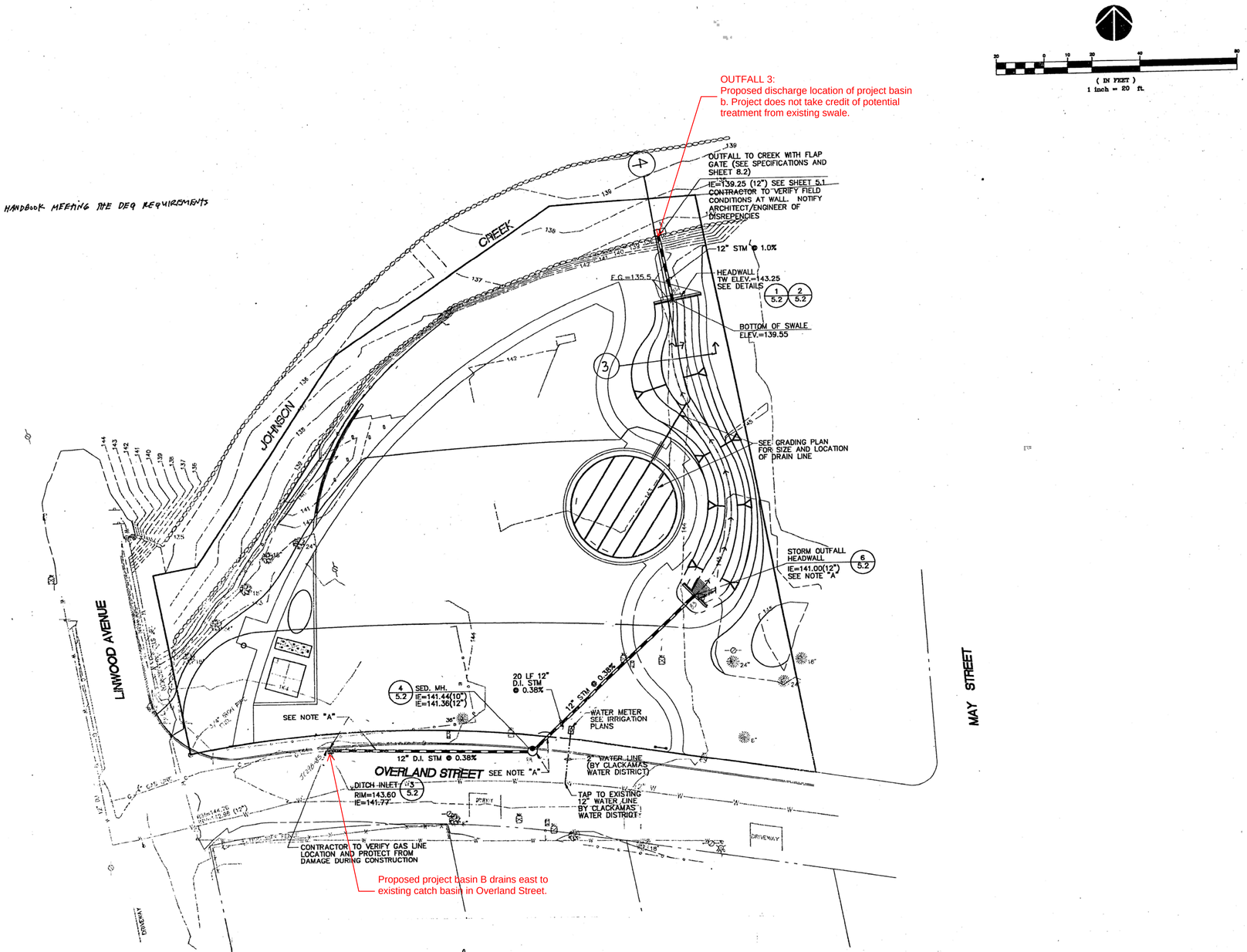
1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF CLACKAMAS COUNTY, AND CLACKAMAS WATER DISTRICT, AND THE CURRENT EDITION OF THE UNIFORM PLUMBING CODE AND UNIFORM BUILDING CODE.
2. THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT PIECE, SECTION, JOINT OR FITTING REQUIRED TO COMPLETE THE PROJECT. ALL LOCATIONS FOR WORK SHALL BE CHECKED AND COORDINATED WITH EXISTING CONDITIONS IN THE FIELD BEFORE BEGINNING CONSTRUCTION. EXISTING UNDERGROUND UTILITIES LAYING WITHIN THE LIMITS OF EXCAVATION SHALL BE VERIFIED AS TO CONDITION, SIZE AND LOCATION BY UNCOVERING, PROVIDING SUCH IS PERMITTED BY LOCAL PUBLIC AUTHORITIES WITH JURISDICTION. BEFORE BEGINNING CONSTRUCTION. CONTRACTOR TO NOTIFY ENGINEER IF THERE ARE ANY DISCREPANCIES.
3. PROVIDE CLEANOUTS AS REQUIRED IN THE CURRENT UNIFORM PLUMBING CODE CHAPTER 4, SECTION 406, AND CHAPTER 11, SECTION 1107.
4. CONTRACTOR SHALL VERIFY AND CONFIRM EXISTING CONDITIONS PRIOR TO COMMENCING WORK. NOTIFY ENGINEER OF DISCREPANCIES.
5. EFFECTIVE EROSION CONTROL IS REQUIRED. EROSION CONTROL DEVICES MUST BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH CCSD #1 EROSION & SEDIMENTATION GUIDANCE HANDBOOK MEETING THE DEQ REQUIREMENTS The District MAY, AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE EROSION CONTROL.
6. EFFECTIVE DRAINAGE CONTROL IS REQUIRED. DRAINAGE SHALL BE CONTROLLED WITHIN THE WORK SITE AND SHALL BE SO ROUTED THAT ADJACENT PRIVATE PROPERTY, PUBLIC PROPERTY, AND THE RECEIVING SYSTEM ARE NOT ADVERSELY IMPACTED. THE DISTRICT MAY AT ANY TIME, ORDER CORRECTIVE ACTION AND STOPPAGE OF WORK TO ACCOMPLISH EFFECTIVE DRAINAGE CONTROL.
7. EXISTING TOPOGRAPHIC INFORMATION BY MACKENZIE ENGINEERING INCORPORATED.

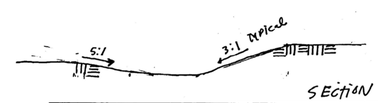
NOTE "A"

BID ALTERNATE – SEE SPECIFICATIONS

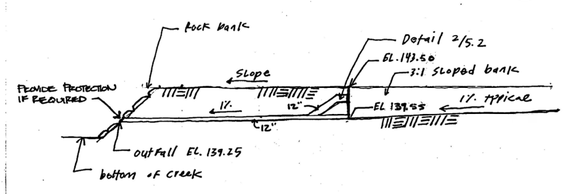
LEGEND

EXISTING WATERLINE	—W—
EXISTING GAS LINE	—G—
PROPOSED WATERLINE	
PROPOSED STORMLINE	
PROPOSED DITCH INLET	
PROPOSED CLEANOUT	
PROPOSED WATER METER	





SECTION 3
1/8"=1'-0"



SECTION PROFILE 4
1/8"=1'-0"

MILL Park
JUNE 27, 95

(IN FEET)
1 inch = 20 ft.

EXPIRES: 6/30/95

Planning
Urban Design
Landscape Architecture
Walker&Macy
111 SW Oak, Suite 200
Portland, Oregon 97204
Phone 503-228-3122

MACKENZIE ENGINEERING INCORPORATED
Civil • Structural • Transportation
0690 S.W. Bancroft Street
P.O. Box 69039
Portland, Oregon 97201-0039
Phone (503)224-9560
FAX (503)224-1285

NORTH CLACKAMAS PARKS & RECREATION DISTRICT
MILL PARK
CLACKAMAS, OREGON

Drawing Title
MILL PARK UTILITIES

Revisions
08/07/95

SUM-287-95

Date: 04/25/95
Job Number: 9453.0
Drawn by: GLK
Checked by: KJK

Drawing No.
5.1

Mill Park Swale

Conveyance Q25

Natural Channels

CIVIL TOOLS PRO
English Units
07-08-2022 15:07:35

Data Entered

Flow Rate	=	6.27 cfs
Channel Slope	=	0.0130 V:H

Distance (ft)	Elevation (ft)	Manning's N
0.00	146.57	0.150
12.00	144.97	0.150
14.00	145.00	0.150
21.00	146.00	0.150
45.00	146.50	0.150

MINIMUM CROSS SECTION FROM LIDAR SURVEY

Results

Flow Depth	=	0.95 ft
Flow Rate	=	6.27 cfs
Channel Slope	=	0.0130 V:H
Wetted Area	=	8.18 sq ft
Wetted Perimeter	=	15.66 ft
Flow Velocity	=	0.77 ft/s
Froude's Number	=	0.19
Flow Regime	=	sub-critical flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	3.378	2	480	58,360	------	------	------	Ex Mill Park - Impervious
2	SBUH Runoff	2.912	2	482	56,521	------	------	------	Ex Mill Park - Pervious
3	Combine	6.274	2	480	114,880	1, 2	------	------	Ex Mill Park

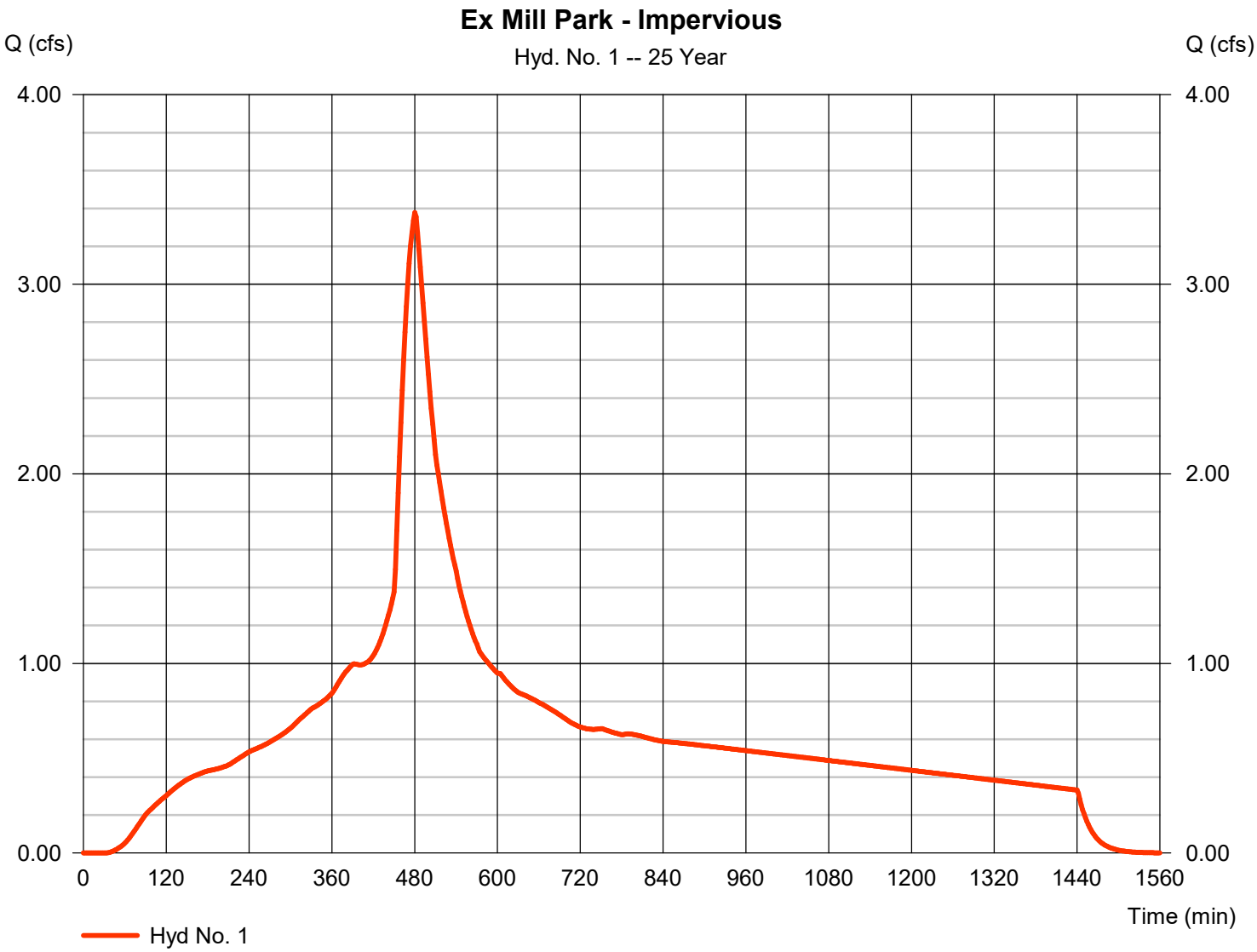
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Friday, 07 / 8 / 2022

Hyd. No. 1

Ex Mill Park - Impervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 3.378 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 58,360 cuft
Drainage area	= 4.270 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



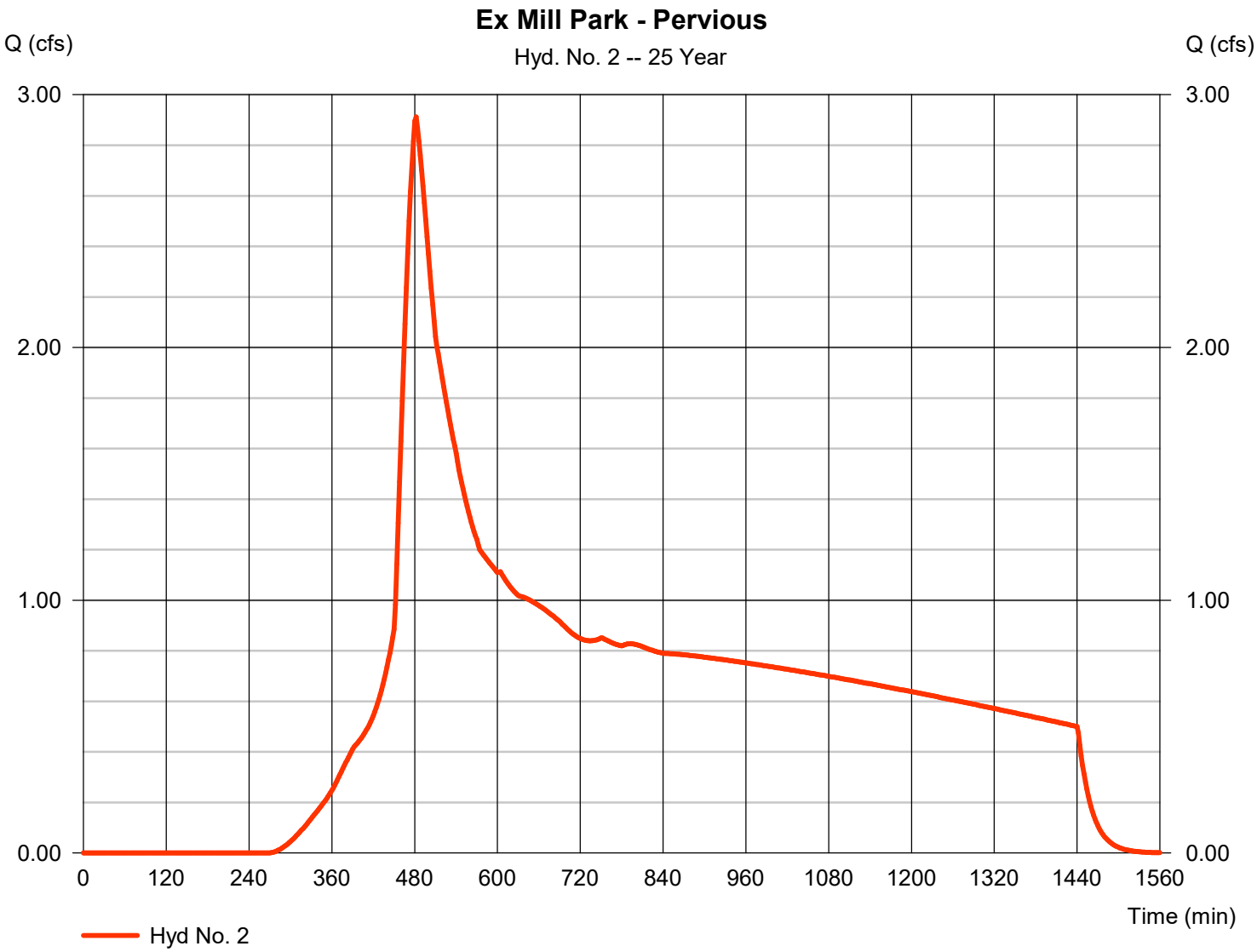
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Friday, 07 / 8 / 2022

Hyd. No. 2

Ex Mill Park - Pervious

Hydrograph type	= SBUH Runoff	Peak discharge	= 2.912 cfs
Storm frequency	= 25 yrs	Time to peak	= 482 min
Time interval	= 2 min	Hyd. volume	= 56,521 cuft
Drainage area	= 7.930 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 4.00 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



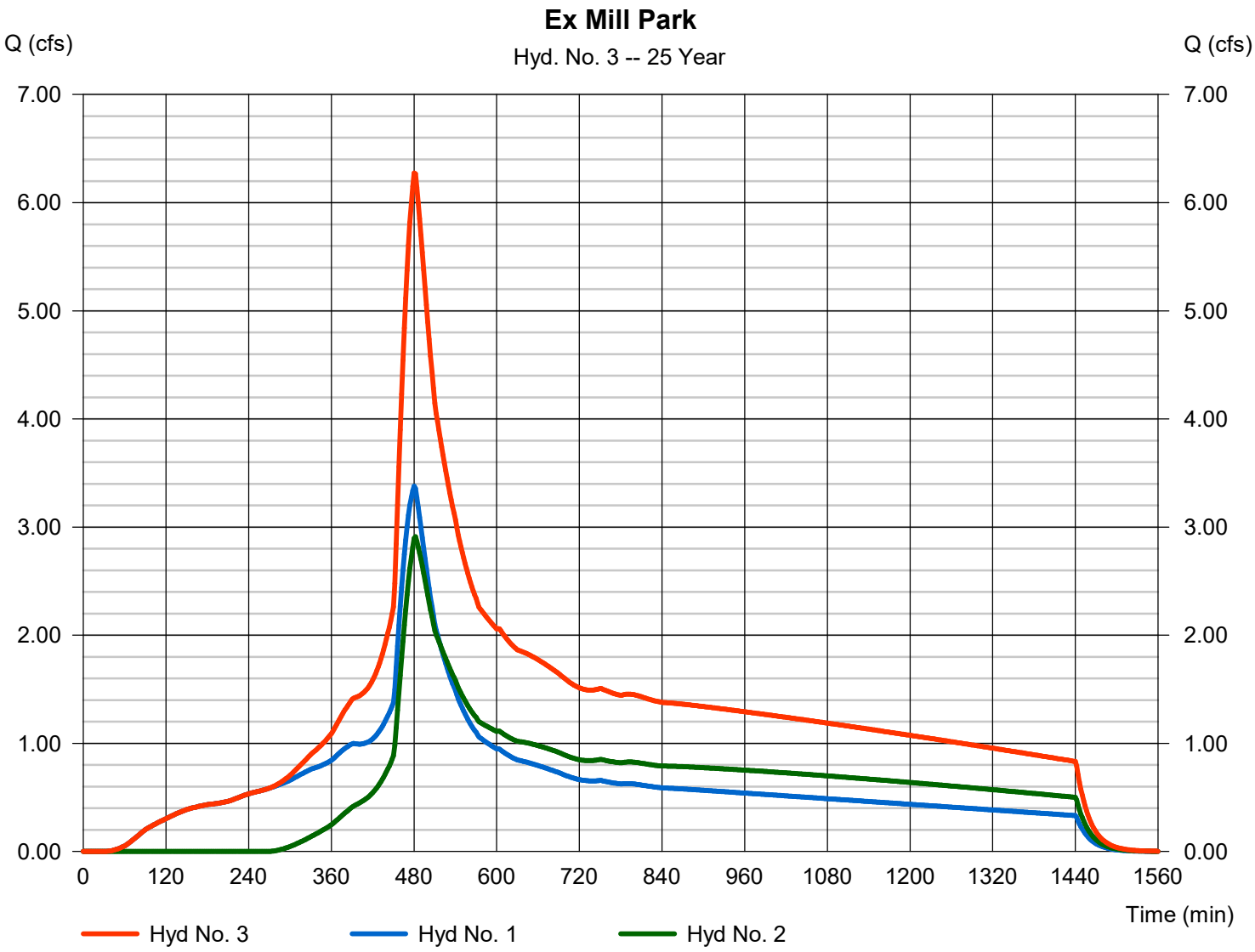
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020.4 Friday, 07 / 8 / 2022

Hyd. No. 3

Ex Mill Park

Hydrograph type	= Combine	Peak discharge	= 6.274 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 2 min	Hyd. volume	= 114,880 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.200 ac



Existing Drainage Ditch

Basin H Q25 Conveyance

Natural Channels

CIVIL TOOLS PRO
English Units
07-08-2022 15:38:18

Data Entered

Flow Rate	=	0.11	cfs
Channel Slope	=	0.0120	V:H

Distance (ft)	Elevation (ft)	Manning's N
0.00	148.00	0.240
10.00	147.00	0.240
30.00	148.00	0.240

Results

Flow Depth	=	0.22	ft
Flow Rate	=	0.11	cfs
Channel Slope	=	0.0120	V:H
Wetted Area	=	0.71	sq ft
Wetted Perimeter	=	6.55	ft
Flow Velocity	=	0.15	ft/s
Froude's Number	=	0.08	
Flow Regime	=	sub-critical flow	

Appendix E – Operations and Maintenance

Stormwater Facilities Operations & Maintenance Checklist				
✓	Problem	Frequency	Trigger	Preferred Condition
	Sediment Accumulation in Treatment Area	Monthly from November through April Annually Required	Sediment depth exceeds 3 inches	Sediment removed from vegetated treatment area; level side to seide and drains freely toward outlet; no standing water within 24 hours of any major storm (1" in 24 hours)
	Erosion Scouring	Monthly from November through April Annually Required	Monthly from November through April Annually Required	Repair ruts or bare areas by filling with topsoil during dry season; regrade and replant large bare areas
	Standing Water	Monthly from November through April and after any major storm (1-inch in 24 hours)	Standing water in the planter between storms that does not drain freely	Remove sediment or trash blockages; improve end to end grade so there is no standing water 24 hours after any major storm (1" in 24 hours)
	Flow Not Distributed Evenly	Monthly from November through April Annually Required	Flows unevenly distributed through planter width due to uneven or clogged flow spreader	Level the spreader and clean so that flows spread evenly over entire planter width
	Settlement / Misalignment	Annually Required	Failure of planters has created safety, function, or design problem	Planter replaced or repaired to design standards
	Constant Baseflow	Monthly from November through April Annually Required	Small, continual flow of water through the planter even after weeks without rain; planter bottom has an eroded, muddy channel	Add a low-flow pea gravel drain the length of the planter or bypass the baseflow around the planter
	Vegetation	Monthly from November through April Annually Required	Vegetation blocking more than 10% of the inlet pipe opening	No vegetation blocking the inlet pipe opening
	Poor Vegetation Coverage	Monthly Annually Required	Grass or other vegetation is sparse, or bare in more than 10% of the planter area	Determine cause of poor growth and correct the condition; replant with plants (per Appendix A) as needed to meet facility standards
	Invasive Vegetation	Monthly Annually Required	No invasive vegetation is planted or permitted to remain	No invasive vegetation present; remove excessive weeds. Control if complete eradication is not feasible
	Rodents	Monthly Annually Required	Evidence of rodents or rodent damage	No rodents; functioning facility.
	Insects	Annually Required	Insects such as wasps and hornets that interfere with maintenance activities	Harmful insects removed
	Trash & Debris	Monthly and after any major storm (1-inch in 24 hours) Annually Required	Visual evidence of trash, debris or dumping	Trash and Debris removed from facility
	Contamination and Pollution	Monthly from November through April Annually Required	Any evidence of oil, gasoline, contamination or other pollutants	No contaminants or pollutants present; coordinate removal/cleanup with local water quality response agency
	Obstructed Inlet/Outlet	Monthly and after any major storm (1-inch in 24 hours) Annually Required	Inlet/outlet areas clogged with sediment, vegetation or debris	Clear inlet and outlet; obstructions removed
	Excessive Shading	Monthly from November through April Annually Required	Vegetation growth is poor because sunlight does not reach planter	Trim over-hanging limbs and/or remove brushy vegetation as needed
	Vegetation	Monthly from November through April Annually Required	Specified or approved grass grows so tall that it competes with shrubs and/or becomes a fire danger	String trim non-wetland grasses to 4" to 6" and remove clippings; protect woody vegetation

1. Stormwater Planters

Stormwater Planters Operations & Maintenance Plan
Planters are designed to allow runoff to filter through layers of topsoil (thus capturing pollutants) and then either infiltrate into the native soils (infiltration planter) or be collected in a pipe to be discharged off-site (filtration planter). The planter is sized to accept runoff and temporarily store the water in a reservoir on top of the soil. The filtration planter is designed with an impervious bottom or is placed on an impervious surface. Water should drain through the planter within 3-4 hours after a storm event. All facility components and vegetation shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, 2 times per year thereafter, and within 48 hours after each major storm event. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater
Vegetation shall cover 90% of the facility.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 48 hours.

Annual Maintenance Schedule

See O&M Checklist

Maintenance Records: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the inspector.

Access: Maintain ingress/egress to design standards.

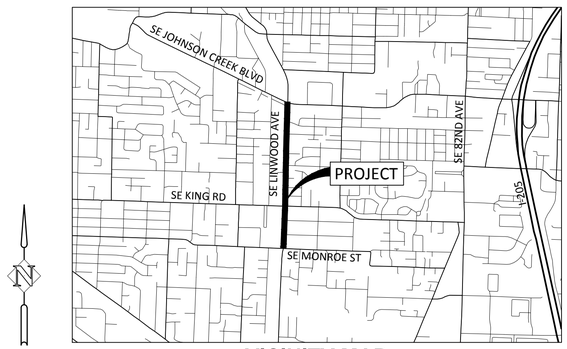
Infiltration/Flow Control: All facilities shall drain within 48 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact _____ for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Clackamas County Vector Control for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

SE LINWOOD AVENUE IMPROVEMENT PROJECT

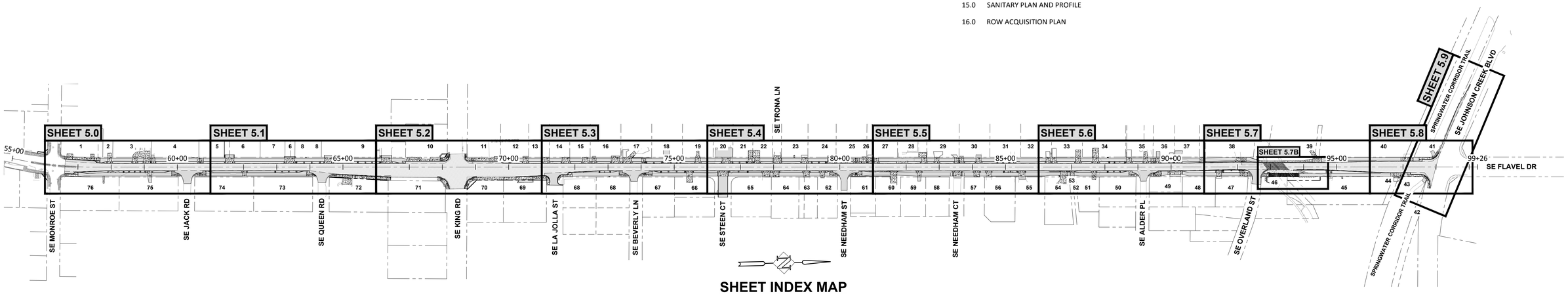
CLACKAMAS COUNTY, OREGON



VICINITY MAP
N.T.S.

SHEET INDEX

1.0 COVER SHEET, GENERAL NOTES AND LEGEND
2.0 TYPICAL SECTIONS
3.0 DETAILS
4.0 EROSION AND SEDIMENT CONTROL PLANS AND DETAILS
5.0 LINWOOD AVE ROADWAY PLAN AND PROFILE
5.7C PEDESTRIAN BRIDGE PLAN AND PROFILE
5.7D PEDESTRIAN BRIDGE DETAILS
5.7E PEDESTRIAN BRIDGE NOTES
6.0 GEOMETRY AND PAVING PLANS
7.0 CURB RETURNS
8.0 DETAILED DRIVEWAY GRADING
8.6 DRIVEWAY CONNECTION PROFILES
8.8 DETAILED PLANTER GRADING
9.0 LANDSCAPE PLANS
10.0 CROSS SECTIONS
11.0 SIGNING AND STRIPING PLANS
12.0 TRAFFIC SIGNAL PLANS
13.0 ADVANCE AREA SIGNAGE PLAN
14.0 ILLUMINATION PLANS (FOR COORDINATION WITH PGE ONLY); NOT INCLUDED IN BID SET
15.0 SANITARY PLAN AND PROFILE
16.0 ROW ACQUISITION PLAN



SHEET INDEX MAP
1"=150'

BID SET

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

COVER SHEET
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **1.0**
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-1.0 COVER SHEET.dwg

LEGEND

EXISTING

- RIGHT OF WAY
- PROPERTY LINE
- EASEMENT LINE
- FENCE
- OVERHEAD WIRE
- COMMUNICATIONS LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- COMMUNICATIONS LINE PER ASBUILT DATA
- GAS LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- GAS LINE PER ASBUILT DATA
- POWER/SIGNAL LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- POWER/SIGNAL LINE PER ASBUILT DATA
- STORM DRAINAGE LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- STORM DRAINAGE LINE PER ASBUILT DATA
- SANITARY SEWER LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- SANITARY SEWER LINE PER ASBUILT DATA
- WATER LINE PER UTILITY LOCATE PAINT/VISUAL FIELD OBSERVATION
- WATER LINE PER ASBUILT DATA

- FOUND SURVEY MONUMENT
- ASPHALT SURFACE
- CONCRETE SURFACE
- CATCH BASIN
- CURB INLET
- STORM MANHOLE
- SANITARY MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- GAS VALVE
- POWER/ELECTRICAL VAULT
- POWER POLE
- POWER POLE W/ LIGHT
- GUY WIRE/ANCHOR
- GRAVEL SURFACE
- EXISTING BUILDING
- TRAFFIC/SIGNAL JUNCTION BOX
- TRAFFIC SIGNAL POLE
- TRAFFIC SIGNAL CROSSING POLE
- COMMUNICATIONS RISER AS NOTED
- COMMUNICATIONS MANHOLE AS NOTED
- COMMUNICATIONS VAULT
- UTILITY CABINET AS NOTED
- BOLLARD
- MAIL BOX
- SIGN
- GATE POST
- BUSH/SHRUB
- CONIFEROUS TREE
- DECIDUOUS TREE

PROPOSED

- ROADWAY CENTERLINE
- ROW / PROPERTY LINE
- STORM PIPE
- REMOVE EXISTING STORM PIPE
- FENCE
- REMOVE EXISTING FENCE
- WALL
- DAYLIGHT CATCH LINE
- PERFORATED PIPE
- SANITARY PIPE
- SANITARY FOREMAIN PIPE
- STORM MANHOLE
- SANITARY CLEANOUT
- G-2 CATCH BASIN
- CURB INLET CG-3 CATCH BASIN
- AREA DRAIN
- BEEHIVE OVERFLOW INLET
- WATER METER
- STORM PLANTER CLEANOUT
- CURB CUT
- UTILITY POLE
- UTILITY POLE GUY WIRE
- PROPOSED CONCRETE
- PROPOSED AC
- PROPOSED GRIND AND INLAY
- PROPOSED PERVIOUS ASPHALT PATHWAY
- PROPOSED LANDSCAPE
- PROPOSED STORM PLANTER
- PROPOSED GRAVEL
- PROPOSED TACTICAL WARNING

ABBREVIATIONS

"L"	LINWOOD AVE
"M"	MONROE ST
"J"	JACK ST
"Q"	QUEEN RD
"K"	KING RD
"LJ"	LA JOLLA ST
"B"	BEVERLY LN
"S"	STEEN CT
"N1"	NEEDHAM ST
"N2"	NEEDHAM CT
"A"	ALDER PL
"O"	OVERLAND ST
"JCB"	JOHNSON CREEK BLVD
"CRW"	CLACKAMAS RIVER WATER
"MWK"	CITY OF MILWAUKIE
"ROW"	RIGHT OF WAY
"TCE"	TEMPORARY CONSTRUCTION EASEMENT
"CRW"	CLACKAMAS RIVER WATER
"MWK"	CITY OF MILWAUKIE
"PR"	PROPOSED
"EX"	EXISTING
"TYP"	TYPICAL
"OF"	OVERFLOW

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO CLACKAMAS COUNTY STANDARDS AND THE OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2021, AS AMENDED BY THE SPECIAL PROVISIONS.
2. THIS PROJECT HAS BEEN DESIGNED BASED ON ORIGINAL TOPOGRAPHIC SURVEY PERFORMED BY PBS ENGINEERING AND ENVIRONMENTAL INC WITH SUPPLEMENTAL TOPOGRAPHIC SURVEY PERFORMED BY HARPER HOUF PETERSON RIGHELLIS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF SURVEYED CONDITIONS DIFFER FROM ACTUAL FIELD CONDITIONS.
3. THE CONTRACTOR SHALL PRUNE ALL VEGETATION, AS NECESSARY, AWAY AND UP FROM THE STREET AS WELL AS ANY ROOT PRUNING AS DETERMINED BY THE ENGINEER. THE CONTRACTOR SHALL PROTECT ALL EXISTING TREES AND LANDSCAPING THAT IS TO REMAIN.
4. THE CONTRACTOR SHALL MAKE EVERY REASONABLE EFFORT TO PROTECT THE REMAINING EXISTING CONCRETE CURBS AND SIDEWALKS.
5. AT THE END OF EACH WORK DAY THE CONTRACTOR SHALL CLEAN UP THE PROJECT AREA AND LEAVE IT IN A NEAT AND SECURED MANNER. UPON COMPLETION, THE CONTRACTOR SHALL LEAVE THE PROJECT AREA FREE OF DEBRIS AND UNUSED MATERIAL.
6. RIGHT-OF-WAY DOCUMENTS ARE ON FILE WITH THE ENGINEER. THESE DOCUMENTS INCLUDE LEGAL DESCRIPTIONS AND EXHIBITS FOR TEMPORARY CONSTRUCTION EASEMENTS, RIGHT-OF-WAY, RIGHT-OF-ENTRIES AND OTHER INFORMATION. THE CONTRACTOR SHALL OBTAIN A COPY OF THIS INFORMATION. THESE DOCUMENTS SHOW PROPERTY AGREEMENTS, LEGAL LIMITS OF CONSTRUCTION EASEMENTS AND RIGHT-OF-WAY AND ARE HEREBY MADE A PART OF THESE DOCUMENTS. FOR INFORMATIONAL PURPOSES ONLY, REFER TO RIGHT-OF-WAY DEVELOPMENT AND CONTROL PLANS.
7. THE CONSTRUCTION NOTE NUMBERS SHOWN ON EACH PLAN SHEET ARE EXCLUSIVE TO THAT INDIVIDUAL PLAN SHEET.

UTILITY NOTES:

1. EXISTING ABANDONED UTILITIES (I.E. STORM AND WATER LINE, ETC.) MAY EXIST THAT ARE NOT SHOWN ON THE PLANS. IF THE CONTRACTOR ENCOUNTERS ABANDONED FACILITIES DURING EXCAVATION THEY SHALL NOTIFY THE ENGINEER AND UTILITY IMMEDIATELY.
2. EXISTING UTILITIES SHOWN ON THE PLANS ARE PER SURFACE LOCATIONS AND AS-BUILT DRAWINGS. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS AND ELEVATIONS OF ALL EXIST. UTILITIES PRIOR TO CONSTRUCTION TO AVOID POTENTIAL CONFLICTS.
3. EXCAVATOR(S) MUST COMPLY WITH O.R.S. 757.542 THROUGH 757.562. EXCAVATOR(S) SHALL NOTIFY OREGON UTILITY NOTIFICATION CENTER FOR LINE LOCATIONS AT LEAST TWO, BUT NOT MORE THAN TEN, BUSINESS DAYS PRIOR TO START OF WORK. DAMAGE TO UTILITIES SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.
   OREGON UTILITY NOTIFICATION CENTER: PH. 1-800-332-2344
4. COORDINATE UTILITY RELOCATIONS WITH APPROPRIATE UTILITY PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL PROTECT EXISTING WATER SERVICE LINES. ALL DISTURBED WATER SERVICE LINES SHALL BE REPAIRED BY A LICENSED PLUMBER AS DIRECTED BY WATER AUTHORITY, CLACKAMAS RIVER WATER/CITY OF MILWAUKIE AND/OR PLUMBING CODES.
6. CONTRACTOR SHALL PROTECT EXISTING SANITARY SERVICE LATERALS. ALL DISTURBED SANITARY SERVICE LATERALS SHALL BE REPAIRED AS DIRECTED AND INSPECTED BY CLACKAMAS COUNTY. CONTRACTOR SHALL PAY INSPECTION FEES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF EXISTING SANITARY SERVICE LATERALS AND EXISTING WATER SERVICE LINES DESTROYED THROUGH NEGLIGENCE AND/OR INATTENTION.
8. CONTRACTOR SHALL POTHOLE ALL UTILITY CROSSINGS BEFORE INSTALLING STORM, SANITARY, AND/OR WATER LINES. CONTRACTOR TO REPORT ANY CONFLICTS TO ENGINEER PRIOR TO INSTALLATION.
9. WHILE PERFORMING ANY CONSTRUCTION WORK WITHIN 10 FEET OF A HIGH PRESSURE GAS LINE, A REPRESENTATIVE/INSPECTOR FOR THE HIGH PRESSURE GAS LINE MUST BE PRESENT. THE CONTRACTOR SHALL COORDINATE BY CALLING THE AFFECTED UTILITY AT LEAST 24 HOURS PRIOR TO EXCAVATION.

UTILITY CONTACTS:

DON KEMP
CLACKAMAS COUNTY WES
PHONE: (503) 742-4577
DONKEM@CLACKAMAS.US

JOE ESKEW
CLACKAMAS RIVER WATER
PHONE: (503) 723-2565
CELL: (503) 747-8520
JESKEW@CRWATER.COM

BRENT BALDWIN
PGE
PHONE: (503) 736-54770
CELL: (503)-351-7345
BRENT.BALDWIN@PGN.COM

JAMES LOWRY
PGE
PHONE: (503) 672-5438
JAMES.LOWRY@PGN.COM

RICO TORRES SOLIS
PGE LIGHTING
PHONE: (503) 403-9084
RODRIGO.SOLIS@PGN.COM

JEREMY LORENCE
NW NATURAL
PHONE: (503) 226-4211 EXT 6772
CELL: (503) 781-4467
JEREMY.LORENCE@NWNATURAL.COM

DAVID DODD
LUMEN
PHONE: (503)242-8849
CELL: (503) 616-6291
DAVID.DODD@LUMEN.COM

BRENT CHRISTIANSEN
COMCAST
PHONE: (503) 347-0854
BRENT_CHRISTIANSEN@COMCAST.COM

RONELLE SEARS
CITY OF MILWAUKIE WATER
PHONE: (503) 786-7615
SEARSR@MILWAUKIEOREGON.GOV

DUKE DEXTER
CBX FIBER
PHONE: (503) 672-5438
DDEXTER@CLACKAMAS.US

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-1.0 COVER SHEET.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

GENERAL NOTES & LEGEND

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 1.1

JOB NO. CLA-93

TYPICAL SECTIONS SHOWN
(SEE SHEET SERIES 6.0 FOR LOCATIONS OF VARIATION)

NOTE: TYPICAL DAYLIGHT TO BE 2:1 MAX SLOPE UNLESS OTHERWISE SPECIFIED ON PLAN WITH OTHER DAYLIGHT CONDITIONS SUCH AS DRIVEWAY CONNECTIONS, CURBS, WALLS, STAIRS, ETC. FOR LOCATIONS AND DETAILS SEE ROADWAY PLAN SHEET SERIES 5.0 AND CROSS SECTIONS ON SHEET SERIES 10.0.

LINWOOD AVE - TYPICAL SECTION

STA: TYPICAL FOR ALL LOCATIONS NOT SPECIFIED ON SHEET 2.1
SCALE: 1"=5'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-2.0 TYPICAL SECTIONS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

TYPICAL SECTIONS

LINWOOD AVENUE IMPROVEMENTS

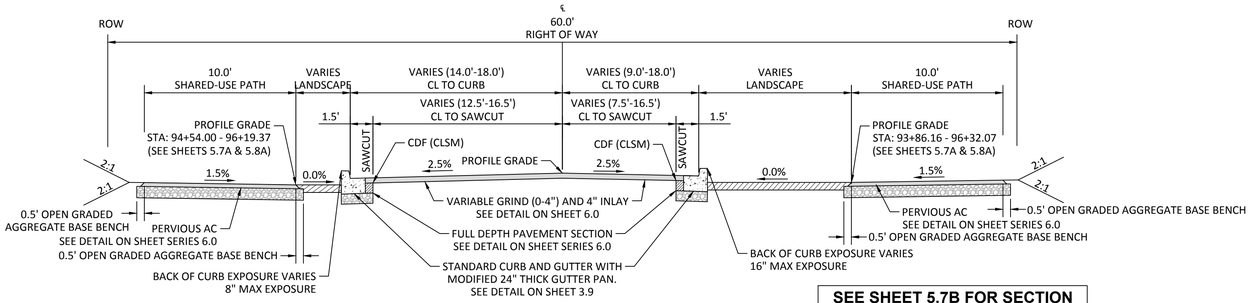
CLACKAMAS COUNTY, OREGON

SHEET NO. 2.0

JOB NO. CLA-93

TYPICAL SECTIONS SHOWN
(SEE SHEET SERIES 6.0 FOR LOCATIONS OF VARIATION)

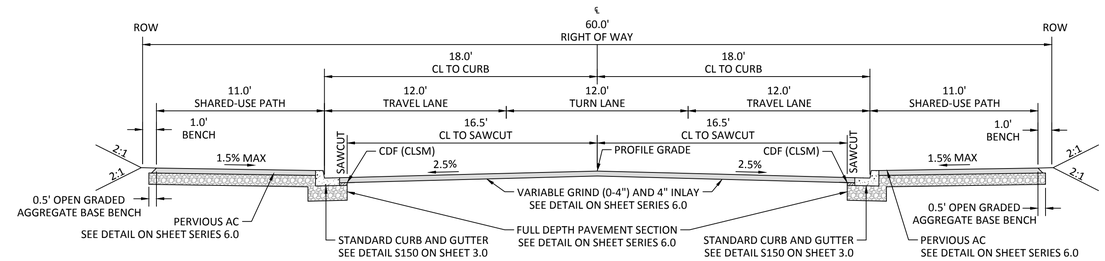
NOTE: TYPICAL DAYLIGHT TO BE 2:1 MAX SLOPE UNLESS OTHERWISE SPECIFIED ON PLAN WITH OTHER DAYLIGHT CONDITIONS SUCH AS DRIVEWAY CONNECTIONS, CURBS, WALLS, STAIRS, ETC. FOR LOCATIONS AND DETAILS SEE ROADWAY PLAN SHEET SERIES 5.0 AND CROSS SECTIONS ON SHEET SERIES 10.0.



SEE SHEET 5.7B FOR SECTION OF JOHNSON CREEK CROSSING

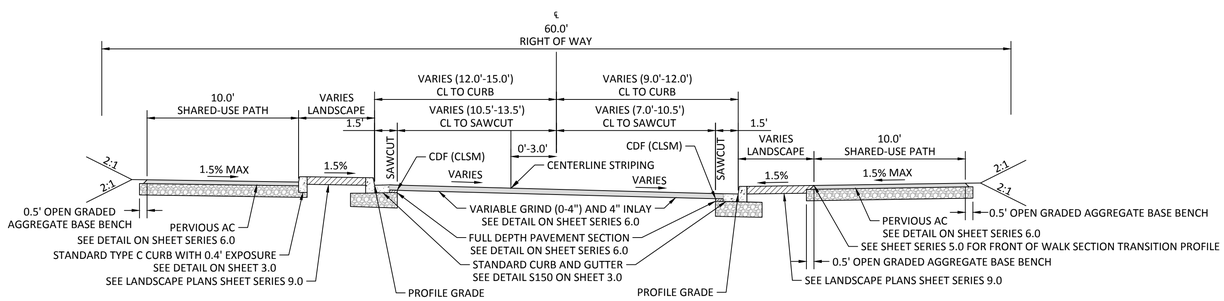
LINWOOD AVE TYPICAL SECTION FLOODPLAIN - (LOOKING NORTH)

STA:93+86.16 - 96+32.07
SCALE: 1"=5'



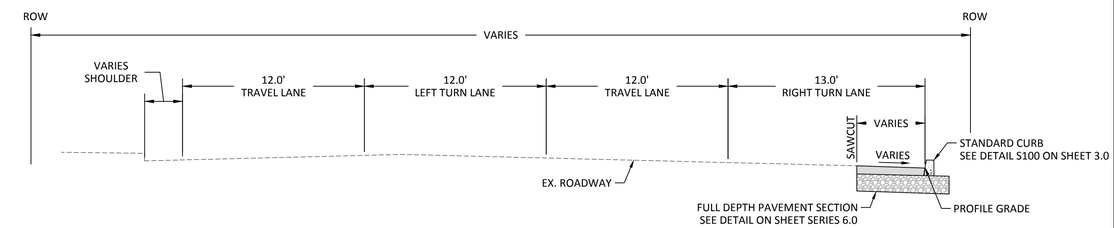
LINWOOD AVE TYPICAL SECTION JOHNSON CREEK INTERSECTION - (LOOKING NORTH)

STA: 96+42.34 - 97+13.21
SCALE: 1"=5'



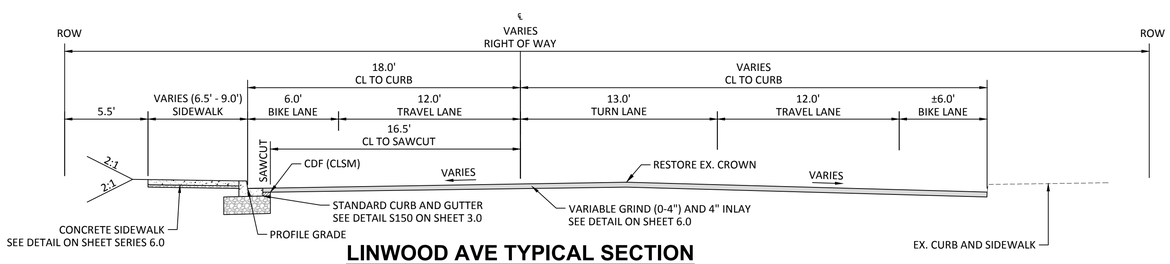
LINWOOD AVE TYPICAL SECTION ALDER-OVERLAND - (LOOKING NORTH)

STA:89+80.00 - 92+27.02
SCALE: 1"=5'



JOHNSON CREEK BLVD TYPICAL SECTION RIGHT TURN ADDITION - (LOOKING EAST)

STA: 4+08.42 - 6+37.38
SCALE: 1"=5'



LINWOOD AVE TYPICAL SECTION KING RD INTERSECTION - (LOOKING NORTH)

STA: 66+44.58 - 67+55.78
SCALE: 1"=5'

NOTE:
STORMWATER PLANTER LOCATIONS ARE SHOWN ON SHEETS 8.8 - 8.11 AND DETAIL ON SHEET SHEET 3.9, AND NOT INDICATED ON THE TYPICAL SECTION FOR CLARITY.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-2.0 TYPICAL SECTIONS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

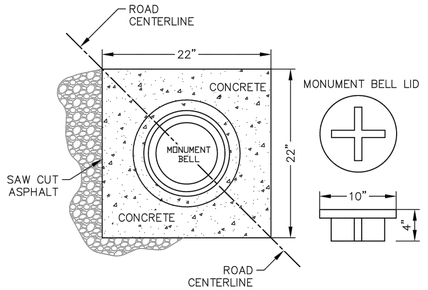
DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

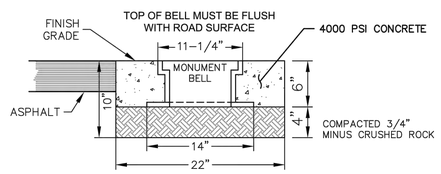
REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

TYPICAL SECTIONS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **2.1**
JOB NO. CLA-93





COORDINATE LOCATION OF MONUMENT BOXES WITH ENGINEER/CLACKAMAS COUNTY

NOTE:
MONUMENT BOXES TO BE CAST IRON OR ALLOY SUITABLE FOR HEAVY TRAFFIC LOADING. #1036 OR #1033 EAST JORDAN IRON WORKS #3680 OR EQUIVILANT.

REVISION	DATE	BY
REVISION	11/19	RN
REVISION	3/20	RN

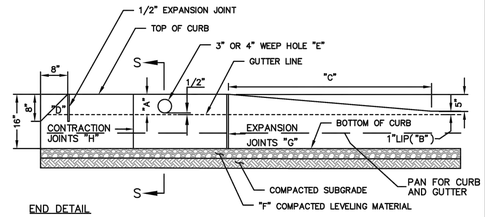
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

APPROVAL DATE: 6/1/2020 SCALE: N.T.S.

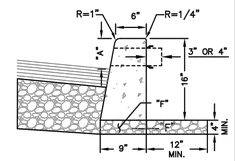
MONUMENT BOX
35 MPH OR LESS

STANDARD DRAWING M100



END DETAIL

APRON DETAIL



SECTION S-S

NOTES

1. "A" CURB EXPOSURE, STANDARD 6", VARY AS SHOWN ON TYPICAL SECTION, OR AS DIRECTED.
   "B" CURB EXPOSURE ADJACENT TO DRIVEWAY, STANDARD 1", OR AS DIRECTED.
   "C" DRIVEWAY APRON WING, STANDARD RESIDENTIAL & COMMERCIAL 5' MIN, OR AS DIRECTED.
   "D" END CURB SECTION, TOP TO BE REMOVED UPON EXTENSION OF CURB.
   "E" WEEP HOLE, 4" PLASTIC DRAIN PIPE OR APPROVED EQUIVALENT, LOCATED AS INDICATED ON THE PLANS OR AS DIRECTED. DRAIN PIPE SHALL HAVE A BELL OR A 3" EXTENSION, FOR FUTURE HOOK-UP.
   "F" AGGREGATE BASE, 3/4"-0" OR 1/2"-0", 4" MINIMUM
   "G" EXPANSION JOINTS, MAX. 45' SPACING AND AT BEGINNING AND END OF CURVES OR AS DIRECTED.
   "H" CONTRACTION JOINTS, MAX. 15' SPACING AND AT LOCATIONS AS DIRECTED.
2. CURB TO BE CLASS 3300 PORTLAND CEMENT CONCRETE.
3. CONCRETE AND MISC. MATERIALS USED IN CURB CONSTRUCTION SHALL CONFORM TO CURRENT OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION.
4. FROM PC TO PT INSIDE THE UGB AND UNINCORPORATED COMMUNITIES, AND WHEN THE GUTTER SLOPE OR CURB LINE IS LESS THAN 1% STANDARD DWG. S150 SHALL BE USED, AT PUBLIC INTERSECTIONS.

REVISION	DATE	BY
EDIT NOTE 3	12/12	RN
REVISED	11/19	AAR

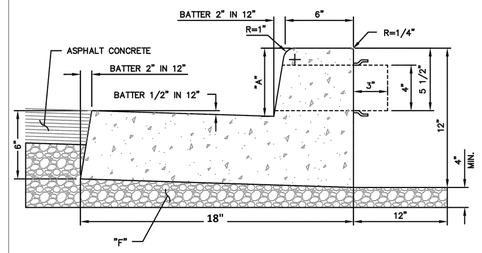
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

APPROVAL DATE: 6/1/2020 SCALE: N.T.S.

STANDARD TYPE 'C' VERTICAL CURB AND CURB DETAILS

STANDARD DRAWING S100



NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION.
2. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3300 PSI IN 28 DAYS, 2" TO 4" SLUMP.
3. 4" PLASTIC PIPE SHALL HAVE A BELL OR A 3" EXTENSION, FOR FUTURE HOOK-UP.
4. EXPANSION JOINTS, MAX. 45' SPACING AND AT BEGINNING AND END OF CURVES OR AS DIRECTED.
5. CONTRACTION JOINTS, MAX. 15' SPACING AND AT LOCATIONS AS DIRECTED.
6. USE FROM PC TO PT AT PUBLIC INTERSECTIONS INSIDE THE UGB AND UNINCORPORATED COMMUNITIES. ALSO USE WHEN THE GUTTER SLOPE OR CURB LINE IS LESS THAN 1% ON ALL PUBLIC ROADS.
7. SEE NOTES ON DETAIL S100.

REVISION	DATE	BY
EDIT NOTE 1	12/12	RN
REVISED	11/19	AAR

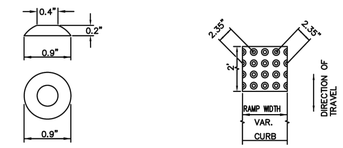
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

APPROVAL DATE: 6/1/2020 SCALE: N.T.S.

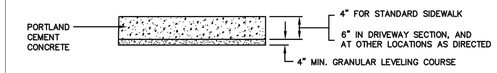
STANDARD CURB AND GUTTER

STANDARD DRAWING S150



TRUNCATED DOME DETAIL

RAMP TEXTURE PATTERN (TRUNCATED DOMES) DETAIL



SIDEWALK SURFACING DETAIL

NOTES

1. CONCRETE AND MISC. MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION. DETECTABLE WARNINGS ON WALKING SURFACES AS PER ADA REQUIREMENTS.
2. DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9 in (23 mm) A HEIGHT OF NOMINAL 0.2 in (5 mm) AND A CENTER-TO-CENTER SPACING OF NOMINAL 2.35in (60mm) AND YELLOW IN COLOR. THE MATERIAL USED TO PROVIDE CONTRAST SHALL BE AN INTEGRAL PART OF THE WALKING SURFACE. DETECTABLE WARNINGS USED ON INTERIOR SURFACES SHALL DIFFER FROM ADJOINING WALKING SURFACES IN RESILIENCY OR SOUND-ON-CANE CONTACT.
3. EXPANSION JOINT SPACING EVERY 45' MIN. OR AT EQUAL INTERVALS CORRESPONDING TO CURB LINE. JOINTS SHALL BE PROVIDED PER ODOT STD. DWG. RD722.
4. THE SURFACE FINISH SHALL BE CROSS BROOMED.
5. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3300 PSI IN 28 DAYS.

REVISION	DATE	BY
EDIT NOTE 1	12/12	RN
EDIT NOTE 6	12/12	RN
REVISION	11/19	BP
REVISION	3/20	RN

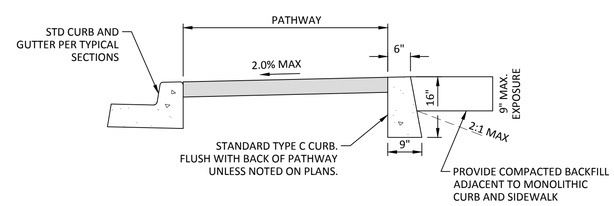
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

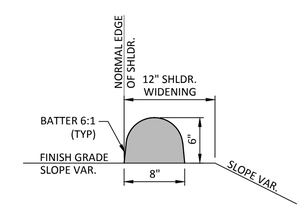
APPROVAL DATE: 6/1/2020 SCALE: N.T.S.

STANDARD SIDEWALK & CURB RAMP NOTES & DETAILS

STANDARD DRAWING S960



STANDARD CURB AT BACK OF SHARED-USE PATH
NTS



AC DRAINAGE CURB
NTS

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

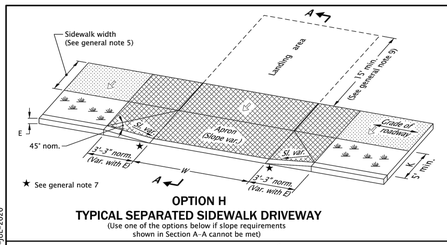
DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

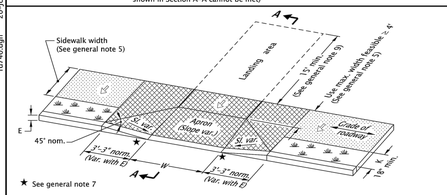
SHEET NO. 3.0

JOB NO. CLA-93

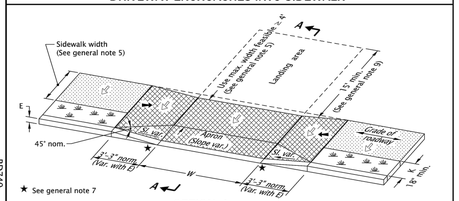


OPTION H
TYPICAL SEPARATED SIDEWALK DRIVEWAY

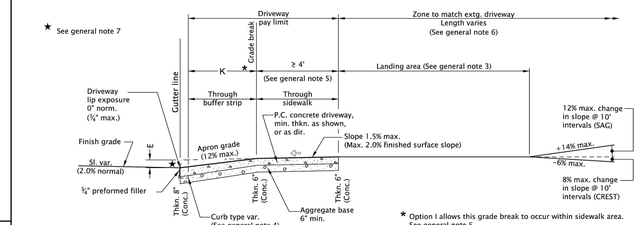
(Use one of the options below if slope requirements shown in Section A-A cannot be met)



OPTION I
DRIVEWAY ENCROACHES INTO SIDEWALK



OPTION J
LOWERED SIDEWALK



SECTION A-A

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Details are based on applicable ODOT Standards.
2. Only use details allowed by jurisdiction.
3. The following dimensions are as shown on plans, or as directed: driveway width, driveway slope, sidewalk width, buffer strip width, curb exposure, driveway lip exposure, landing area length and width. See project plans for details not shown.
4. Curb, gutter, and sidewalk types varies, see plans.
   See Std. Dwgs. RD700 & RD701 for curb details.
   See Std. Dwg. RD721 for sidewalk details.
   See Std. Dwg. RD722 for joint details.
5. A greater than or equal 4' unobstructed clear passage with cross slope 1.5% max. (Max. 2.0% finished surface slope) is required behind driveway apron.
6. Where existing driveway is in good condition, and meets slope requirements, construct only as much landing area as required for satisfactory connection with new work.
7. Check the gutter flow depth at driveway locations to assure that the design flood does not overtop the back of sidewalk at driveway. If overtopping occurs place an inlet at upstream side of driveway or perform other approved design mitigation.
8. Construct a full deph expansion joints with 1#2" (In) preformed joint filler at ends of each driveway. Tooled joints are required at all driveway slope break lines.
9. 15' min. of the driveway behind the sidewalk should be surfaced to prevent tracking of gravel onto the sidewalk.
10. Any dimensions except those of general note 5 may be amended by local agencies for their use.

LEGEND:

- Sidewalk
- Driveway pay limit (See project plans for details not shown)
- Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
- Running slope 7.5% max. (Max. 8.3% finished surface slope)

W Width of driveway
K Buffer strip width
E Curb exposure

NOTE: This drawing is to be used by local agencies to assist them in the design of driveways on their facilities.

CALC. BOOK NO. N/A
SDR DATE 20-JUL-2020

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

SEPARATED SIDEWALK DRIVEWAYS OR ALLEYS (OPTIONS H, I & J) LOCAL JURISDICTIONS

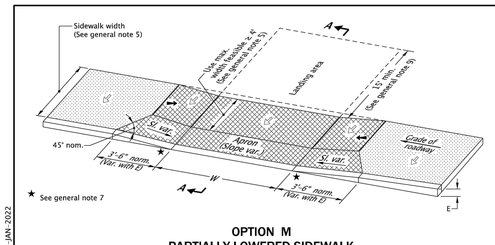
2021

DATE	REVISION DESCRIPTION

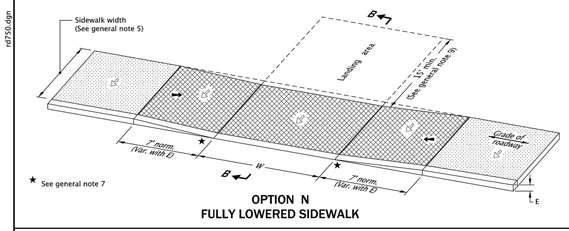
rd740.dgn 20-JUL-2020

RD740

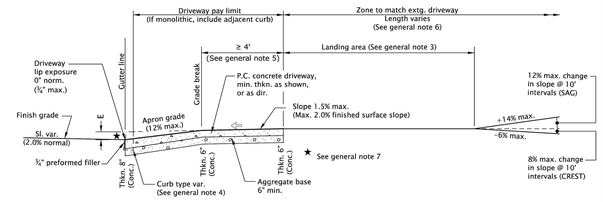
Effective Date: June 1, 2022 - November 30, 2022 RD740



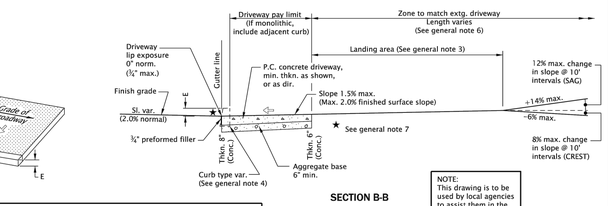
OPTION M
PARTIALLY LOWERED SIDEWALK



OPTION N
FULLY LOWERED SIDEWALK



SECTION A-A



SECTION B-B

NOTE: This drawing is to be used by local agencies to assist them in the design of driveways on their facilities.

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Details are based on applicable ODOT Standards.
2. Only use details allowed by jurisdiction.
3. The following dimensions are as shown on plans, or as directed: driveway width, driveway slope, sidewalk width, curb exposure, driveway lip exposure, landing area length and width. See project plans for details not shown.
4. Curb, gutter, and sidewalk types varies, see plans.
   See Std. Dwgs. RD700 & RD701 for curb details.
   See Std. Dwg. RD720 for sidewalk details
   See Std. Dwg. RD722 for joint details.
5. A greater than or equal 4' unobstructed clear passage with cross slope 1.5% max. (Max. 2.0% finished surface slope) is required behind driveway apron.
6. Where existing driveway is in good condition, and meets slope requirements, construct only as much landing area as required for satisfactory connection with new work.
7. Check the gutter flow depth at driveway locations to assure that the design flood does not overtop the back of sidewalk at driveway. If overtopping occurs place an inlet at upstream side of driveway or perform other approved design mitigation.
8. Construct a full deph expansion joints with 1#2" (In) preformed joint filler at ends of each driveway. Tooled joints are required at all driveway slope break lines.
9. 15' min. of the driveway behind the sidewalk should be surfaced to prevent tracking of gravel onto the sidewalk.
10. Monolithic curb & sidewalk shall retain thickened edge through lowered profile, to accommodate driveway use. See Std. Dwg. RD720 for details.
11. Any dimensions except those of general note 5 may be amended by local agencies for their use.

LEGEND:

- Sidewalk
- Driveway pay limit (If monolithic, include adjacent curb) (See project plans for details not shown)
- Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
- Running slope 7.5% max. (Max. 8.3% finished surface slope)

W Width of driveway
E Curb exposure

CALC. BOOK NO. N/A
SDR DATE 20-JUL-2020

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

CURB LINE SIDEWALK DRIVEWAYS OR ALLEYS (OPTIONS M & N) LOCAL JURISDICTIONS

2021

DATE	REVISION DESCRIPTION

rd750.dgn 14-JAN-2022

RD750

Effective Date: June 1, 2022 - November 30, 2022 RD750

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

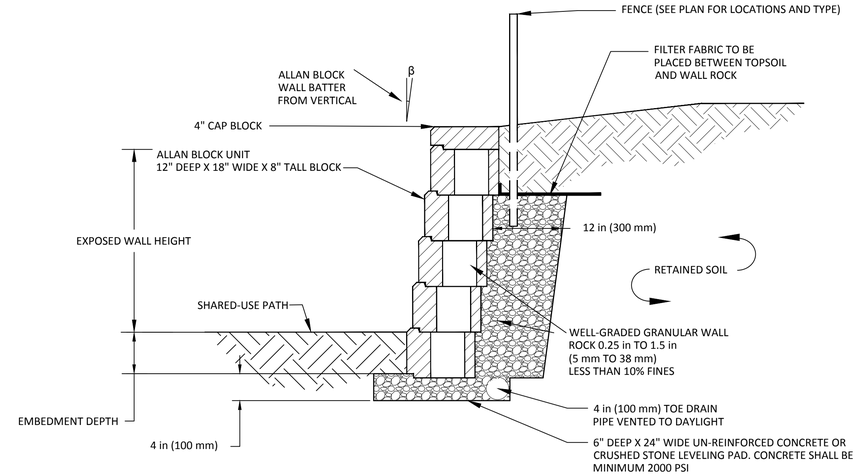
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 3.1

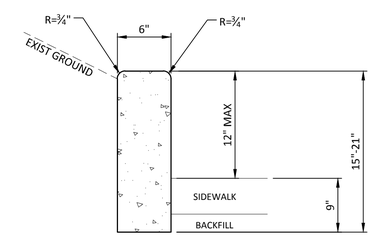
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg



SEGMENTAL BLOCK WALL - CUT SLOPE

NTS



VERTICAL CURB WALL DETAIL

NTS

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

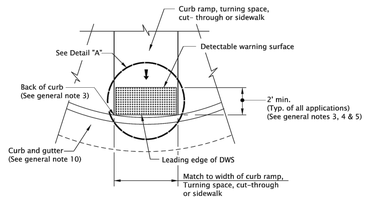
DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

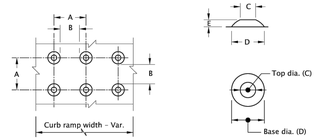
SHEET NO. 3.2

JOB NO. CLA-93



DETECTABLE WARNING SURFACE DETAIL

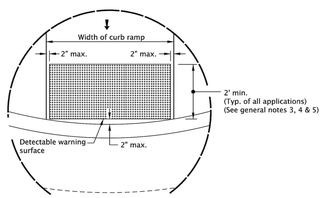
	A	B	C	D	E
MIN.	1.60"	0.65"	0.45"	0.90"	0.20"
MAX.	2.40"	--	0.91"	1.40"	0.20"



TRUNCATED DOME SPACING

TRUNCATED DOME

TRUNCATED DOME DETAILS



DETAIL "A"

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Detectable warning surface details & locations are based on applicable ODOT Standards.
2. See project plans for details not shown.
   See Std. Dwgs. RD700 & RD701 for curbs.
3. The detectable warning surface shall extend the full width of the curb ramp opening, shared use path, blended transition, turning space, or other roadway entrance as applicable. A gap of up to 2 inches on each side of the detectable warning surface is permitted (measured at the leading edge of the detectable warning surface panel as shown in Detail "A").
4. Detectable warning surface shall be placed at the back of curb for a minimum depth of 2 ft. in the direction of pedestrian travel at curb ramps that are adjacent to traffic. Detectable warning surface may be radial or rectangular, but must comply with the truncated dome size and spacing standards. Detectable warning surface may be cut to meet necessary shape as shown in plans. Detectable warning surface across a grade break is prohibited. Place abutting panels within¼ inch of each other and install anchors, as specified by manufacturers, along cut edge.
5. Color to be safety yellow if no color specified in construction note. Alternative colors require a design exception on or along state highways.
6. Detectable warning surface shall be used in the following locations:
   a) Curb ramps at street crossings.
   b) Crossing islands (Accessible Route Islands).
   c) Rail crossings.
7. Where public transportation stations (rail, bus, etc.) use platform boarding, detectable warning surface shall be placed along the full edge length of the station, when not protected by platform screens or guards, (see Std. Dwg. RD908).
8. Detectable warning surface shall not be used on the following locations:
   a) End of sidewalk transitions that are not at a crosswalk, (see Std. Dwgs. RD950, RD952 and RD960).
   b) Driveways, unless constructed with curb return or are signalized.
   c) Parking lots, access aisles and passenger loading zones where curb ramp does not lead to vehicular way.
9. Where no curb is present, the detectable warning surface shall be placed at the edge of the roadway.
10. On or along state highways, curb and gutter is required at curb ramps.

LEGEND:

- Detectable warning surface
- Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
- Running slope 7.5% max. (Max. 8.3% finished surface slope)

CALC. BOOK NO. N/A

SDR DATE 19-JULY-2021

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

DETECTABLE WARNING SURFACE DETAILS

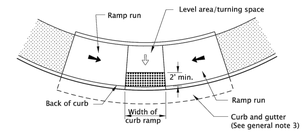
2021

DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED
07-2021	REVISED DETAIL AND NOTES

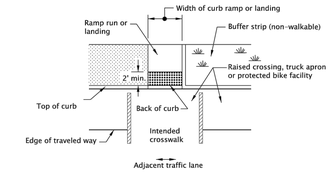
rd902.dgn 19-JUL-2021

RD902

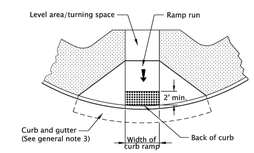
Effective Date: June 1, 2022 - November 30, 2022 RD902



PARALLEL CURB RAMP

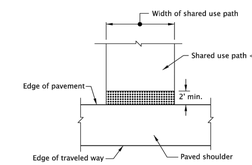


RAISED CROSSING, TRUCK APRON OR PROTECTED BIKE FACILITY



PERPENDICULAR CURB RAMP

GRADE BREAK IN FRONT OF CURB



SHARED-USE PATH CONNECTION

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Detectable warning surface details & locations are based on applicable ODOT Standards.
2. See project plans for details not shown.
   See Std. Dwgs. RD700 & RD701 for curbs.
   See Std. Dwg. RD902 for detectable warning surface installation details.
3. On or along state highways, curb and gutter is required at curb ramps.
4. Detectable warning surface placement for perpendicular ramps vary as shown.

LEGEND:

- Marked or intended crossing location
- Sidewalk
- Detectable warning surface
- Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
- Running slope 7.5% max. (Max. 8.3% finished surface slope)

CALC. BOOK NO. N/A

SDR DATE 20-JULY-2020

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

DETECTABLE WARNING SURFACE PLACEMENT FOR CURB RAMPS

2021

DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED

rd904.dgn 20-JUL-2020

RD904

Effective Date: June 1, 2022 - November 30, 2022 RD904

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

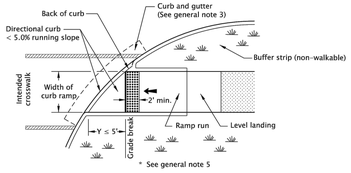
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

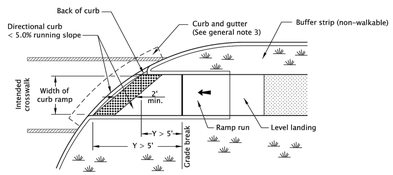
SHEET NO. 3.3

JOB NO. CLA-93

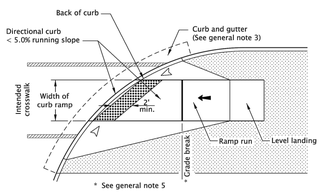
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg



CURB RAMP CROSSING
GRADE BREAK ≤ 5 FT. FROM BACK OF CURB



CURB RAMP CROSSING
GRADE BREAK > 5 FT. FROM BACK OF CURB



CURB RAMP CROSSING
DIRECTIONAL CURB WITH FLARED CONSTRUCTION

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Detectable warning surface details & locations are based on applicable ODOT Standards.
2. See project plans for details not shown.
   See Std. Dwgs. RD700 & RD701 for curbs.
   See Std. Dwg. RD902 for detectable warning surface installation details.
3. On or along state highways, curb and gutter is required at curb ramps.
4. Detectable warning surface placement for perpendicular ramps vary as shown.
5. Detectable warning surface placement across the grade break is prohibited.

LEGEND:

- Marked or intended crossing location
- Sidewalk
- Detectable warning surface
- Running slope 7.5% max. (Max. 8.3% finished surface slope)
- Flare slope (Max. 10.0% finished surface slope)

CALC. BOOK NO. N/A | SDR DATE 14-JAN-2022

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

DETECTABLE WARNING SURFACE PLACEMENT FOR DIRECTIONAL CURBS

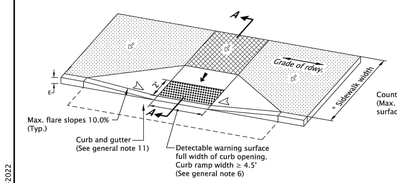
2021

DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED
01-2022	REVISED NOTES

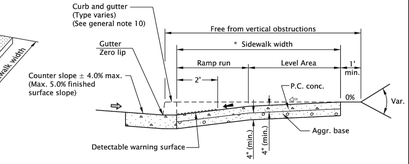
rd905.dgn 14-JAN-2022

RD905

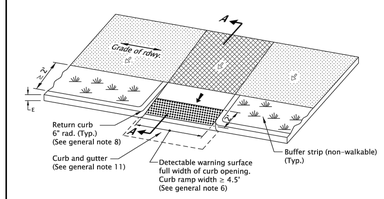
Effective Date: June 1, 2022 - November 30, 2022 RD905



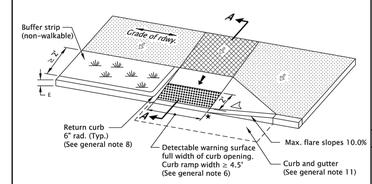
PERPENDICULAR CURB RAMP DETAIL
(Use "Parallel Curb Ramp Detail" or "Combination Curb Ramp Detail" when reqd. turning space cannot be obtained)



SECTION A-A
* NOTE: Minimum width of 14.25 feet sidewalk for E=7'



THROUGH BUFFER STRIP



WITH SINGLE FLARE

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Curb ramp details are based on applicable ODOT Standards.
2. See Std. Dwgs. RD700 & RD701 for curbs.
   See Std. Dwgs. RD720 & RD721 for sidewalks.
   See Std. Dwgs. RD902 through RD908 for detectable warning surface installation details.
   See Std. Dwgs. RD912 through RD916 for curb ramp placement options.
3. Site conditions normally require a project specific design. See project plans for details not shown.
4. Tooled dummy joints are required at all curb ramp grade break lines, (see Std. Dwg. RD722).
5. Curb ramp slopes shown are relative to the true level horizon (zero bubble).
6. Place detectable warning surface at the back of curb for a minimum depth of 2' in the direction of pedestrian travel full width of curb ramp opening that is adjacent to traffic.
7. Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run. Grade breaks shall not be permitted on the surface of ramp runs and turning spaces. Surface slopes that meet at grade breaks shall be flush.
8. Return curb may be provided in lieu of flared slope only if protected from traverse travel by landscaping, see Std. Dwg. RD721. Return curb shall not reduce width of approaching sidewalk.
9. Curb ramps for shared use paths intersecting a roadway shall be full width of path, excluding flares. When a curb ramp is used to provide bicycle access from a roadway to a sidewalk, the curb ramp opening will be ≥ 8' wide, (see Std. Dwg. RD909 for additional details).
10. Place an inlet at upstream side of curb ramp or perform other approved design mitigation. Check the gutter flow depth at curb ramp locations to assure that the design flood does not overtop the back of sidewalk.
11. On or along state highways, curb and gutter is required at curb ramps.

LEGEND:

- Sidewalk
- Detectable warning surface
- Level area (Turning space/landing)
  Unobstructed 4.5' x 4.5'
  With obstruction 4.5' x 5.5' (Longer dimension in direction of pedestrian street crossing).
  For the purposes of this application, a max. 2.0% finished surface slope (for drainage) measured perpendicular in two directions is considered level.
- Cross slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)
- Running slope 7.5% max. (Max. 8.3% finished surface slope)
- Counter slope 4.0% max. ascending or descending, (Max. 5.0% finished surface slope) Slope as required for drainage
- Flare slope (Max. 10% finished surface slope)

CALC. BOOK NO. N/A | SDR DATE 14-JAN-2022

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

PERPENDICULAR CURB RAMP

2021

DATE	REVISION DESCRIPTION
07-2020	DRAWING CREATED
01-2022	REVISED NOTES

rd910.dgn 14-JAN-2022

RD910

Effective Date: June 1, 2022 - November 30, 2022 RD910

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

LINWOOD AVENUE IMPROVEMENTS

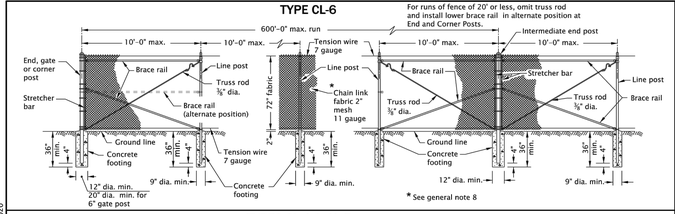
CLACKAMAS COUNTY, OREGON

SHEET NO. 3.4

JOB NO. CLA-93

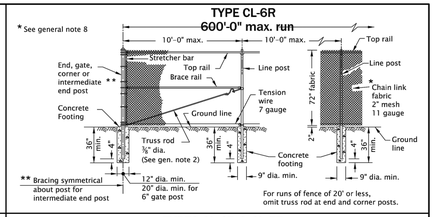
TYPE CL-6

For runs of fence of 20' or less, omit truss rod and install lower brace rail in alternate position at End and Corner Posts.

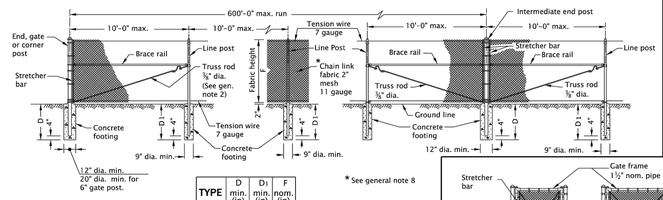


TYPE CL-6R

600'-0" max. run

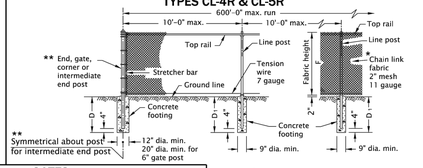


TYPES CL-4 & CL-5



TYPE	D min. (in)	D1 min. (in)	F nom. (in)
CL-4	30	24	48
CL-5	36	36	60

TYPES CL-4R & CL-5R



TYPE	D min. (in)	D1 min. (in)	F nom. (in)
CL-4R	30	24	48
CL-5R	36	36	60

For runs of fence of 20' or less, omit truss rod at end and corner posts.

GATES

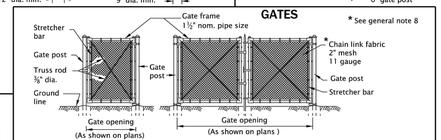


TABLE 1

TYPE		MEMBER: BRACE AND TOP RAILS (TUBULAR) Fence Industry (in)	Nom. Dia. (in)	LINE POSTS (TUBULAR) Fence Industry (in)	Nom. Dia. (in)	LINE POSTS (H-SECTION) Size (in)	Wt. lb./ft.	END, CORNER & INTERMEDIATE END POST (TUBULAR) Fence Industry (in)	Nom. Dia. (in)
STEEL	CL-4 & CL-4R	1⅞	1¼	1⅞	1½	1⅞ x 1⅞	2.72	2⅞	2
STEEL	CL-5 & CL-5R	1⅞	1¼	2⅜	2	2¼ x 2	4.10	2⅞	2½
STEEL	CL-6 & CL-6R	1⅞	1¼	2⅜	2	2½ x 2	4.10	2⅞	2½

GATE OPENING (ft) SINGLE GATE	DOUBLE GATE	GATE POSTS (TUBULAR) Fence Industry (in)	Nom. Dia. (in)
Up thru 6	Up thru 12	2⅞	2½
7 thru 13	13 thru 26	4	3½
14 thru 18	27 thru 36	6⅝	6

NOTE: For CL-6, CL-6R, CL-8, CL-8R, CL-10 & CL-10R, the hardware is minimum and does not include slat wind loading.

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Do not use top rail where fence can be struck by an errant vehicle.
2. Fittings shown are illustrative of use and not specific as to design.
3. Gate posts on each side of a gate opening to be the same size. At a double gate installation with unequal width gates, size of both posts to be as indicated for a single gate installation of the wider gate width.
4. For cross sectional dimensions of members, see Table 1.
5. Posts and rails with sections not shown that meet the requirements of AASHTO M181 are acceptable alternates. See ODOT's QPL for acceptable alternates.
6. All concrete shall be commercial grade concrete.
7. All chain link fabric top and bottom selvage shall be knuckled finish.
8. Chain link fabric for the fence to be installed with pickets shall be 9 gauge wire woven in 3½" by 5½" diamond mesh.
9. See project plans for details not shown.
10. Add fence grounding as required.

CALC. BOOK NO. N/A

SDR DATE 13-JAN-2020

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

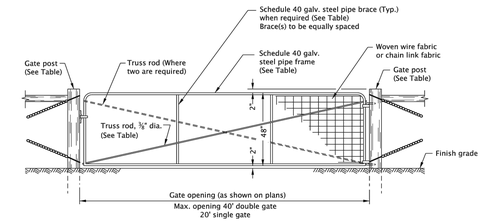
CHAIN LINK FENCE

2021

DATE	REVISION DESCRIPTION

RD815 20-JUL-2020 rd815.dgn

Effective Date: June 1, 2022 - November 30, 2022 RD815



GATE OPENING (ft) SINGLE GATE	DOUBLE GATE	SCHEDULE 40 GALV. STEEL PIPE FRAME NOM. DIA. (in)	MIN. WT. (lb/ft)	SCHEDULE 40 GALV. STEEL PIPE BRACE NUMBER	NOM. DIA. (in)	MIN. WT. (lb/ft)	TRUSS RODS	GATE POSTS ①② WOOD * ROUND DIA. OF SMALL END (in) Min.	Max.	Min. Avg.	SQUARE NOM. SIZE (in)	STEEL SCHEDULE 40 GALV. STEEL PIPE NOM. DIA. (in)	MIN. WT. (lb/ft)
UP thru 6	UP thru 12	1	1.68	–	–	–	–	5	7	6	6x6	2½	5.79
7 thru 11	13 thru 22	1¼	2.27	1	1	1.68	1	5	7	6	6x6	3½	9.11
12 thru 16	23 thru 32	1½	2.72	2	1¼	2.27	2	7	9	8	8x8	6	18.97
17 thru 20	33 thru 40	2	3.65	2	1¼	2.27	2	9	11	10	10x10	6	18.97

① Gate posts on each side of a gate opening to be the same size. At a double gate installation with unequal width gates, size of both posts to be as indicated for single gate installation of the wider gate width.

② For length, setting and bracing details see end posts, Std. Dwg. RD810.

* Max. taper 1" in 4'

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Gates shown are for use with Fence Types 1, 1-5W and 2.
2. See Std. Dwg. RD810 for details not shown.
3. See project plans for details not shown.
4. Add fence grounding as required.

CALC. BOOK NO. N/A

SDR DATE 13-JAN-2020

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

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OREGON STANDARD DRAWINGS

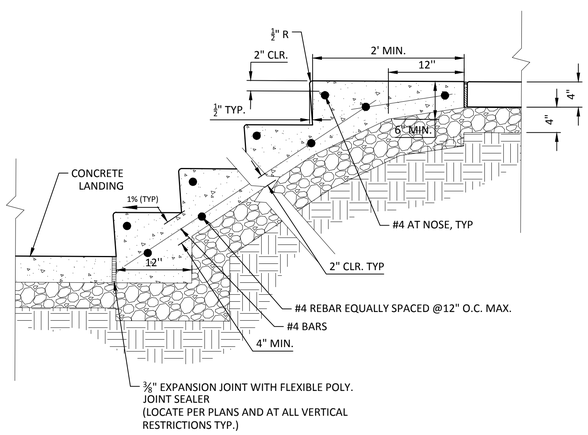
FENCE GATES

2021

DATE	REVISION DESCRIPTION

RD820 20-JUL-2020 rd820.dgn

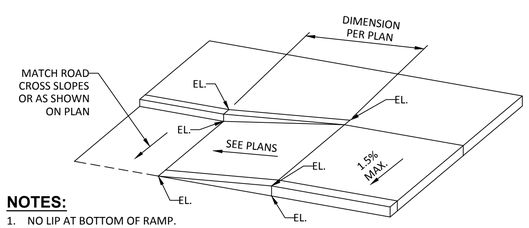
Effective Date: June 1, 2022 - November 30, 2022 RD820



CONCRETE STAIRS

NTS

NOTE:
MATCH EXISTING FENCE TYPE, SIZE, AND MATERIAL. APPROXIMATE FENCE LENGTH IDENTIFIED IN SPECIFICATIONS. INCLUDE TOP BAR AT ALL NEW FENCE LOCATIONS.



NOTES:

1. NO LIP AT BOTTOM OF RAMP.
2. NO TRUNCATED DOME AT BIKE RAMP.

BIKE RAMP AT CYCLE TRACK

NTS

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

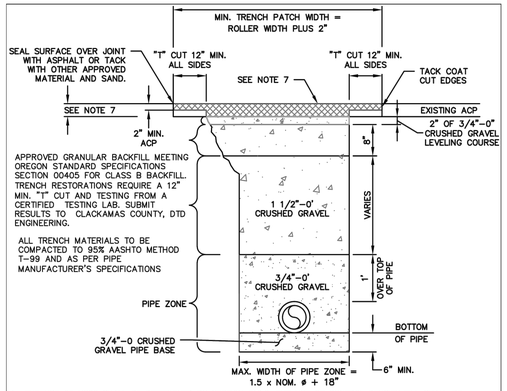
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 3.5

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg



1. THE USE OF U200 SHALL BE DETERMINED BY SECTION 710.8. THE USE OF CONTROL DENSITY FILL SHALL BE DETERMINED BY SECTION 710.8. WHEN USED, REFER TO STANDARD DRAWING U250A.
2. THE EXISTING ACP SHALL BE SAWCUT THROUGH ENTIRE ACP SECTION PRIOR TO EXCAVATION.
3. BACKFILL IN PIPE ZONE SHALL BE PLACED IN MAXIMUM 6" LIFTS AND COMPACTED.
4. TRENCH BACKFILL SHALL BE PLACED IN MAXIMUM 12" LIFTS TO 95% DENSITY.
5. SAWCUT EDGES TO BE TACKED WITH HOT LIQUID ASPHALT.
6. WORK RESULTING IN IRREGULAR TRENCH WIDTHS OR INCIDENTAL DAMAGE TO THE ROADWAY SURFACE WILL REQUIRE ANOTHER SAWCUT AND SUBSEQUENT REMOVAL OF ACP. THE SAWCUT LINE SHALL BE APPROVED BY CLACKAMAS COUNTY PRIOR TO THE PERMANENT ACP REPAIR.
7. RESTORE ACP SECTION WITH 4" OF HMAC LEVEL 3, PG 64-22, 1/2" DENSE GRADED AGGREGATE OR AN EQUAL THICKNESS OF THAT REMOVED WHICHEVER IS GREATER. ASPHALTIC CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF OREGON STANDARD SPECIFICATIONS SEC. 00744.40. ACP TO BE PLACED IN LIFTS BETWEEN 2 INCHES AND 3 INCHES IN THICKNESS.
8. ACP JOINTS/SEAMS SHALL BE SEALED WITH HOT LIQUID ASPHALT, OR APPROVED EQUAL, AND SANDED.
9. CLACKAMAS COUNTY SHALL BE NOTIFIED FOR INSPECTION.
10. TRENCHES SHALL BE PROTECTED WITH STEEL PLATING CAPABLE OF CARRYING A MINIMUM OF H-20 LOADING. EACH PLATE SHALL BE SECURED IN PLACE WITH APPROACH RAMPS OF COLD MIX A.C. LIGHTED BARRICADES SHALL BE MOUNTED WITH BUMP AND CONSTRUCTION AHEAD SIGNS. REFLECTIVE SHEETING FOR NIGHT VISION SHALL BE PLACED AHEAD OF AND ADJACENT TO THE PLATING.
11. TRAFFIC SIGNAL DETECTOR LOOPS IN SIGNALIZED INTERSECTIONS, DAMAGED AS A RESULT OF WORK DONE UNDER THE PERMIT, SHALL BE REPLACED IN THEIR ENTIRETY. NO SPLICING OF TRAFFIC LOOPS IS ALLOWED. ANY TRAFFIC LOOP THAT IS TUNNELED UNDER WILL REQUIRE A FULL DEPTH TRENCH BACKFILL WITH FLUID 150 PSI MAXIMUM STRENGTH CDF (CONTROLLED DENSITY FILL) A MINIMUM WIDTH OF 18" ON EACH SIDE OF THE TRAFFIC LOOP WIRE. ANY TRAFFIC LOOP WORK DONE UNDER THIS PERMIT WILL BE WARRANTED FOR A PERIOD OF TWO YEARS FROM THE DATE OF SUCH WORK.
12. COMPLY WITH SMOOTHNESS REQUIREMENTS OF ODOT STANDARD SPECIFICATIONS.

REVISION	DATE	BY
TEC-CUT ADDED	05/18/20	DC
TEC-CUT MOD.	09/18/20	RM
REVISED	12/19/08	MR

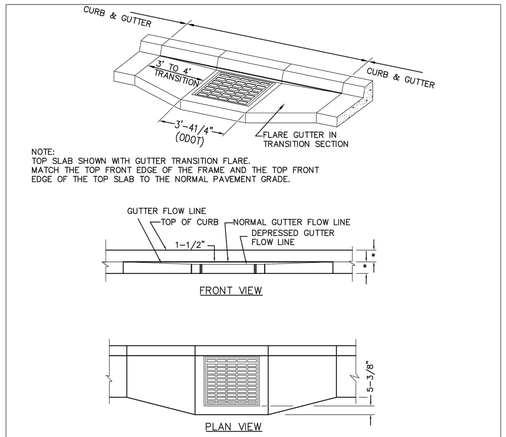
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

APPROVAL DATE: 6/1/2020 SCALE: N.T.S.

STANDARD TRENCH AND BACKFILL

STANDARD DRAWING U200



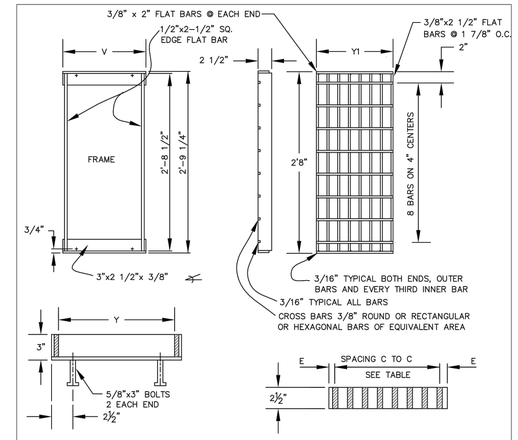
WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes

CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045

APPROVAL DATE: 2013 SCALE: N.T.S.

CATCH BASIN-CURB AND GUTTER DETAIL

STANDARD DRAWING SWM CB-1.0



CATCH BASIN TYPE	V	Y	Y1	E	SPACING C TO C	NO. OF BARS PER GRATE	REMARKS
GB-2	2'-4 3/4"	2'-3 3/8"	1'-1 1/2"	5/8"	1 3/4"	8	2-GRATES
D	2'-4 3/4"	2'-3 3/8"	2'-3"	1 1/2"	3"	9	
GB	1'-3 1/4"	1'-1 7/8"	1'-1 1/2"	5/8"	1 3/4"	8	1-GRATE

NOTES

1. MATERIALS AND FABRICATION SHALL CONFORM TO THE CURRENT APWA STANDARD SPECIFICATIONS.
2. 3/8" CROSS BARS SHALL BE FLUSH WITH THE GRATE SURFACE AND MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTROFORGED TO BEARING BARS.
3. GB CATCH BASIN FOR USE WITH CURB INLET CATCH BASIN WITH GRATE ONLY.

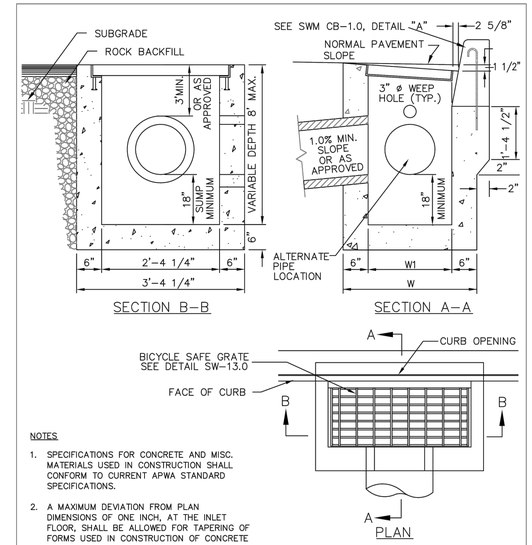
WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes

CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045

APPROVAL DATE: 2013 SCALE: N.T.S.

CATCH BASIN-FRAME AND GRATE

STANDARD DRAWING SWM CB-4.0



NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISC. MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.
2. A MAXIMUM DEVIATION FROM PLAN DIMENSIONS OF ONE INCH, AT THE INLET FLOOR, SHALL BE ALLOWED FOR TAPERING OF FORMS USED IN CONSTRUCTION OF CONCRETE INLETS.
3. REFER TO CURRENT ODOT/APWA OREGON STATE CHAPTER DRAWING RD 366.
4. THE OUTSIDE DIAMETER OF THE PIPE MATERIAL SHALL NOT EXCEED 28".
5. PROVIDE 6" OF COMPACTED CRUSHED ROCK BELOW STRUCTURE.

CATCH BASIN TYPE	W	W1
GB-2	3' 3-3/8"	2' 3-3/8"

GB-1 NOT ALLOWED

WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes

CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045

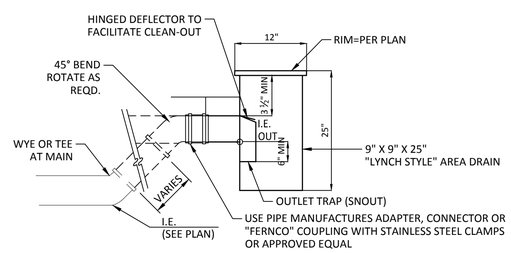
APPROVAL DATE: 2013 SCALE: N.T.S.

CATCH BASIN-STANDARD GB-2

STANDARD DRAWING SWM CB-5.0

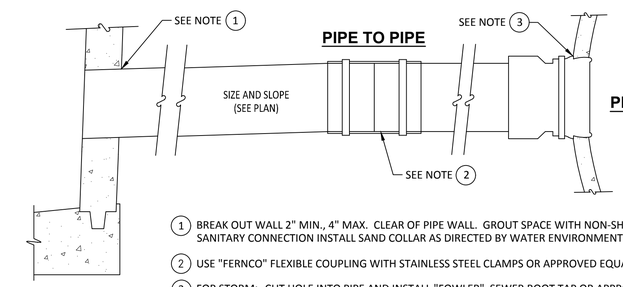
NOTES:

1. TRAP TO BE REMOVABLE TO ALLOW FOR FULL ACCESS TO OUTLET PIPE.
2. FRAMES, GRATES, HOODS, & BASE PLATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3. THE BACKFILL MATERIAL SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS II MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.
4. PVC AREA DRAIN BASIN SHALL BE OREGON PLUMBING CODE APPROVED.
5. CONTRACTOR SHALL DETERMINE THE REQUIRED FITTINGS NEEDED FOR EACH CATCH BASIN



AREA DRAIN CATCH BASIN

NTS



MANHOLE OR CATCH BASIN

1. BREAK OUT WALL 2" MIN., 4" MAX. CLEAR OF PIPE WALL. GROUT SPACE WITH NON-SHRINK GROUT. FOR SANITARY CONNECTION INSTALL SAND COLLAR AS DIRECTED BY WATER ENVIRONMENT SERVICES (WES).
2. USE "FERNCO" FLEXIBLE COUPLING WITH STAINLESS STEEL CLAMPS OR APPROVED EQUAL AS REQUIRED.
3. FOR STORM: CUT HOLE INTO PIPE AND INSTALL "FOWLER" SEWER BOOT TAP OR APPROVED EQUAL.
   FOR SANITARY: PROVIDE 48 HOUR NOTICE TO WATER ENVIRONMENT SERVICES (WES, PHONE: 503-742-4567). WES TO PROVIDE AND INSTALL TAP. CONTRACTOR TO EXCAVATE, SHORE, AND BACKFILL.

PIPE CONNECTION

FOR STORM PIPE AND/OR SANITARY PIPE

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

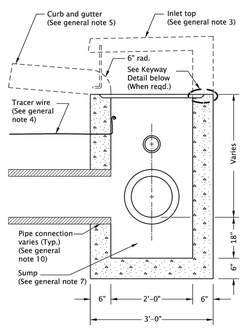
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

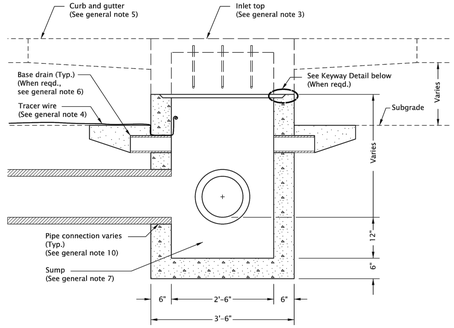
SHEET NO. 3.6

JOB NO. CLA-93

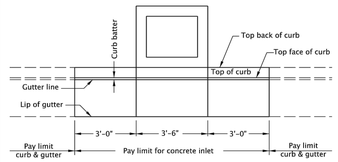
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg



SECTION B - B

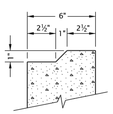


SECTION A - A

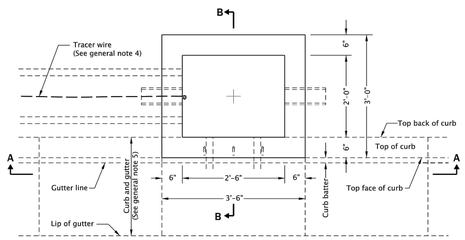


PLAN

PAY LIMIT



KEYWAY DETAIL



PLAN

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All concrete shall be commercial grade concrete.
2. Inlet base may be cast-in-place or precast. Where precast inlet base is used as an alternate, a 4" compacted leveling bed of sand or ¼"-0 crushed aggregate shall be provided. All precast inlets shall conform to requirements of ASTM C913.
3. See Std. Dwgs. RD372 & RD373 for inlet top details.
4. See Std. Dwg. RD336 for tracer wire details, or approved alternate.
5. See Std. Dwgs. RD700 & RD701 for curb and gutter details.
6. See Std. Dwg. RD364 for base drain details.
7. Provide sump only where shown on plans, and allowed by jurisdiction. For sump details, see Std. Dwg. RD364.
8. Location, elevation, diameter, slope, and number of pipe(s) varies, see project plans.
9. Max. pipe diameter varies with pipe material.
10. See Std. Dwg. RD339 for pipe to structure connections.

CALC. BOOK NO. N/A SDR DATE 21-JUL-2015

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

CONCRETE INLET BASE TYPE CG-3

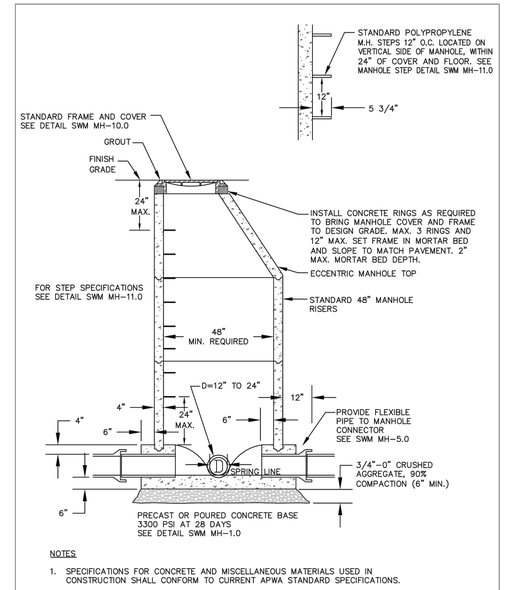
2021

DATE	REVISION DESCRIPTION

rd371.dgn 20-JUL-2020

RD371

Effective Date: June 1, 2022 - November 30, 2022 RD371



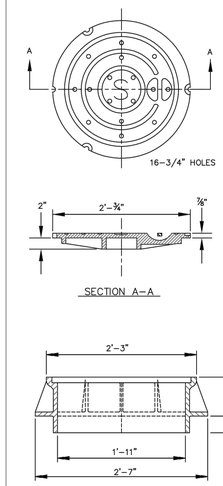
NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.

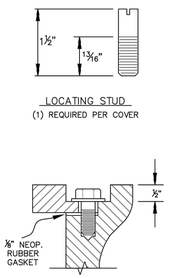
NOTE: UTILIZE SHALLOW CONE OR FLAT-TOP IN LOCATIONS WITH SHALLOW INCOMING PIPE

WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | MANHOLE - STANDARD | STANDARD DRAWING SWM MH-9.0

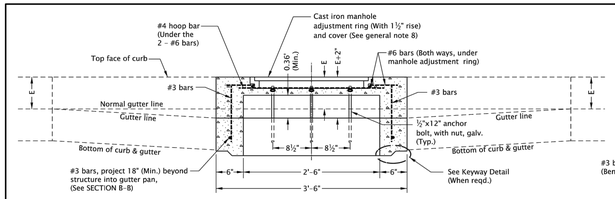
STANDARD MANHOLE



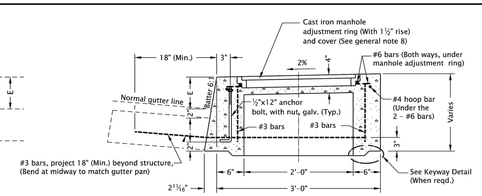
WATER TIGHT DETAILS
TAMPERPROOF



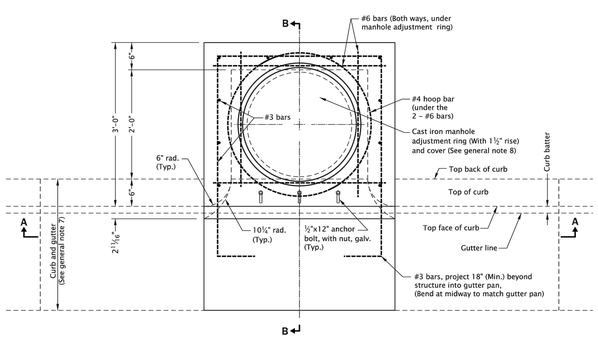
WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | MANHOLE-STANDARD FRAME & COVER | STANDARD DRAWING SWM MH-10.0



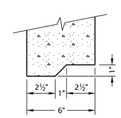
SECTION A - A



SECTION B - B



PLAN



KEYWAY DETAIL

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All concrete shall be commercial grade concrete.
2. Inlet top may be cast-in-place or precast. All precast inlets shall conform to requirements of ASTM C913.
3. All reinforcement shall be 2" clear of nearest face of conc., unless otherwise shown.
4. Vary anchor bolt length and reinforcing bar placement as required by curb exposure E (See note 7 below).
5. See Std. Dwg. RD371 for inlet base details.
6. See Std. Dwg. RD371 for inlet pay limit.
7. See Std. Dwgs. RD700 & RD701 for curb and gutter details.
8. See Std. Dwg. RD356 for cast iron manhole adjustment ring and cover.

CALC. BOOK NO. N/A SDR DATE 16-JAN-2019

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

CONCRETE INLET TOP, OPTION 1 TYPE CG-3

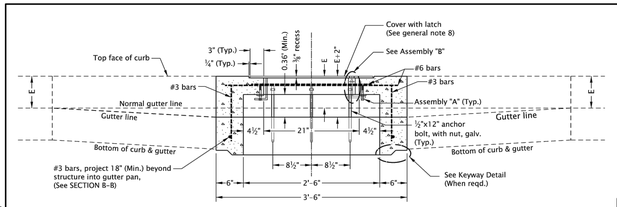
2021

DATE	REVISION DESCRIPTION

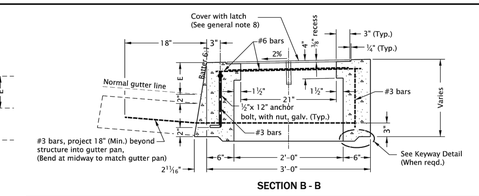
rd372.dgn 20-JUL-2020

RD372

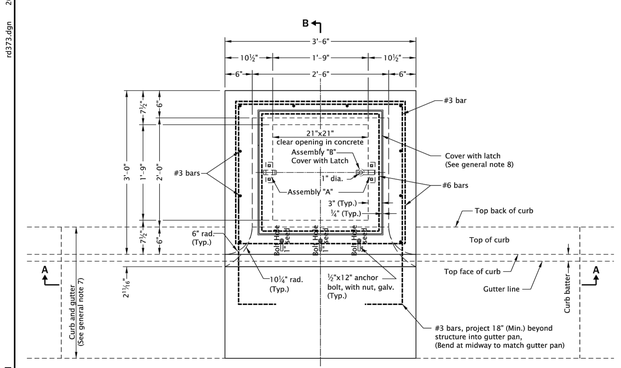
Effective Date: June 1, 2022 - November 30, 2022 RD372



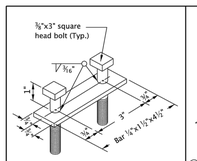
SECTION A - A



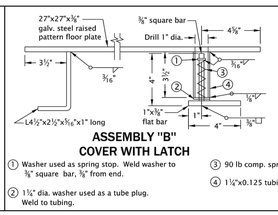
SECTION B - B



PLAN



ASSEMBLY "A"

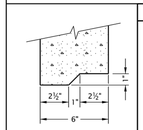


ASSEMBLY "B"
COVER WITH LATCH

1. Washer used as spring stop. Weld washer to ⅜" square bar, ⅜" from end.
2. 1¼" dia. washer used as a tube plug. Weld to tubing.
3. 90 lb comp. spring.
4. 1¼"x0.125 tubing.

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All concrete shall be commercial grade concrete.
2. Inlet top may be cast-in-place or precast. All precast inlets shall conform to requirements of ASTM C913.
3. All reinforcement shall be 2" clear of nearest face of conc., unless otherwise shown.
4. Vary anchor bolt length and reinforcing bar placement as required by curb exposure E (see note 7 below).
5. See Std. Dwg. RD371 for inlet base details.
6. See Std. Dwg. RD371 for inlet pay limit.
7. See Std. Dwgs. RD700 & RD701 for curb and gutter details.
8. Provide cover with latch per Assembly A & Assembly B, hot dip galvanize after fabrication. Mount cover with latch flush with finish grade, in ⅜" deep concrete recess, with ¼" horizontal clearance on all sides.



KEYWAY DETAIL

CALC. BOOK NO. N/A SDR DATE 16-JAN-2019

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

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OREGON STANDARD DRAWINGS

CONCRETE INLET TOP, OPTION 2 TYPE CG-3

2021

DATE	REVISION DESCRIPTION

rd373.dgn 20-JUL-2020

RD373

Effective Date: June 1, 2022 - November 30, 2022 RD373

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
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LANDSCAPE ARCHITECTS • SURVEYORS
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

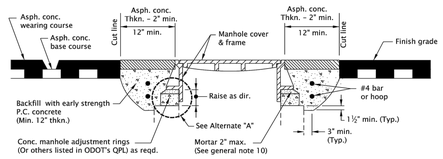
DETAILS

LINWOOD AVENUE IMPROVEMENTS

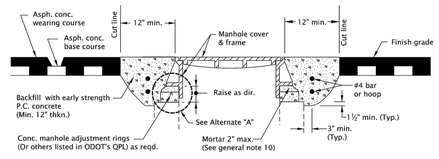
CLACKAMAS COUNTY, OREGON

SHEET NO. 3.7

JOB NO. CLA-93



METHOD "A"



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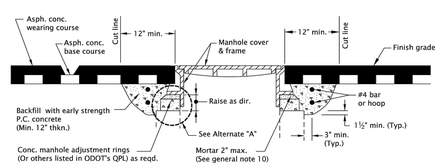

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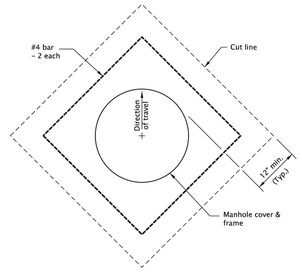
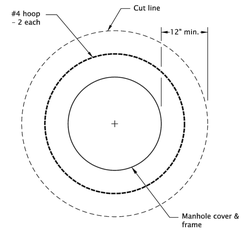
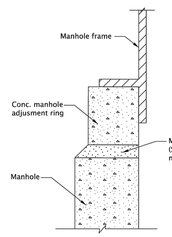


PLAN
SQUARE CUT



PLAN
CIRCULAR CUT



ALTERNATE "A"

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Cover manhole with building paper and const. asph. conc. base course and wearing courses.
2. Saw cut square or circular excavation around manhole 12" min. from manhole frame.
3. Raise manhole cover and frame to finish grade by installing conc. manhole adjustment rings and leveling mortar, as shown.
4. Backfill with early strength Portland Cement Concrete. All concrete shall be commercial grade concrete.
5. Protect from traffic loading until conc. has cured to 3000 psi.
6. Apply tack coat to edges of existing pavement before installing patch.
7. Finish joint with asphalt seal and sand.
8. See Std. Dwg. RD336 for manhole steps details.
9. See appropriate manhole standard drawings for details not shown.
10. Use epoxy for synthetic grade rings.
11. See Std. Dwg. RD336 for tracer wire details.
12. See Std. Dwg. RD356 for manhole covers and frames.

CALC. BOOK NO. N/A

SDR DATE 21-JUL-2015

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

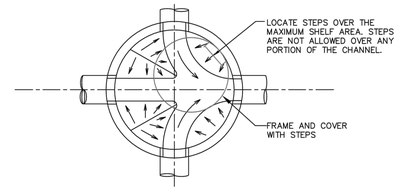
MANHOLE FRAME ADJUSTMENT

2021

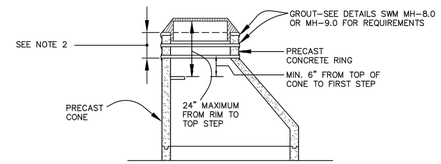
DATE	REVISION DESCRIPTION

Effective Date: June 1, 2022 - November 30, 2022

RD360



GENERAL PLAN OF CHANNEL INTERSECTION

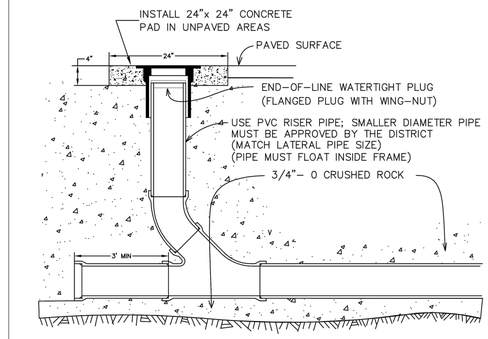


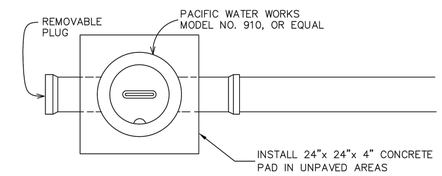
PRECAST RING EXTENSION

NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.
2. NUMBER OF RISER RINGS ALLOWED SHALL NOT EXCEED 12" MAXIMUM.

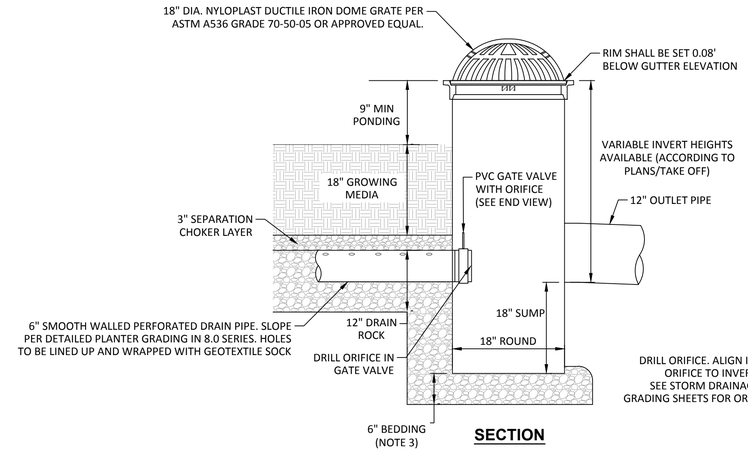
WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | MANHOLE-CHANNEL AND RING EXTENSION | STANDARD DRAWING SWM MH-2.0





NOTE: CLEANOUTS WITHIN A PRIVATE OR PUBLIC RIGHT-OF-WAY SHALL MEET THE LATEST ROADWAY STANDARDS FOR SPECIFICATIONS AND LOAD RATE.

WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes | CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045 | APPROVAL DATE: 2013 SCALE: N.T.S. | STORM - CLEAN OUT | STANDARD DRAWING SWM ST-4.0



BEEHIVE OVERFLOW INLET

NTS

NOTES:

1. CONTRACTOR TO WIDEN EXCAVATION AS REQUIRED TO OBTAIN COMPACTION WITH COMPACTION EQUIPMENT.
2. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 24").
3. BEDDING MATERIAL SHALL BE 6" OF COMPACTED ¾"-0 CRUSHED ROCK BASE MATERIAL OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS I OR CLASS II MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.
4. REFER TO 8.0 SERIES FOR DETAILED PLANTER GRADING AND BEEHIVE LOCATIONS

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

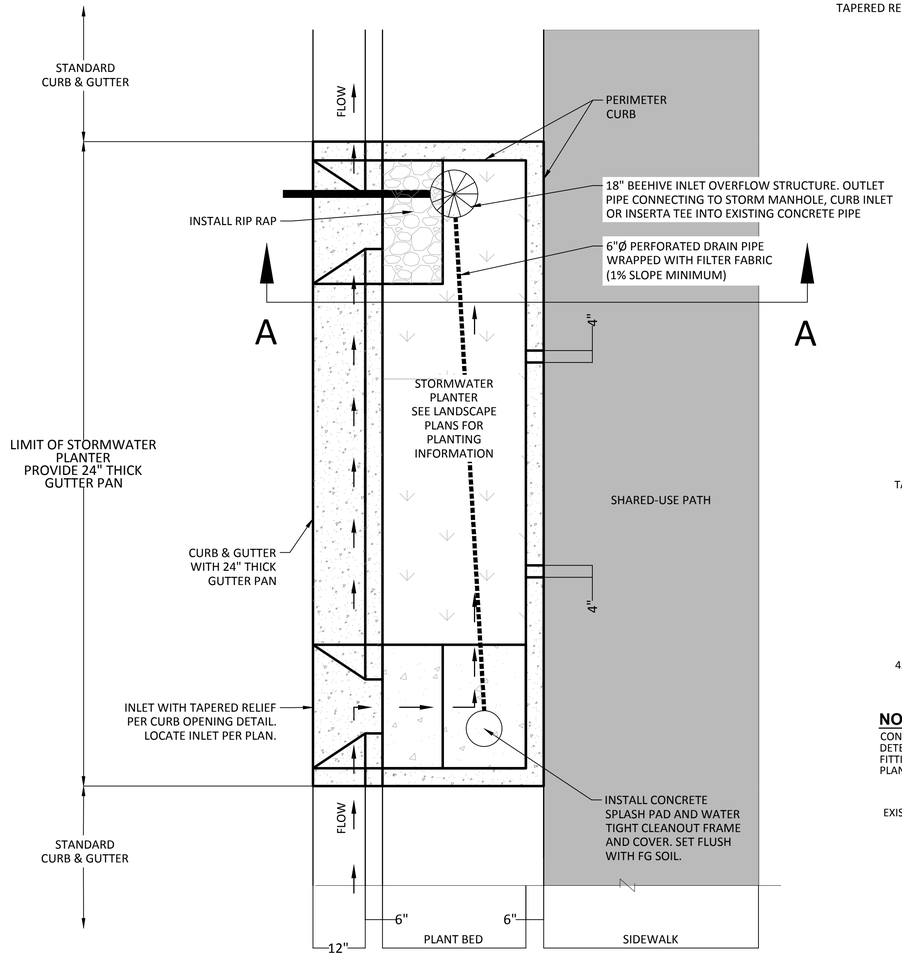
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

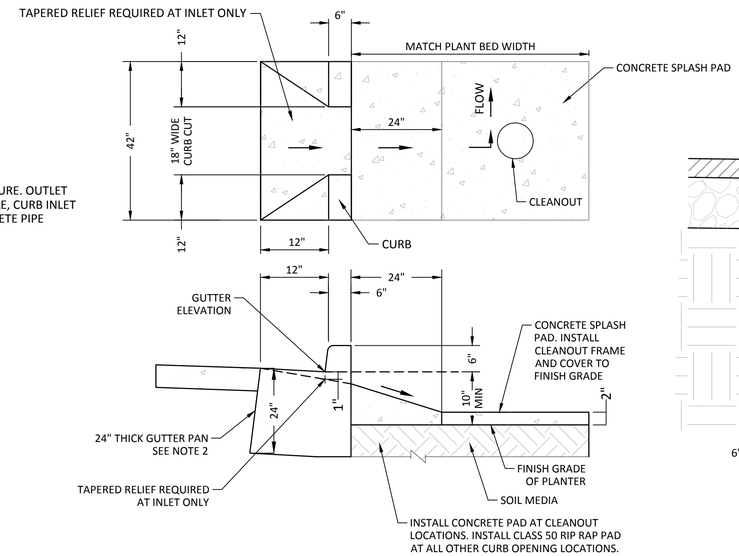
SHEET NO. 3.8

JOB NO. CLA-93

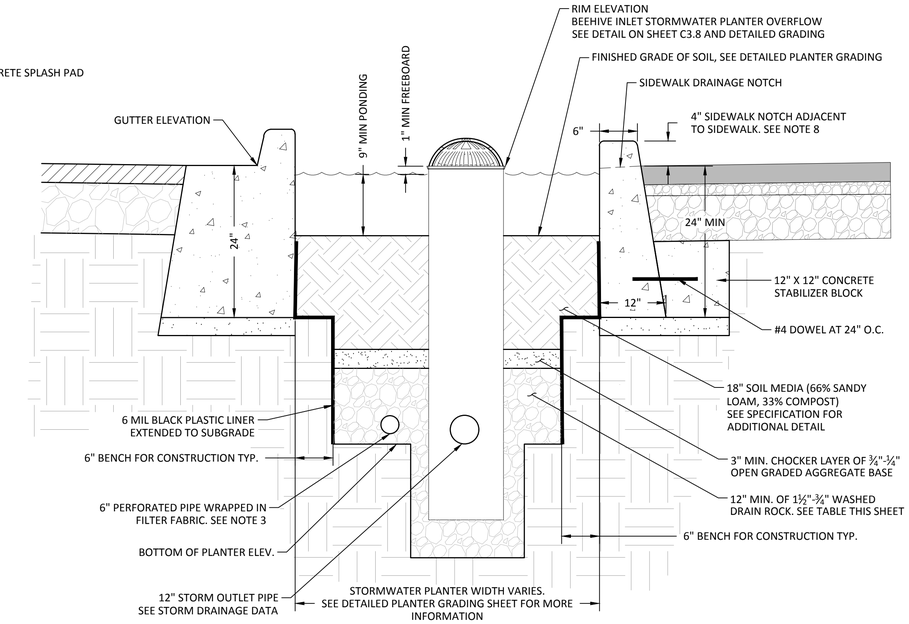
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg
RD360.dgn 20-JUL-2020



STORMWATER PLANTER PLAN



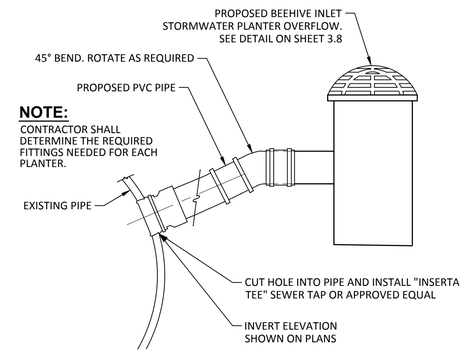
CURB OPENING DETAIL



STORMWATER PLANTER SECTION WITH BEEHIVE INLET STORMWATER PLANTER OVERFLOW

PLANTER NUMBER	WQ SOIL DEPTH	CHOCKER DEPTH	*WASHED DRAIN ROCK DEPTH
1	18"	3"	VARIES (12" - 26")
2	18"	3"	VARIES (12" - 20")
3	18"	3"	VARIES (12" - 19")
4	18"	3"	VARIES (12" - 16")
5	18"	3"	VARIES (12" - 19")
6	18"	3"	VARIES (12" - 17")
7	18"	3"	12"
8	18"	3"	12"
9	18"	3"	VARIES (12" - 16")
10	18"	3"	VARIES (12" - 18")
11	18"	3"	VARIES (12" - 20")
12	18"	3"	VARIES (12" - 21")
13	18"	3"	VARIES (12" - 25")
14	18"	3"	VARIES (12" - 17")
15	18"	3"	VARIES (12" - 21")
16	18"	3"	VARIES (12" - 17")

*FLAT BOTTOM



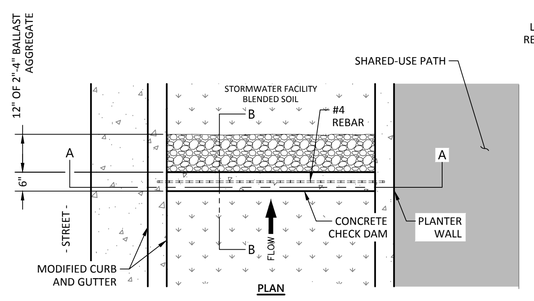
NOTE:
CONTRACTOR SHALL DETERMINE THE REQUIRED FITTINGS NEEDED FOR EACH PLANTER.

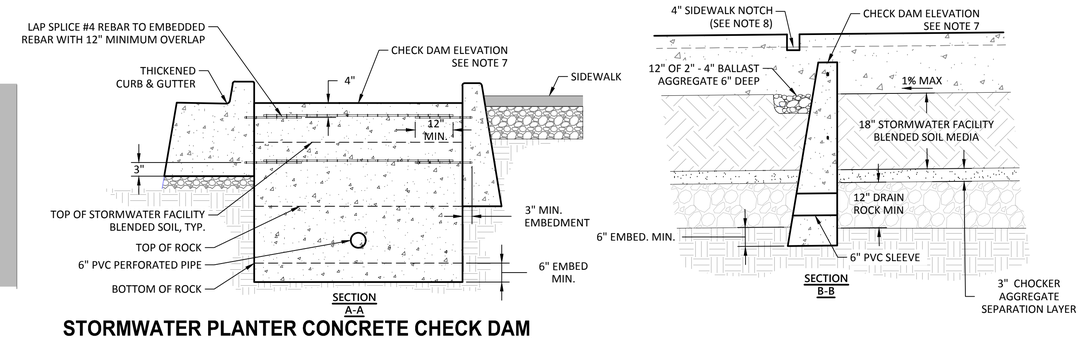
PLANTER INSERTA TEE PIPE CONNECTION

NTS

STORMWATER PLANTER NOTES

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING AND FOOT TRAFFIC PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. CONSTRUCT MODIFIED STANDARD CURB AND GUTTER PER STANDARD CURB AND GUTTER DETAIL S150 ON SHEET 3.0. MODIFY GUTTER PAN TO BE 24" THICK AS SHOWN.
3. PIPE SHALL BE PVC D3034 SDR 35, 6" PERFORATED PIPE WRAPPED IN FILTER FABRIC WITH 0.5% MINIMUM SLOPE. BOTTOM OF PIPE SHALL BE SET AT LEAST 6" ABOVE EXISTING SUBGRADE. CONNECT TO BEEHIVE INLET AND INSTALL PIPE WITHIN EACH STORMWATER PLANTER FOR DRAINAGE PURPOSES. SEE STORM DRAINAGE DATA ON ROADSIDE SHEETS FOR LENGTH, S=0.01 MIN.
4. SLOPE OF PLANTER TO NOT EXCEED 1.0%
5. CONTRACTOR TO POTHOLE AND PROTECT EXISTING UTILITIES DURING CONSTRUCTION. WATER LINE TO MAINTAIN 3.0' OF COVER WITH PROPOSED DESIGN. FILED COORDINATE ANY CONFLICTS WITH DESIGN ENGINEER.
6. FINISH ALL EXPOSED CONCRETE SURFACES.
7. CHECK DAM TOP ELEVATION TO BE WHICHEVER IS LOWEST: EQUAL TO THE FLOW LINE ELEVATION AT THE UPSTREAM INLET OF THE FACILITY; THE ELEVATION OF THE SIDEWALK ADJACENT TO THE CHECK DAM; OR 6" BELOW THE ELEVATION OF THE TOP-OF-CURB ADJACENT TO THE PLANTER. ENSURE THAT THE CHECK DAM ELEVATIONS DO NOT CAUSE STORMWATER TO OVERFLOW TO SIDEWALK, OR BACKWATER TO STREET.
8. CONSTRUCT 4" SIDEWALK NOTCH TOP OF WALL EVERY 10 LF ON CENTER. NOTCH TO BE SET 1" BELOW SIDEWALK LOW POINT, SLOPING DOWNWARD INTO PLANTER FACILITY, TYP.





STORMWATER PLANTER CONCRETE CHECK DAM

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

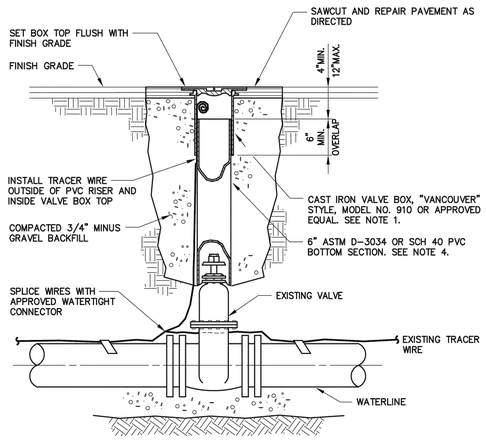
LINWOOD AVENUE IMPROVEMENTS

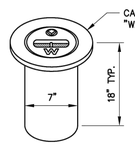
CLACKAMAS COUNTY, OREGON

SHEET NO. 3.9

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-3.0 DETAILS.dwg





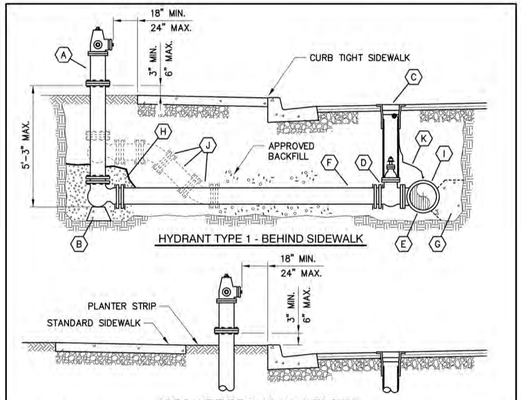
"VANCOUVER" STYLE VALVE BOX

NOTES:

1. REFERENCE CRW TECHNICAL SPECIFICATION SECTION 15200.
2. VALVE BOXES SHALL BE CENTERED DIRECTLY OVER THE VALVE NUT IN A VERTICAL POSITION.
3. VALVE BOX TOP SHALL BE ADJUSTED TO FINISH GRADE.
4. PVC LOWER SHALL BE A CONTINUOUS PIECE – NO BELLS OR COUPLERS.

NO	REVISION	VALVE BOX REPLACEMENT		
		SCALE: N.T.S.	DATE: MAY 2021	104B
		DRAWING: CRW.STD.DTL104B.dwg		

Clackamas River Water



HYDRANT TYPE 1 - BEHIND SIDEWALK

HYDRANT TYPE 2 - IN PLANTER STRIP

(MAIN CONNECTION AND VALVE AS ABOVE)

KEYNOTES:

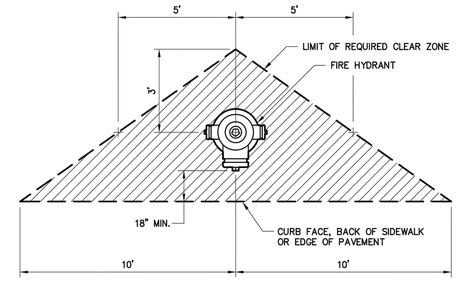
- (A) THREE WAY FIRE HYDRANT WITH (2) 2½" HOSE NOZZLES AND (1) 4½" PUMP NOZZLE
- (B) STANDARD CONCRETE PIER BLOCK, 8" THICK x 16" SQUARE BASE
- (C) SEE CRW DETAIL 104, "GATE VALVE AND ACCESSORIES"
- (D) 6" FLGxMJ GATE VALVE.
- (E) NEW MJxFLG TEE, USE 18' OF RESTRAINED PIPING EACH WAY.
- (F) 6" D.I. RESTRAINED SPOOL
- (G) THRUST BLOCK REQUIRED AT WET TAP. SEE CRW DETAIL 105, "WET TAP ASSEMBLY".
- (H) 1½" MIN. CLEAN DRAIN ROCK 6" ABOVE WEEP HOLES. COVER WITH GEOFABRIC.
- (I) FOR WET TAP OF EXISTING MAIN, USE APPROVED S.S. TAP SADDLE – SEE CRW DETAIL 105, "WET TAP ASSEMBLY"
- (J) 6" RESTRAINED MJ BENDS AND SPOOL AS REQUIRED TO ADJUST GRADE
- (K) TRACER WIRE

NOTES:

1. REFERENCE CRW TECHNICAL SPECIFICATION SECTION 15200.
2. INSTALL MJ BENDS AS REQUIRED TO ADJUST GRADE TO COMPLY WITH MAXIMUM FIRE HYDRANT BURY REQUIREMENTS.

NO	REVISION	FIRE HYDRANT ASSEMBLY		
		TYPE 1 AND 2		
		SCALE: N.T.S.	DATE: MAY 2021	110A
		DRAWING: CRW.STD.DTL 110A.dwg		

Clackamas River Water



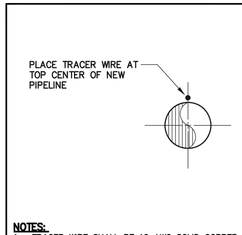
NOTES:

1. REFERENCE CRW TECHNICAL SPECIFICATION SECTION 15200.
2. THE CLEAR ZONE PROHIBITS THE FOLLOWING:
   - VEHICLE PARKING
   - FENCES
   - TREES
   - LARGE BUSHES
   - RETAINING WALLS
   - ANYTHING ELSE THAT MAY INTERFERE WITH OPERATION OF THE FIRE HYDRANT
3. THE CLEAR ZONE ALLOWS THE FOLLOWING:
   - LAWN GRASS
   - MULCH
   - BARK DUST
   - GROUND COVER
   - LOW PLANTINGS

   HOWEVER, THE PROPERTY OWNERS SHOULD BE AWARE THE GROUND COVER COULD BE DAMAGED WHEN THE HYDRANT IS USED OR MAINTAINED.

NO	REVISION	FIRE HYDRANT ASSEMBLY		
		CLEAR ZONE		
		SCALE: N.T.S.	DATE: MAY 2021	110C
		DRAWING: CRW.STD.DTL.110C.dwg		

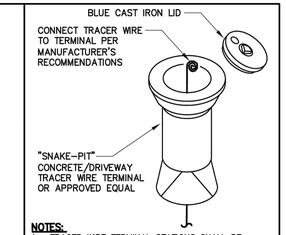
Clackamas River Water



NOTES:

1. TRACER WIRE SHALL BE 12 AWG SOLID COPPER WIRE WITH BLUE HMWPE OR PVC INSULATION.
2. INTERSECTIONS AND SPLICES SHALL PROVIDE ELECTRICAL CONTINUITY AND SHALL BE WATER TIGHT, SILICONE FILLED CONNECTORS.
3. REFERENCE CRW SPECIFICATION SECTION 15100.

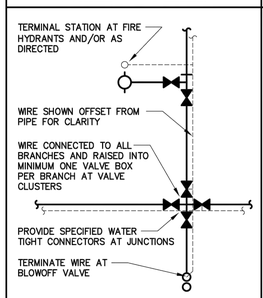
TRACER WIRE LOCATION



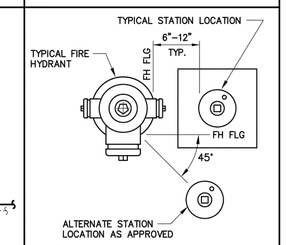
NOTES:

1. TRACER WIRE TERMINAL STATIONS SHALL BE SUITABLE FOR TRAFFIC LOADS WITH CAST IRON TOP AND SINGLE TERMINAL.
2. REFERENCE CRW SPECIFICATION SECTION 15100.
3. INSTALL 1.5'SQx4"THK CONCRETE OR HMAC PAD AROUND BOX.

TRACER WIRE TERMINAL STATION



TRACER WIRE LAYOUT



NOTES:

1. TRACER WIRE TERMINAL STATIONS ARE TYPICALLY LOCATED AT FIRE HYDRANTS. LOCATE THE STATION AS SHOWN OR AS DIRECTED.
2. REFERENCE CRW SPECIFICATION SECTION 15100.

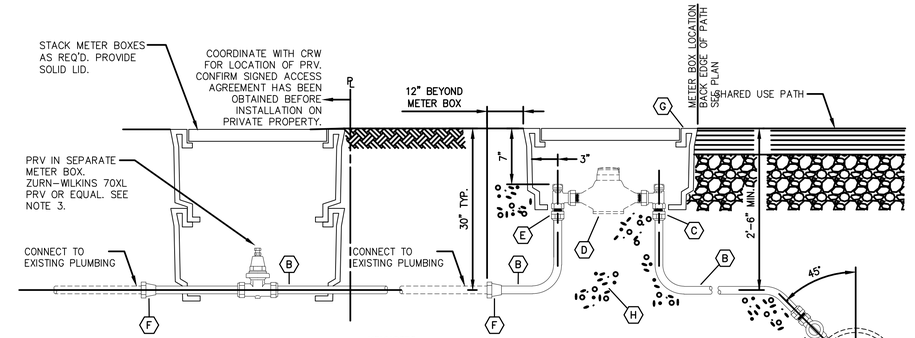
TRACER WIRE TERMINAL STATION LOCATION

NO	REVISION	TYPICAL TRACER WIRE		
		SCALE: N.T.S.	DATE: MAY 2021	115
		DRAWING: CRW.STD.DTL115.dwg		

Clackamas River Water

GENERAL NOTES:

1. **CONTRACTOR TO PROVIDE A NOTICE TO EACH CUSTOMER AT LEAST ONE DAY PRIOR TO SERVICE WORK.**
2. **CONTRACTOR MUST COMPLETE SERVICE WORK AND RETURN SERVICE THE SAME DAY.**



NOTES:

1. ALL SERVICE MATERIALS SHALL COMPLY WITH "LEAD-FREE" REQUIREMENTS
2. FINAL LOCATION OF SERVICE ASSEMBLY REQUIRES CRW APPROVAL.
3. INSTALL PRESSURE REDUCING VALVE ON PRIVATE PROPERTY, AT LOCATIONS WITH EXISTING PRV'S, AS INDICATED ON PLANS, OR AS DIRECTED AND IN CONFORMANCE WITH LOCAL PLUMBING CODE REQUIREMENTS.

KEYNOTES:

- (A) EXISTING CORP STOP-STYLE UNKNOWN REPLACE COMPRESSION NUT AND GASKET ASSEMBLY. DIRECT TAP DUCTILE IRON, FORD (CCxG), AS REQUIRED OR DIRECTED
- (B) COPPER TUBING TYPE "K", SOFT SEAMLESS, MATCH EXISTING SIZE
- (C) FORD ANGLE METER STOP (GxMETER SWIVEL NUT) WITH PADLOCK WING
- (D) REINSTALL EXISTING METER. CONTRACTOR TO SUPPLY AND INSTALL NEW GASKETS.
- (E) FORD ANGLE METER STOP (GxMETER SWIVEL NUT) WITH OR WITHOUT PADLOCK WING
- (F) STRAIGHT JOINT COMP COUPLING (FIPxCU). CONNECT TO EXISTING HOUSE SERVICE PER PLUMBING CODE
- (G) METER BOX, ARMORCAST A6001946PCX12 WITH EBAA IRON MC 1324-4R LID. CENTER BOX OVER METER.
- (H) CLASS B 3/4"-MINUS COMPACTED BACKFILL

TYPICAL CRW SERVICE ASSEMBLY

N.T.S.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

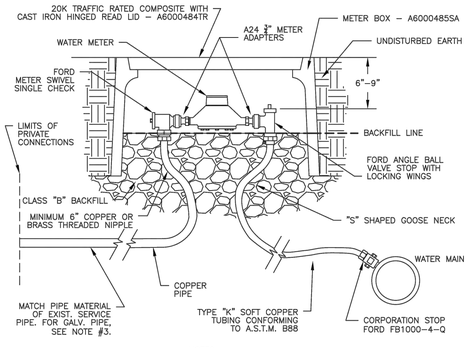
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

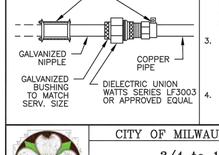
SHEET NO. 3.10

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-3.0 DETAILS.dwg



UNTHREADED GALVANIZED PIPE CONNECTION:



NOTES:

1. IF COPPER TUBING CROSSES CATHODICALLY PROTECTED LINE, ENCASE COPPER IN POLYETHYLENE TUBING FOR 24" (CENTERED AT THE CROSSING LINE) AND FASTEN WITH 2" WIDE ADHESIVE TAPE THAT IS COMPATIBLE WITH POLYETHYLENE.
2. PLACE METER BOXES (1) LOCATED BEHIND THE SIDEWALK WHERE THERE IS SUFFICIENT RIGHT–OF–WAY, (2) WITHIN THE PLANTER STRIP, EXCLUDING WATER QUALITY FACILITIES, (3) WITHIN THE SIDEWALK WITH THE BACK OF THE METER BOX AT THE BACK EDGE OF THE SIDEWALK.
3. CONNECT GALVANIZED SERVICE PIPE; (1) AT EXISTING THREADED FITTING WITHIN 5 FEET OF WATER METER; (2) RETHREAD EXISTING GALVANIZED SERVICE PIPE; (3) IF EXISTING PIPE IS IN POOR CONDITION AND CANNOT BE RETHREADED, USE UNTHREADED GALVANIZED PIPE CONNECTION DETAIL.
4. IF METER BOX IS LOCATED IN THE SIDEWALK, DIELECTRIC UNION WILL BE INSTALLED (1) 6" FROM BACK OF METER INSIDE OF METER BOX, (2) BEHIND BACK OF SIDEWALK.

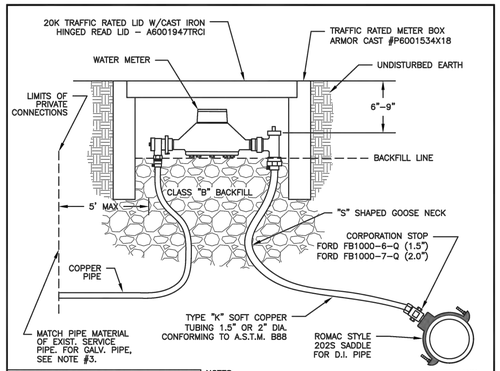
CITY OF MILWAUKIE, OREGON – PUBLIC WORKS DEPT.

3/4 to 1 Inch Water Service

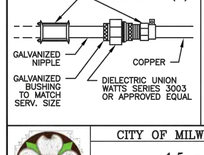
DRAWING NO. 401

APPROVED 08/2019 CITY ENGINEER DATE

NO.	REVISIONS	DATE	BY
5	ADDED DIELECTRIC UNION NOTE	12/14	AJR
6	ADDED 3/4" WATER SERVICE	11/18	TAP
7	TITLE CHANGE	08/19	TAP



UNTHREADED GALVANIZED PIPE CONNECTION:



NOTES:

1. IF COPPER TUBING CROSSES CATHODICALLY PROTECTED LINE, ENCASE COPPER IN POLYETHYLENE TUBING FOR 24" (CENTERED AT THE CROSSING LINE) AND FASTEN WITH 2" WIDE ADHESIVE TAPE THAT IS COMPATIBLE WITH POLYETHYLENE.
2. PLACE METER BOXES (1) LOCATED BEHIND THE SIDEWALK WHERE THERE IS SUFFICIENT RIGHT–OF–WAY, (2) WITHIN THE PLANTER STRIP, EXCLUDING WATER QUALITY FACILITIES, (3) WITHIN THE SIDEWALK WITH THE BACK OF THE METER BOX AT THE BACK EDGE OF THE SIDEWALK.
3. CONNECT GALVANIZED SERVICE PIPE; (1) AT EXISTING THREADED FITTING WITHIN 5 FEET OF WATER METER; (2) RETHREAD EXISTING GALVANIZED SERVICE PIPE; (3) IF EXISTING PIPE IS IN POOR CONDITION AND CANNOT BE RETHREADED, USE UNTHREADED GALVANIZED PIPE CONNECTION DETAIL.
4. IF METER BOX IS LOCATED IN THE SIDEWALK, DIELECTRIC UNION WILL BE INSTALLED (1) 6" FROM BACK OF METER INSIDE OF METER BOX, (2) BEHIND BACK OF SIDEWALK.

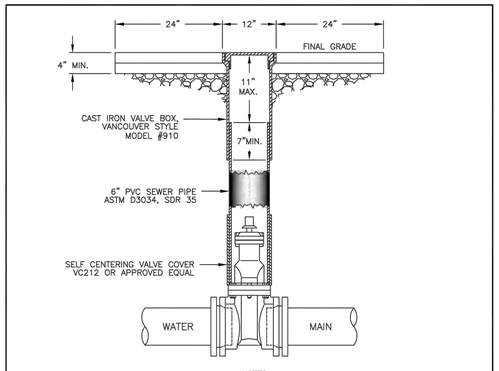
CITY OF MILWAUKIE, OREGON – PUBLIC WORKS DEPT.

1.5 – 2 Inch Water Service

DRAWING NO. 402

APPROVED 08/2019 CITY ENGINEER DATE

NO.	REVISIONS	DATE	BY
5	REMOVED COPPERSETTER	12/13	AJR
6	ADDED DIELECTRIC UNION NOTE	12/14	AJR
7	TITLE CHANGED	08/19	TAP



18" TALL VALVE BOX

NOTES:

1. VALVE BOXES MUST BE CENTERED DIRECTLY OVER THE VALVE NUT IN A VERTICAL POSITION.
2. VALVE BOX TOP TO BE ADJUSTED TO MEET FINISHED GRADE.
3. PVC MUST BE ONE CONTINUOUS PIECE – NO BELLS OR COUPLERS.
4. VALVE NUT EXTENSIONS TO BE USED TO BRING VALVE NUT WITHIN 4 FEET OF FINAL GRADE.
5. VALVE CAN MUST BE ENCASED IN 2'x2' PAD IN UNIMPROVED AREAS. REPAIRS WITHIN PAVED STREET REQUIRE A MINIMUM 5'x5' ASPHALT PATCH.

CITY OF MILWAUKIE, OREGON – PUBLIC WORKS DEPT.

Valve Box

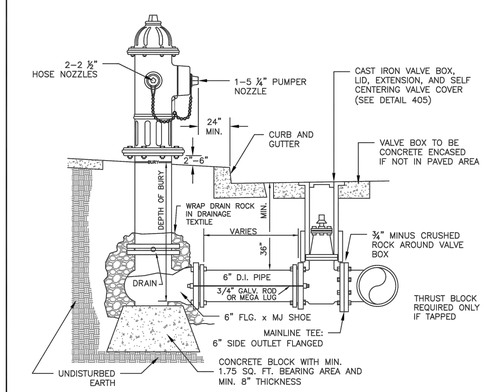
DRAWING NO. 405

APPROVED 08/2019 CITY ENGINEER DATE

NO.	REVISIONS	DATE	BY
3	DRAWING NUMBER CHANGED	12/13	AJR
4	DRAWING NUMBER CHANGED	11/18	TAP
5	TITLE AND NOTE CHANGED	08/19	TAP

NOTES:

1. HYDRANTS TO BE WATEROUS WB67, MUELLER CENTURION A423, M&H 929 RELIANT, OR CLOW MEDALLION F2545 WITH 1 ½" OPERATING NUTS.
2. HYDRANT COLOR TO BE MILLER EQUIP. ENAMEL OE 40 (SAFETY YELLOW).
3. JOINTS TO BE RESTRAINED BY ⅜" DIA. GALVANIZED STEEL RODS OR MEGA LUGS.
4. ALL FITTINGS IN CONTACT W/ CONCRETE TO BE WRAPPED IN PLASTIC. HYDRANT DRAIN HOLES TO REMAIN OPEN TO DRAIN ROCK AND OPERATIONAL.
5. MIN. 4 CU. FT. OF 2"–1" CLEAN DRAIN ROCK MUST BE PLACED AROUND SHOE UP TO A MIN. OF 6" ABOVE DRAIN OUTLETS.
6. WHERE PLASTIC STRIP EXISTS, HYDRANT TO BE PLACED SO FRONT PORT IS A MINIMUM OF 24" BEHIND FACE OF CURB.
7. WHERE INTEGRAL SIDEWALK AND CURB EXISTS, HYDRANT TO BE PLACED AT BACK OF SIDEWALK, OR AS DIRECTED BY ENGINEER.
8. BURY OF HYDRANT TO BE MEASURED FROM FINISHED GRADE TO BOTTOM OF CONNECTING PIPE.
9. HYDRANT VALVE TO BE AMERICAN FLOW CONTROL SERIES 2500 OR APPROVED EQUAL.
10. WHERE NO SIDEWALK EXISTS, PLACE A 5'x5'x4" THICK CONCRETE APRON AROUND HYDRANT.
11. NO VERTICAL EXTENSIONS ALLOWED WITHOUT APPROVAL.



CITY OF MILWAUKIE, OREGON – PUBLIC WORKS DEPT.

Fire Hydrant Installation

DRAWING NO. 406

APPROVED 08/2019 CITY ENGINEER DATE

NO.	REVISIONS	DATE	BY
3	ADDED DIMENSIONS	12/12	MTC
3	REMOVED THRUST BLOCKS	12/14	AJR
4	RENUMBERED DRAWING, NOTE CHANGED	08/19	TAP

INFORMATIONAL PURPOSES ONLY. CITY OF MILWAUKIE WILL COMPLETE THIS WORK.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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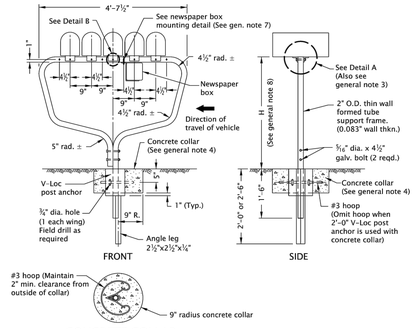
DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 3.11

JOB NO. CLA-93



CONCRETE COLLAR
(See general note 4)

MULTIPLE SUPPORT
(Supports 5 standard (Sizes 1 & 1½) mailboxes or 4 large (Size 2) mailboxes)

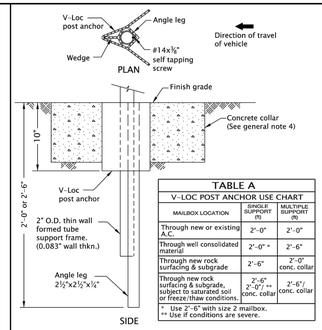
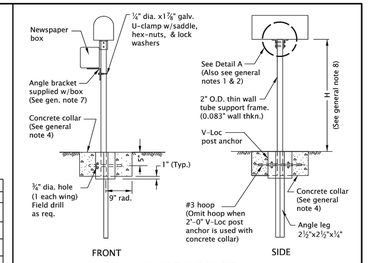


TABLE A
V-LOC POST ANCHOR USE CHART

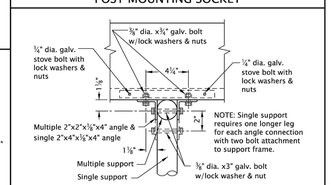
MAILBOX LOCATION	SINGLE SUPPORT (5)	MULTIPLE SUPPORT (8)
Through new or existing A.C.	2'-0"	2'-0"
Through well consolidated material	2'-0" *	2'-6"
Through new rock surfacing & subgrade	2'-6"	2'-0" conc. collar
Through new rock surfacing & subgrade, subject to saturated soil or freeze/thaw conditions.	2'-6" 2'-0" ** conc. collar	2'-6"/ conc. collar

* Use 2'-6" with size 2 mailbox.
** Use if conditions are severe.

POST MOUNTING SOCKET

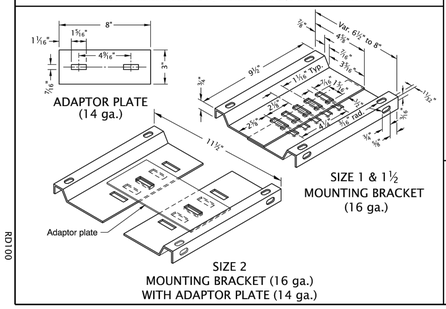


SINGLE SUPPORT



NOTE: Single support requires one longer leg for each angle connection with two bolt attachment to support frame.

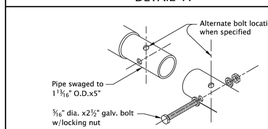
DETAIL A



ADAPTOR PLATE
(14 ga.)

SIZE 1 & 1½
MOUNTING BRACKET
(16 ga.)

SIZE 2
MOUNTING BRACKET (16 ga.)
WITH ADAPTOR PLATE (14 ga.)



DETAIL B

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Angle connections to be parallel to traffic flow for Size 2 mailbox mounted on single post.
2. All holes in the tube support frame are to be predrilled by the manufacturer.
3. Size 2 mailbox mounted on a multiple support requires 2 each ⅝" dia. x¾" galv. bolts with lock washers and nuts to attach the adaptor plate to the mounting bracket. The unit will then require 4 angle connections to attach to the formed tube support frame. See Detail A.
4. Provide concrete collar when any of the following conditions exist:
   a) when required in Table A
   b) when required by project plans
   c) as directed by the Engineer
   Concrete collar, when required, to be poured in place after V-Loc post anchor has been installed, level and plumb. Do not excavate below bottom of V-Loc post anchor. Care shall be taken that no concrete is placed within anchor.
5. Other proprietary products available as listed in ODOT's QPL.
6. For mailbox installation locations, see Std. Dwg. RD101 and project plans.
7. For Newspaper Box Mounting Detail, see Std. Dwg. RD101.
8. Mounting height (H) shall be 42" nominal, measured from vehicle driving surface.
9. See project plans for detail not shown.

CALC. BOOK NO. N/A
SDR DATE 25-JUL-2017

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

MAILBOX SUPPORT

2021

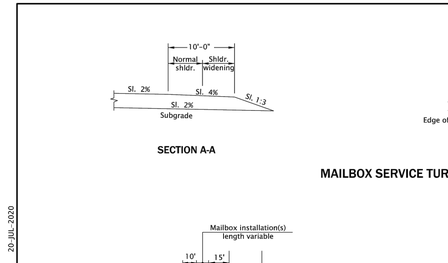
DATE	REVISION DESCRIPTION

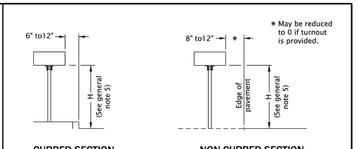
rd100.dgn 20-JUL-2020

RD100

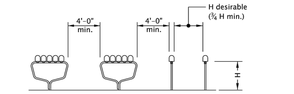
Effective Date: June 1, 2022 - November 30, 2022

RD100

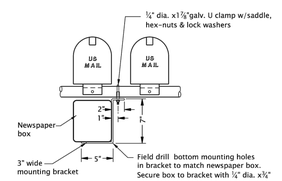




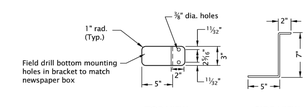
PLACEMENT



SUPPORT SPACING



NEWSPAPER BOX
MOUNTING DETAIL



NEWSPAPER BOX
MOUNTING BRACKET DETAIL
(14 ga.)

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All holes in the tube support frame are to be predrilled by the manufacturer.
2. Other proprietary products available as listed in ODOT's QPL.
3. For mailbox support details, see Std. Dwg. RD100.
4. For approach details, see Std. Dwg. RD715.
5. Mounting height (H) shall be 42" nominal, measured from vehicle driving surface.
6. See project plans for details not shown.

CALC. BOOK NO. N/A
SDR DATE 25-JUL-2017

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

MAILBOX INSTALLATION

2021

DATE	REVISION DESCRIPTION

rd101.dgn 20-JUL-2020

RD101

Effective Date: June 1, 2022 - November 30, 2022

RD101

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

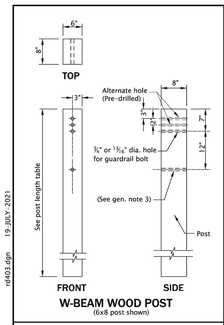
DETAILS

LINWOOD AVENUE IMPROVEMENTS

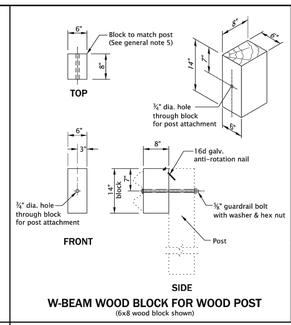
CLACKAMAS COUNTY, OREGON

SHEET NO. 3.12

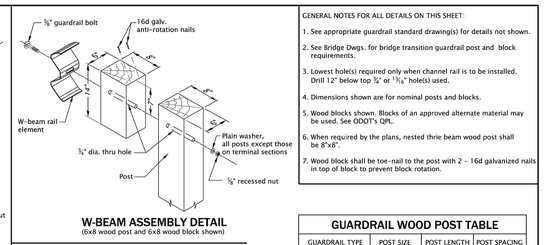
JOB NO. CLA-93



W-BEAM WOOD POST
(6x8 post shown)



W-BEAM WOOD BLOCK FOR WOOD POST
(6x8 wood block shown)



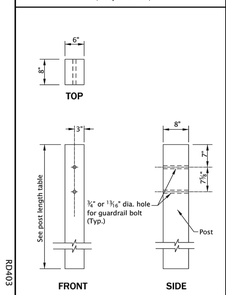
W-BEAM ASSEMBLY DETAIL
(6x8 wood post and 6x8 wood block shown)

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

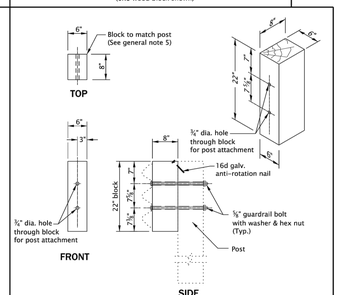
1. See appropriate guardrail standard drawing(s) for details not shown.
2. See Bridge Dwgs. for bridge transition guardrail post and block requirements.
3. Lowest hole(s) required only when channel rail is to be installed. Drill 12" below top 3/4" or 13/16" hole(s) used.
4. Dimensions shown are for nominal posts and blocks.
5. Wood blocks shown. Blocks of an approved alternate material may be used. See ODOT's QPL.
6. When required by the plans, nested thrie beam wood post shall be 8"x8".
7. Wood block shall be toe-nail to the post with 2 - 16d galvanized nails in top of block to prevent block rotation.

GUARDRAIL WOOD POST TABLE

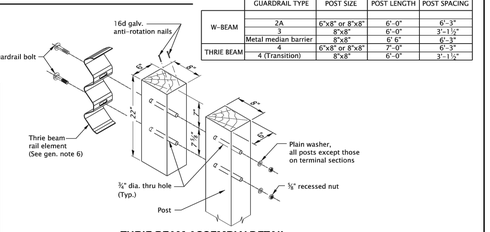
	GUARDRAIL TYPE	POST SIZE	POST LENGTH	POST SPACING
W-BEAM	2A	6"x8" or 8"x8"	6'-0"	6'-3"
	3	8"x8"	6'-0"	3'-1 1/2"
	Metal median barrier	8"x8"	6' 6"	6'-3"
THRIE BEAM	4	6"x8" or 8"x8"	7'-0"	6'-3"
	4 (Transition)	8"x8"	6'-0"	3'-1 1/2"



THRIE BEAM WOOD POST
(6x8 post shown)



THRIE BEAM WOOD BLOCK FOR WOOD POST
(6x8 wood block shown)



THRIE BEAM ASSEMBLY DETAIL
(6x8 wood post and 6x8 wood block shown)

CALC. BOOK NO. N/A

SDR DATE 19-JUL-2021

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

MIDWEST GUARDRAIL SYSTEM WOOD POST AND BLOCK

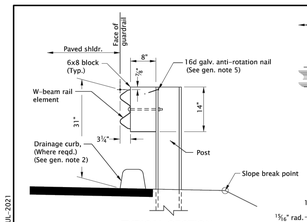
2021

DATE	REVISION DESCRIPTION
07-2021	REVISED DETAILS AND NOTES

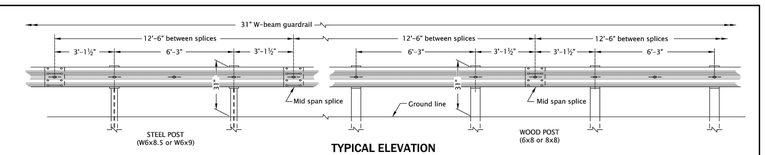
rd403.dgn 19-JUL-2021

RD403

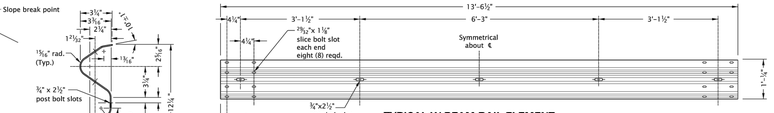
Effective Date: June 1, 2022 - November 30, 2022 RD403



TYPICAL SECTION
(Steel post shown)



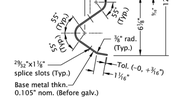
TYPICAL ELEVATION



TYPICAL W-BEAM RAIL ELEMENT

NORMAL RAIL ELEMENT DATA

Type	Effective Lengths	Thkn. (Galv.)
2A, 3	6.25', 12.5', 25'	10 ga. & 12 ga.

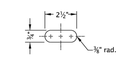


FITTINGS

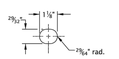
NOTES:

a. When required by the plans, post bolts to extend beyond the tightened nuts within limits of 1/4" to 1/2".

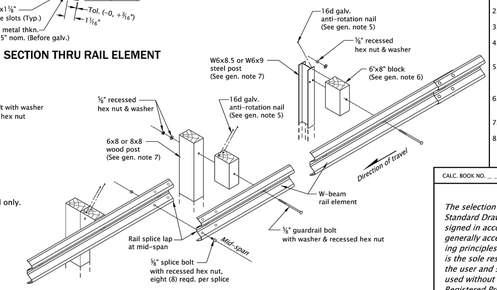
b. All post bolt threads to be set after assembly for wrench removal only.



POST BOLT SLOT



SPLICE BOLT SLOT



W-BEAM ASSEMBLY DETAILS

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. See appropriate guardrail standard drawing(s) for details not shown.
2. When required by the plans, drainage curb alignment same as face of guardrail.
3. Lap guardrail in direction of adjacent traffic.
4. Final paved surfacing to extend to face of post. Rail height measured from final paved surface at face of rail to top of rail (typ. all types). 1" ± tolerance.
5. Blocks shall be toe-nailed to prevent rotation when wood posts are used (see Std. Dwg. RD403). Blocks shall be reunted or toe-nailed when steel posts are used to prevent rotation (see Std. Dwg. RD404).
6. Wood blocks shown. Blocks of an approved alternate material may be used. See ODOT's QPL.
7. All posts for guardrail run shall be of the same type: wood or steel.
8. For guardrail installed on radii of 150' or less (5' min. radius) use rail elements pre-curved to industry standard. Install "Radius Identification Plate".

CALC. BOOK NO. N/A

SDR DATE 19-JUL-2021

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

MIDWEST GUARDRAIL SYSTEM W-BEAM

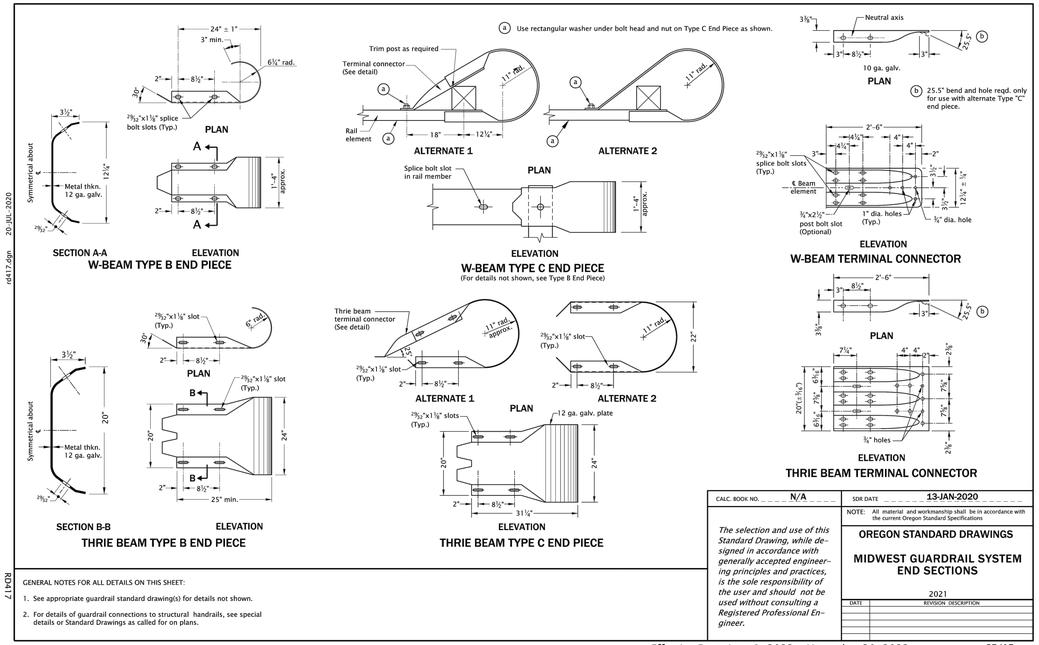
2021

DATE	REVISION DESCRIPTION
07-2021	REVISED DETAILS AND NOTES

rd407.dgn 19-JUL-2021

RD407

Effective Date: June 1, 2022 - November 30, 2022 RD407



GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. See appropriate guardrail standard drawing(s) for details not shown.
2. For details of guardrail connections to structural handrails, see special details or Standard Drawings as called for on plans.

CALC. BOOK NO. N/A

SDR DATE 13-JAN-2020

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

MIDWEST GUARDRAIL SYSTEM END SECTIONS

2021

DATE	REVISION DESCRIPTION

rd417.dgn 20-JAN-2020

RD417

Effective Date: June 1, 2022 - November 30, 2022 RD417

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-3.0 DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

DETAILS

LINWOOD AVENUE IMPROVEMENTS

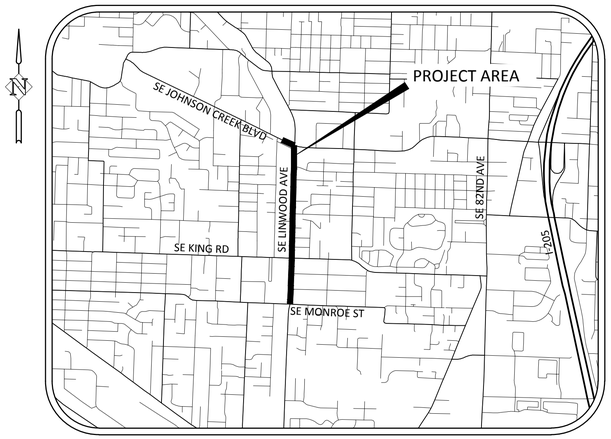
CLACKAMAS COUNTY, OREGON

SHEET NO. 3.13

JOB NO. CLA-93

SE LINWOOD AVE - ESC PLANS

CLACKAMAS COUNTY, OREGON



VICINITY MAP
SCALE: N.T.S.

OWNER / DEVELOPER

DEVELOPER/COMPANY: CLACKAMAS COUNTY
CONTACT: KEN ITEL
150 BEAVERCREEK RD
OREGON CITY, OR 97045
PHONE: 503-742-4324
EMAIL: KENNETHITE@CLACKAMAS.US

PLANNING / ENGINEERING / SURVEYING FIRM

HARPER HOUF PETERSON RIGHELLIS, INC.
CONTACT: JIMMY HOUF, PE
205 SE SPOKANE AVE, SUITE 200
PORTLAND, OR 97202
PHONE: 503-221-1131
EMAIL: JIMMYH@HHPR.COM

NARRATIVE DESCRIPTIONS

EXISTING SITE CONDITIONS

* SE LINWOOD AVE IS AN EXISTING TWO LANE ROADWAY WITH NO BIKE LANES RUNNING NORTH AND SOUTH WITH ADJACENT RESIDENTIAL PROPERTIES THROUGHOUT THE CORRIDOR. PORTIONS OF THE CORRIDOR FRONTAGE ARE DEVELOPED WITH CURB AND SIDEWALK, BUT MOST OF THE CORRIDOR CONSISTS OF UNDERDEVELOPED FRONTAGE.

DEVELOPED CONDITIONS

SE LINWOOD AVE WILL BE IMPROVED FROM THE INTERSECTION AT SE MONROE ST TO SE JOHNSON CREEK BLVD AND APPROXIMATELY 300' OF HALF STREET IMPROVEMENTS ALONG JOHNSON CREEK BLVD. IMPROVEMENTS WILL INCLUDE 12' TRAVEL LANES WITH CURB AND GUTTER ON BOTH SIDES, PEDESTRIAN AND BIKE FACILITIES INCORPORATED INTO A 10' MIXED-USE PATH ON BOTH SIDES, AND IMPROVED STORMWATER MANAGEMENT FACILITIES. THE NEW ROADWAY WILL PROVIDE A SAFE ROUTE FOR PEDESTRIANS AND CYCLISTS AND IMPROVE THE MULTI-MODAL CAPACITY OF THIS NORTH / SOUTH ARTERIAL. THESE PROPOSED IMPROVEMENTS ARE ONLY FOR THE CLACKAMAS COUNTY PORTION OF SE LINWOOD AVE. THE CITY OF MILWAUKIE COMPLETED ITS PORTION OF SE LINWOOD AVENUE WITH A SIMILAR TYPICAL SECTION.

NATURE OF CONSTRUCTION ACTIVITY AND ESTIMATED TIME TABLE

- CLEARING (JANUARY 2023)
- MASS GRADING (JANUARY 2023)
- UTILITY INSTALLATION (FEBRUARY 2023 - JUNE 2023)
- STREET CONSTRUCTION (APRIL 2023 - OCTOBER 2023)
- FINAL STABILIZATION (OCTOBER 2023 - DECEMBER 2023)

TOTAL SITE AREA = 6.2 ACRES

TOTAL DISTURBED AREA = 3.8 ACRES

SITE SOIL CLASSIFICATION:

THE SITE IS MAPPED BY USDA WITH THE FOLLOWING SOIL UNITS:

- 53A-LATOURELL LOAM, 0 TO 3 PERCENT SLOPES, RUNOFF IS SLOW, HAZARD OF EROSION IS SLIGHT
- 53B-LATOURELL LOAM, 3 TO 8 PERCENT SLOPES, RUNOFF IS SLOW, HAZARD OF EROSION IS SLIGHT
- 71A-QUATAMA LOAM, 0 TO 3 PERCENT SLOPES, RUNOFF IS SLOW, HAZARD OF EROSION IS SLIGHT
- 84-WAPATO SILTY CLAY LOAM, RATING C/D

RECEIVING WATER BODIES:

JOHNSON CREEK

PROJECT LOCATION

SE LINWOOD AVE
MILWAUKIE, OR 97222
SOUTH PROJECT LIMITS: MONROE ST
NORTH PROJECT LIMITS: JOHNSON CREEK BLVD
LATITUDE = 45.4355555 - 45° 26' 08"
LONGITUDE = 122.5991667 - 122° 35' 57"

ATTENTION EXCAVATORS:

OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. CALL 503-246-6699.

SHEET INDEX

EROSION AND SEDIMENT CONTROL PLANS

4.0 ESCP - COVER SHEET
4.1 ESCP - GENERAL NOTES
4.2 ESCP - CLEARING AND DEMOLITION PLAN
4.3 ESCP - CLEARING AND DEMOLITION PLAN
4.4 ESCP - GRADING AND UTILITIES PLAN
4.5 ESCP - GRADING AND UTILITIES PLAN
4.6 ESCP - DETAILS

INSPECTION FREQUENCY:

SITE CONDITION	MINIMUM FREQUENCY
1. ACTIVE PERIOD	WEEKLY WHEN STORMWATER RUNOFF, INCLUDING RUNOFF FROM SNOW MELT, IS OCCURRING. AT LEAST ONCE EVERY MONTH, REGARDLESS OF WHETHER STORMWATER RUNOFF IS OCCURRING.
2. PRIOR TO THE SITE BECOMING INACTIVE OR IN ANTICIPATION OF SITE INACCESSIBILITY.	ONCE TO ENSURE THAT EROSION AND SEDIMENT CONTROL MEASURES ARE IN WORKING ORDER. ANY NECESSARY MAINTENANCE AND REPAIR MUST BE MADE PRIOR TO LEAVING THE SITE.
3. INACTIVE PERIODS GREATER THAN FOURTEEN (14) CONSECUTIVE CALENDAR DAYS.	ONCE EVERY MONTH.
4. PERIODS DURING WHICH THE SITE IS INACCESSIBLE DUE TO INCLEMENT WEATHER.	IF PRACTICAL, INSPECTIONS MUST OCCUR DAILY AT A RELEVANT AND ACCESSIBLE DISCHARGE POINT OR DOWNSTREAM LOCATION.
5. PERIODS DURING WHICH DISCHARGE IS UNLIKELY DUE TO FROZEN CONDITIONS.	MONTHLY, RESUME MONITORING IMMEDIATELY UPON MELT, OR WHEN WEATHER CONDITIONS MAKE DISCHARGES LIKELY.

- HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS.
- ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-CN PERMIT REQUIREMENTS.
- INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-CN PERMIT REQUIREMENTS.
- RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, RETAIN THE ESCP AT THE CONSTRUCTION SITE OR AT ANOTHER LOCATION.

BMP MATRIX FOR CONSTRUCTION PHASES

REFER TO DEQ GUIDANCE MANUAL FOR A COMPREHENSIVE LIST OF AVAILABLE BMP'S.

	CLEARING	MASS GRADING	UTILITY INSTALLATION	SITE CONSTRUCTION	FINAL STABILIZATION	WET WEATHER (OCT. 1 - MAY 31ST)
EROSION PREVENTION						
PRESERVE NATURAL VEGETATION	**X	X	X	X	X	X
GROUND COVER					X	X
HYDRAULIC APPLICATIONS						
PLASTIC SHEETING						
MATTING						
DUST CONTROL	X	X	X	X	X	X
TEMPORARY/ PERMANENT SEEDING		X	X	X	X	X
BUFFER ZONE						
OTHER:						
SEDIMENT CONTROL						
SEDIMENT FENCE (PERIMETER)	**X	X	X	X	X	X
SEDIMENT FENCE (INTERIOR)						
STRAW WATTLES	**X	X	X	X	X	X
FILTER BERM						
INLET PROTECTION	**X	X	X	X	X	X
DEWATERING						
SEDIMENT TRAP	X	X	X	X		X
NATURAL BUFFER ENCROACHMENT	*X	*X	*X	*X	*X	*X
OTHER:						
RUN OFF CONTROL						
CONSTRUCTION ENTRANCE	**X	X	X	X		X
PIPE SLOPE DRAIN						
OUTLET PROTECTION						
SURFACE ROUGHENING					X	X
CHECK DAMS						
OTHER:						
POLLUTION PREVENTION						
PROPER SIGNAGE	X	X	X	X	X	X
HAZ WASTE MGMT	X	X	X	X	X	X
SPILL KIT ON-SITE	X	X	X	X	X	X
CONCRETE WASHOUT AREA	X	X	X	X	X	X
OTHER:						

* SIGNIFIES ADDITIONAL BMP'S REQUIRED FOR WORK WITHIN 50' OF WATER OF THE STATE.
** SIGNIFIES BMP THAT WILL BE INSTALLED PRIOR TO ANY GROUND DISTURBING ACTIVITY.

RATIONALE STATEMENT

A COMPREHENSIVE LIST OF AVAILABLE BEST MANAGEMENT PRACTICES (BMP) OPTIONS BASED ON DEQ's GUIDANCE MANUAL HAS BEEN REVIEWED TO COMPLETE THIS EROSION AND SEDIMENT CONTROL PLAN. SOME OF THE ABOVE LISTED BMP's WERE NOT CHOSEN BECAUSE THEY WERE DETERMINED TO NOT EFFECTIVELY MANAGE EROSION PREVENTION AND SEDIMENT CONTROL FOR THIS PROJECT BASED ON SPECIFIC SITE CONDITIONS, INCLUDING SOIL CONDITIONS TOPOGRAPHIC CONSTRAINTS, ACCESSIBILITY TO THE SITE, AND OTHER RELATED CONDITIONS, AS THE PROJECT PROGRESSES AND THERE IS A NEED TO REVISE THE ESC PLAN, AN ACTION PLAN WILL BE SUBMITTED.

INITIAL *JSH*

PERMITTEE'S SITE INSPECTOR:

NAME: JAMES WATTS
COMPANY/AGENCY: HARPER HOUF PETERSON RIGHELLIS INC.
PHONE: 503-221-1131
E-MAIL: JAMESW@HHPR.COM
CESCL #82597
DESCRIPTION OF EXPERIENCE: 2 YEARS OF EROSION CONTROL INSPECTION EXPERIENCE.

THE PERMITTEE IS REQUIRED TO MEET ALL THE CONDITIONS OF THE 1200-CA PERMIT. THIS ESCP AND GENERAL CONDITIONS HAVE BEEN DEVELOPED TO FACILITATE COMPLIANCE WITH THE 1200-CA PERMIT REQUIREMENTS. IN CASES OF DISCREPANCIES OR OMISSIONS, THE 1200-CA PERMIT REQUIREMENTS SUPERCEDE REQUIREMENTS OF THIS PLAN.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-4.0 EROSION CONTROL COVER.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

ESCP COVER SHEET
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **4.0**
JOB NO. CLA-93

STANDARD EROSION AND SEDIMENT CONTROL PLAN DRAWING NOTES:

1. HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS. (SCHEDULE A.8.C.I.(3))
2. ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS. (SCHEDULE A.12.B AND SCHEDULE B.1)
3. INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-C PERMIT REQUIREMENTS. (SCHEDULE B.1.C AND B.2)
4. RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, THE ABOVE RECORDS MUST BE RETAINED BY THE PERMIT REGISTRANT BUT DO NOT NEED TO BE AT THE CONSTRUCTION SITE. (SCHEDULE B.2.C)
5. ALL PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT. (SCHEDULE A 8.A)
6. THE ESCP MUST BE ACCURATE AND REFLECT SITE CONDITIONS. (SCHEDULE A.12.C.I)
7. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISION TO DEQ OR AGENT WITHIN 10 DAYS. (SCHEDULE A.12.C.IV. AND V)
8. PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION. (SCHEDULE A.7.A.III)
9. IDENTIFY, MARK, AND PROTECT (BY CONSTRUCTION FENCING OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS. (SCHEDULE A.8.C.I.(1) AND (2))
10. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED. (SCHEDULE A.7.A.V)
11. MAINTAIN AND DELINEATE ANY EXISTING NATURAL BUFFER WITHIN THE 50-FEET OF WATERS OF THE STATE. (SCHEDULE A.7.B.I. AND (2(A)(B))
12. INSTALL PERIMETER SEDIMENT CONTROL, INCLUDING STORM DRAIN INLET PROTECTION AS WELL AS ALL SEDIMENT BASINS, TRAPS, AND BARRIERS PRIOR TO LAND DISTURBANCE. (SCHEDULE A.8.C.I.(5))
13. CONTROL BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND DOWNSTREAM CHANNELS AND STREAMBANKS. (SCHEDULE A.7.C)
14. CONTROL SEDIMENT AS NEEDED ALONG THE SITE PERIMETER AND AT ALL OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION, BOTH INTERNALLY AND AT THE SITE BOUNDARY. (SCHEDULE A.7.D.I)
15. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK. (SCHEDULE A.8.C.I.(6))
16. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES. TEMPORARY OR PERMANENT STABILIZATIONS MEASURES ARE NOT REQUIRED FOR AREAS THAT ARE INTENDED TO BE LEFT UNVEGETATED, SUCH AS DIRT ACCESS ROADS OR UTILITY POLE PADS.(SCHEDULE A.8.C.II.(3))
17. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS. (SCHEDULE A.8.C.I.(7))
18. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: CONSTRUCTION ENTRANCE, GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES. (SCHEDULE A 7.D.II AND A.8.C.I(4))
19. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE. (SCHEDULE A.7.D.II.(5))
20. CONTROL PROHIBITED DISCHARGES FROM LEAVING THE CONSTRUCTION SITE, I.E., CONCRETE WASH-OUT, WASTEWATER FROM CLEANOUT OF STUCCO, PAINT AND CURING COMPOUNDS. (SCHEDULE A.6)
21. USE BMPS TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, FERTILIZER, PESTICIDES AND HERBICIDES, PAINTS, SOLVENTS, CURING COMPOUNDS AND ADHESIVES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.E.I.(2))
22. IMPLEMENT THE FOLLOWING BMPS WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES. (SCHEDULE A. 7.E.III.)
23. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL. (SCHEDULE A 7.A.IV)
24. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE. (SCHEDULE A.9.B.III)
25. IF AN ACTIVE TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN PLAN APPROVAL BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SCHEDULE A.9.D)
26. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SCHEDULE A 7.B)
27. AS NEEDED BASED ON WEATHER CONDITIONS, AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPS MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SCHEDULE A 7.E.II.(2))
28. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND BARE GROUND ACTIVITIES DURING WET WEATHER. (SCHEDULE A.7.A.I)
29. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL. (SCHEDULE A.9.C.I)
30. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL. (SCHEDULE A.9.C.I)
31. CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT. (SCHEDULE A.9.C.III& IV)
32. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN-UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SCHEDULE A.9.B.I)
33. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SCHEDULE A.9.B.II)
34. THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR 30 DAYS OR MORE. (SCHEDULE A.7.F.I)
35. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SCHEDULE A.7.F.II)
36. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED, ALL TEMPORARY EROSION CONTROLS AND RETAINED SOILS MUST BE REMOVED AND DISPOSED OF PROPERLY, UNLESS DOING SO CONFLICTS WITH LOCAL REQUIREMENTS. (SCHEDULE A.8.C.III(1) AND D.3.C.II AND III)

GRADING, STREET AND UTILITY EROSION AND SEDIMENT CONSTRUCTION NOTES:

1. SEED USED FOR TEMPORARY OR PERMANENT SEEDING SHALL BE COMPOSED OF ONE OF THE FOLLOWING MIXTURES, UNLESS OTHERWISE AUTHORIZED:
   A. VEGETATED CORRIDOR AREAS REQUIRE NATIVE SEED MIXES. SEE RESTORATION PLAN FOR APPROPRIATE SEED MIX.
   B. DWARF GRASS MIX (MIN. 100 LB./AC.)
      1. DWARF PERENNIAL RYEGRASS (80% BY WEIGHT)
      2. CREEPING RED FESCUE (20% BY WEIGHT)
   C. STANDARD HEIGHT GRASS MIX (MIN. 100LB./AC.)
      1. ANNUAL RYEGRASS (40% BY WEIGHT)
      2. TURF-TYPE FESCUE (60% BY WEIGHT)
2. SLOPE TO RECEIVE TEMPORARY OR PERMANENT SEEDING SHALL HAVE THE SURFACE ROUGHENED BY MEANS OF TRACK-WALKING OR THE USE OF OTHER APPROVED IMPLEMENTS. SURFACE ROUGHENING IMPROVES SEED BEDDING AND REDUCES RUN-OFF VELOCITY.
3. LONG TERM SLOPE STABILIZATION MEASURES SHALL INCLUDE THE ESTABLISHMENT OF PERMANENT VEGETATIVE COVER VIA SEEDING WITH APPROVED MIX AND APPLICATION RATE.
4. TEMPORARY SLOPE STABILIZATION MEASURES SHALL INCLUDE: COVERING EXPOSED SOIL WITH PLASTIC SHEETING, STRAW MULCHING, WOOD CHIPS, OR OTHER APPROVED MEASURES.
5. STOCKPILED SOIL OR STRIPPINGS SHALL BE PLACED IN A STABLE LOCATION AND CONFIGURATION. DURING "WET WEATHER" PERIODS, STOCKPILES SHALL BE COVERED WITH PLASTIC SHEETING OR STRAW MULCH. SEDIMENT FENCE IS REQUIRED AROUND THE PERIMETER OF THE STOCKPILE.
6. EXPOSED CUT OR FILL AREAS SHALL BE STABILIZED THROUGH THE USE OF TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS OR MATS, MID-SLOPE SEDIMENT FENCES OR WATTLES, OR OTHER APPROPRIATE MEASURES. SLOPES EXCEEDING 25% MAY REQUIRE ADDITIONAL EROSION CONTROL MEASURES.
7. AREAS SUBJECT TO WIND EROSION SHALL USE APPROPRIATE DUST CONTROL MEASURES INCLUDING THE APPLICATION OF A FINE SPRAY OF WATER, PLASTIC SHEETING, STRAW MULCHING, OR OTHER APPROVED MEASURES.
8. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES INCLUDING, BUT NOT LIMITED TO, TIRE WASHES, STREET SWEEPING, AND VACUUMING MAY BE BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
9. ACTIVE INLETS TO STORM WATER SYSTEMS SHALL BE PROTECTED THROUGH THE USE OF APPROVED INLET PROTECTION MEASURES. ALL INLET PROTECTION MEASURES ARE TO BE REGULARLY INSPECTED AND MAINTAINED AS NEEDED.
10. SATURATED MATERIALS THAT ARE HAULED OFF-SITE MUST BE TRANSPORTED IN WATER-TIGHT TRUCKS TO ELIMINATE SPILLAGE OF SEDIMENT AND SEDIMENT-LADEN WATER.
11. AN AREA SHALL BE PROVIDED FOR THE WASHING OUT OF CONCRETE TRUCKS IN A LOCATION THAT DOES NOT PROVIDE RUN-OFF THAT CAN ENTER THE STORM WATER SYSTEM. IF THE CONCRETE WASH-OUT AREA CAN NOT BE CONSTRUCTED GREATER THAN 50' FROM ANY DISCHARGE POINT, SECONDARY MEASURES SUCH AS BERMS OR TEMPORARY SETTLING PITS MAY BE REQUIRED. THE WASH-OUT SHALL BE LOCATED WITHIN SIX FEET OF TRUCK ACCESS AND BE CLEANED WHEN IT REACHES 50% OF THE CAPACITY.
12. SWEEPINGS FROM EXPOSED AGGREGATE CONCRETE SHALL NOT BE TRANSFERRED TO THE STORM WATER SYSTEM. SWEEPINGS SHALL BE PICKED UP AND DISPOSED IN THE TRASH.
13. AVOID PAVING IN WET WEATHER WHEN PAVING CHEMICALS CAN RUN-OFF INTO THE STORM WATER SYSTEM.
14. USE BMPS SUCH AS CHECK-DAMS, BERMS, AND INLET PROTECTION TO PREVENT RUN-OFF FROM REACHING DISCHARGE POINTS.
15. COVER CATCH BASINS, MANHOLES, AND OTHER DISCHARGE POINTS WHEN APPLYING SEAL COAT, TACK COAT, ETC. TO PREVENT INTRODUCING THESE MATERIALS TO THE STORM WATER SYSTEM.

PRE-CONSTRUCTION, CLEARING, AND DEMOLITION NOTES:

1. ALL BASE ESC MEASURES (INLET PROTECTION, PERIMETER SEDIMENT CONTROL, GRAVEL CONSTRUCTION ENTRANCES, ETC.) MUST BE IN PLACE, FUNCTIONAL, AND APPROVED IN AN INITIAL INSPECTION, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
2. SEDIMENT BARRIERS APPROVED FOR USE INCLUDE SEDIMENT FENCE, BERMS CONSTRUCTED OUT OF MULCH, CHIPPINGS, OR OTHER SUITABLE MATERIAL, STRAW WATTLES, OR OTHER APPROVED MATERIALS.
3. SENSITIVE RESOURCES INCLUDING, BUT NOT LIMITED TO, TREES, WETLANDS, AND RIPARIAN PROTECTION AREAS SHALL BE CLEARLY DELINEATED WITH ORANGE CONSTRUCTION FENCING OR CHAIN LINK FENCING IN A MANNER THAT IS CLEARLY VISIBLE TO ANYONE IN THE AREA. NO ACTIVITIES ARE PERMITTED TO OCCUR BEYOND THE CONSTRUCTION BARRIER.
4. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES INCLUDING, BUT NOT LIMITED TO, STREET SWEEPING, AND VACUUMING, MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
5. RUN-ON AND RUN-OFF CONTROLS SHALL BE IN PLACE AND FUNCTIONING PRIOR TO BEGINNING SUBSTANTIAL CONSTRUCTION ACTIVITIES. RUN-ON AND RUN-OFF CONTROL MEASURES INCLUDE: SLOPE DRAINS (WITH OUTLET PROTECTION), CHECK DAMS, SURFACE ROUGHENING, AND BANK STABILIZATION.

EROSION AND SEDIMENT CONTROL BMP IMPLEMENTATION:

1. ALL BASE ESC MEASURES (INLET PROTECTION, PERIMETER SEDIMENT CONTROL, GRAVEL CONSTRUCTION ENTRANCES, ETC.) MUST BE IN PLACE, FUNCTIONAL, AND APPROVED IN AN INITIAL INSPECTION, PRIOR TO COMMENCEMENT OF CONSTRUCTION ACTIVITIES.
2. "STOCK PILE AREA 1" SHALL BE MOVED TO "STOCK PILE AREA 2" FOLLOWING THE EXCAVATION CUT ACTIVITIES.
3. THE "STAGING, EQUIPMENT MAINTENANCE, FUELING, PORTA-POTTY, AND SOLID WASTE AREA 1" SHALL BE MOVED TO "STAGING, EQUIPMENT MAINTENANCE, FUELING, PORTA-POTTY, AND SOLID WASTE AREA 2" FOLLOWING EXCAVATION "CUT" ACTIVITIES.
4. ALL "SEDIMENT BARRIERS (TO BE INSTALLED AFTER GRADING)" SHALL BE INSTALLED IMMEDIATELY FOLLOWING ESTABLISHMENT OF FINISHED GRADE AS SHOWN ON THESE PLANS.
5. LONG TERM SLOPE STABILIZATION MEASURES "INCLUDING MATTING" SHALL BE IN PLACE OVER ALL EXPOSED SOILS BY OCTOBER 1.
6. THE STORM WATER FACILITY SHALL BE CONSTRUCTED AND LANDSCAPED PRIOR TO THE STORM WATER SYSTEM FUNCTIONING AND SITE PAVING.
7. INLET PROTECTION SHALL BE IN-PLACE IMMEDIATELY FOLLOWING PAVING ACTIVITIES.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GSS\SHEETS\ CLA93-4.0 EROSION CONTROL COVER.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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ESCP STANDARD NOTES

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **4.1**

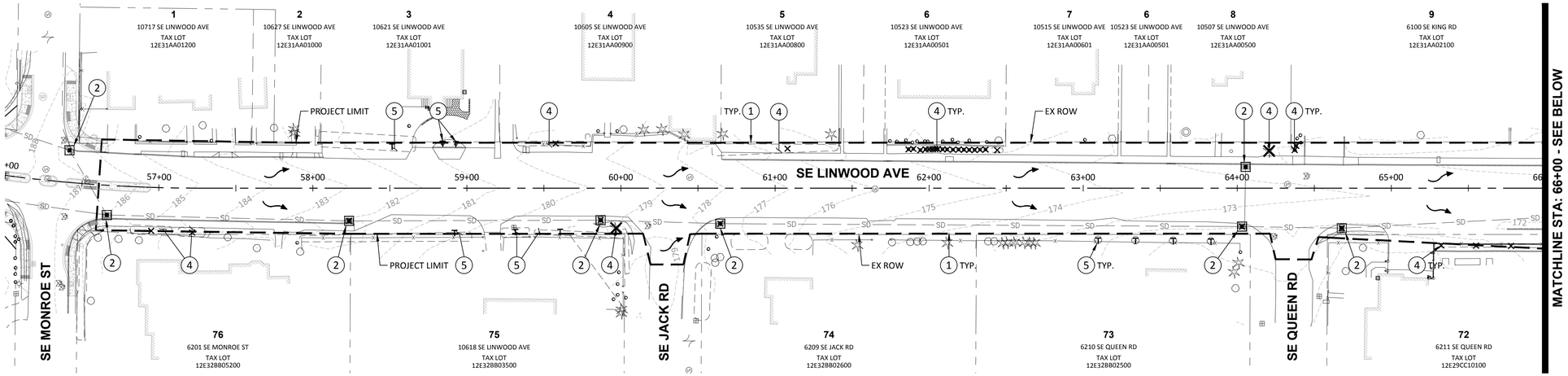
JOB NO. CLA-93

CONSTRUCTION NOTES:

1. INSTALL WATTLES AT PROJECT LIMIT LINE. CONTRACTOR TO DETERMINE NECESSARY LOCATIONS. SEDIMENT RUNOFF TO BE CONTAINED WITHIN PROJECT LIMITS. SEE DETAIL ON SHEET 4.6.
2. INSTALL INLET PROTECTION (TYPE 5) PER DETAIL ON SHEET 4.6.
4. REMOVE EXISTING TREE OR VEGETATION IDENTIFIED AS REMOVAL WITHIN PROJECT LIMITS.
5. TRIM EXISTING TREE OR VEGETATION IDENTIFIED AS TRIM WITHIN PROJECT LIMITS.

TREE REMOVAL (X), SHRUB REMOVAL (×), AND TRIMMING (T) SHOWN ON PLANS. REMOVAL IS TYPICAL WITHIN THE PROPOSED LIMITS OF GRADING (DAYLIGHT/CATCH POINTS). TRIMMING IS TYPICAL FOR ALL EXISTING TREES OR SHRUBS THAT REMAIN ALONG THE BACK OF SHARED-USE-PATH. COORDINATE WITH ENGINEER PRIOR TO REMOVAL OR TRIMMING. STUMPS TO BE GRINDED.

NOTE: CONTRACTOR TO PROVIDE TREE PROTECTION MEASURES, INCLUDING ORANGE CONSTRUCTION FENCING, FOR ALL TREES TO REMAIN WITHIN THE PROJECT LIMITS.

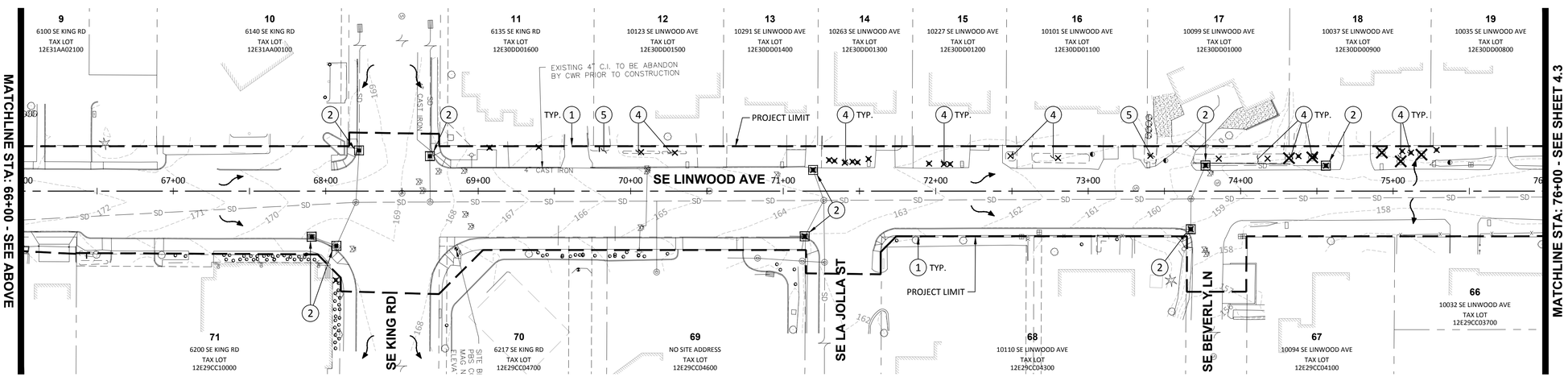


LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

EROSION CONTROL

- CONSTRUCTION ENTRANCE
- FLOW DIRECTION
- INLET PROTECTION (TYPE 4)
- INLET PROTECTION (TYPE 5)
- 100 EXISTING CONTOUR
- PROJECT LIMITS



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

0 20 40 80

SCALE: 1" = 40'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-4.0 EROSION CONTROL DEMO PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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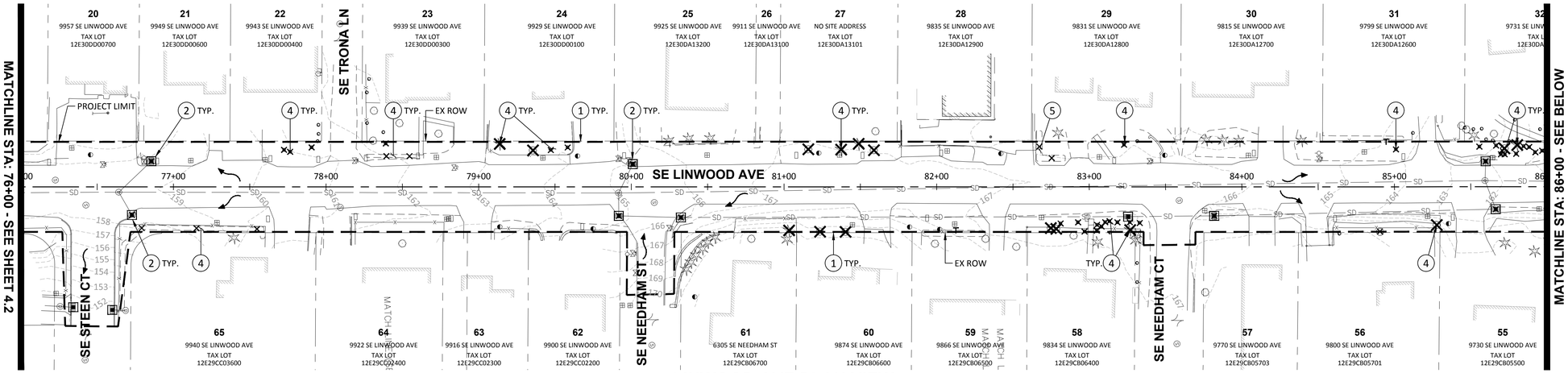
ESCP CLEARING AND DEMO PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

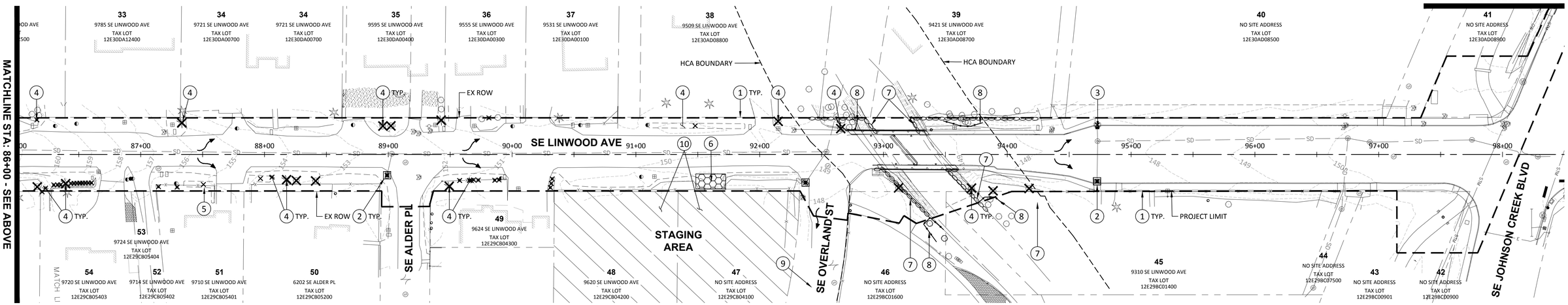
SHEET NO. 4.2

JOB NO. CLA-93



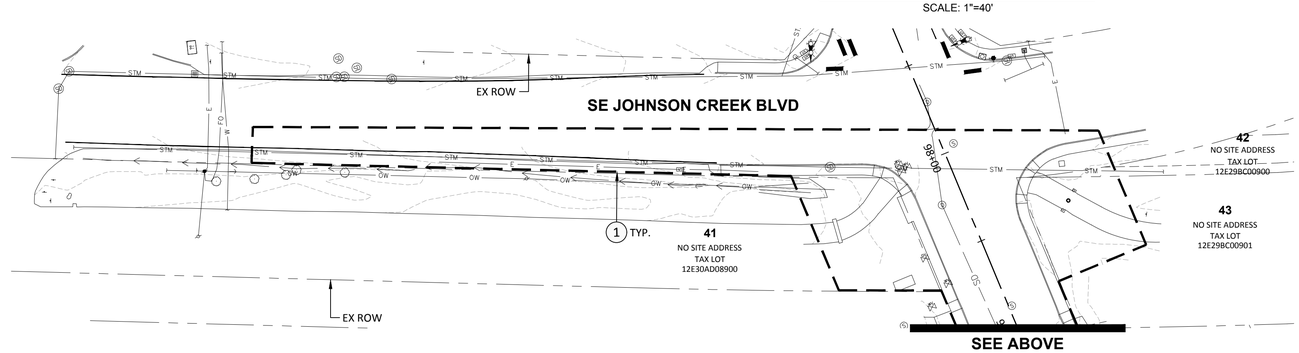
LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



JOHNSON CREEK BLVD PLAN VIEW

SCALE: 1"=40'

CONSTRUCTION NOTES:

1. INSTALL WATTLES AT PROJECT LIMIT LINE. CONTRACTOR TO DETERMINE NECESSARY LOCATIONS. SEDIMENT RUNOFF TO BE CONTAINED WITHIN PROJECT LIMITS. SEE DETAIL ON SHEET 4.6.
2. INSTALL INLET PROTECTION (TYPE 5) PER DETAIL ON SHEET 4.6.
3. INSTALL INLET PROTECTION (TYPE 4) PER DETAIL ON SHEET 4.6
4. REMOVE EXISTING TREE OR VEGETATION IDENTIFIED AS REMOVAL WITHIN PROJECT LIMITS.
5. TRIM EXISTING TREE OR VEGETATION IDENTIFIED AS TRIM WITHIN PROJECT LIMITS.
6. INSTALL GRAVEL CONSTRUCTION ENTRANCE PER DETAIL ON SHEET 4.6.
7. INSTALL WATTLES PER DETAIL ON SHEET 4.6.
8. INSTALL ORANGE CONSTRUCTION FENCING ON OR OUTSIDE THE HCA BOUNDARY, EXCEPT WHERE THE DRIP LINE OF THE PROTECTED TREE EXTENDS OUTSIDE THE HCA, IN WHICH CASE THE DRIP LINE SHALL BE INCLUDED INSIDE THE FENCING.
9. INSTALL INLET PROTECTION (TYPE 5) AT NEAREST DOWNSTREAM CATCH BASIN.
10. AVAILABLE STAGING AREA ON COUNTY OWNED WES PROPERTIES. REESTABLISH TO EQUAL OR BETTER CONDITION AT PROJECT COMPLETION.

0 20 40 80

SCALE: 1" = 40'

NOTE: THE PROJECT WILL PROVIDE EROSION CONTROL TO MEET DEQ AND WES STANDARD AND MEETING NPDES REQUIREMENTS. THE EROSION CONTROL PLANS AND SPECIFICATIONS WILL BE INCLUDED IN THE BID DOCUMENTS PER DTD STANDARDS. THE PROJECT WILL NOT INCLUDE ANY RIP-RAP PROTECTION AS THERE IS NO NEW STORM OUTFALL OR BANK STABILIZATION PROPOSED ON THE WATERWAY.

TREE REMOVAL (X), SHRUB REMOVAL (X), AND TRIMMING (T) SHOWN ON PLANS. REMOVAL IS TYPICAL WITHIN THE PROPOSED LIMITS OF GRADING (DAYLIGHT/CATCH POINTS). TRIMMING IS TYPICAL FOR ALL EXISTING TREES OR SHRUBS THAT REMAIN ALONG THE BACK OF SHARED-USE-PATH. COORDINATE WITH ENGINEER PRIOR TO REMOVAL OR TRIMMING. STUMPS TO BE GRINDED.

NOTE: CONTRACTOR TO PROVIDE TREE PROTECTION MEASURES, INCLUDING ORANGE CONSTRUCTION FENCING, FOR ALL TREES TO REMAIN WITHIN THE PROJECT LIMITS.

EROSION CONTROL

- CONSTRUCTION ENTRANCE
- FLOW DIRECTION
- INLET PROTECTION (TYPE 4)
- INLET PROTECTION (TYPE 5)
- 100 EXISTING CONTOUR
- PROJECT LIMITS

P\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-D\WGS\SHEETS\ CLA93-4.0 EROSION CONTROL DEMO PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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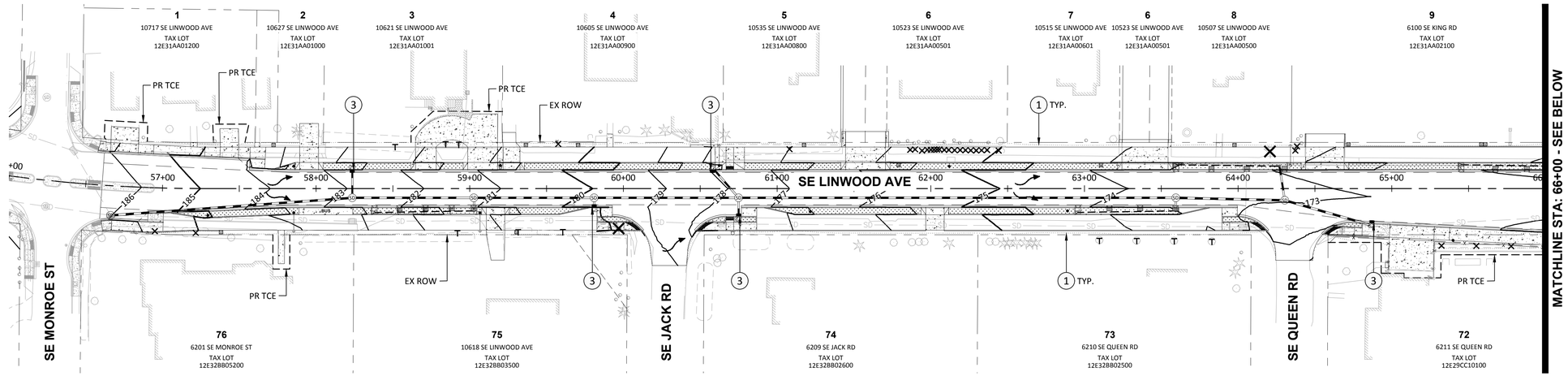
ESCP CLEARING AND DEMO PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

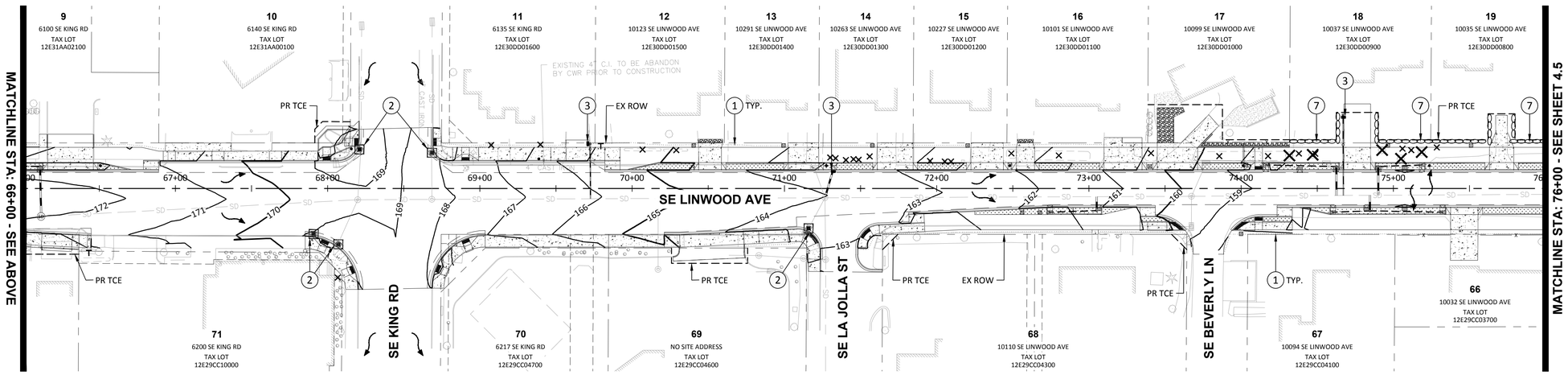
SHEET NO. 4.3

JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

CONSTRUCTION NOTES:

1. INSTALL WATTLES AT PROJECT LIMIT LINE. CONTRACTOR TO DETERMINE NECESSARY LOCATIONS. SEDIMENT RUNOFF TO BE CONTAINED WITHIN PROJECT LIMITS. SEE DETAIL ON SHEET 4.6.
2. INSTALL INLET PROTECTION (TYPE 5) PER DETAIL ON SHEET 4.6.
3. INSTALL INLET PROTECTION (TYPE 4) PER DETAIL ON SHEET 4.6
7. INSTALL WATTLES PER DETAIL ON SHEET 4.6.

TREE REMOVAL (X), SHRUB REMOVAL (×), AND TRIMMING (T) SHOWN ON PLANS. REMOVAL IS TYPICAL WITHIN THE PROPOSED LIMITS OF GRADING (DAYLIGHT/CATCH POINTS). TRIMMING IS TYPICAL FOR ALL EXISTING TREES OR SHRUBS THAT REMAIN ALONG THE BACK OF SHARED-USE-PATH. COORDINATE WITH ENGINEER PRIOR TO REMOVAL OR TRIMMING. STUMPS TO BE GRINDED.

NOTE: CONTRACTOR TO PROVIDE TREE PROTECTION MEASURES, INCLUDING ORANGE CONSTRUCTION FENCING, FOR ALL TREES TO REMAIN WITHIN THE PROJECT LIMITS.

NOTE: CONTRACTOR TO MAINTAIN INLET PROTECTION ON ALL EXISTING DOWNSTREAM STRUCTURES UNTIL THE COMPLETION OF CONSTRUCTION

EROSION CONTROL

- CONSTRUCTION ENTRANCE
- WATTLES
- TREE REMOVAL
- FLOW DIRECTION
- INLET PROTECTION (TYPE 4)
- INLET PROTECTION (TYPE 5)
- TIRE WASH
- 100 EXISTING CONTOUR
- 101 PROPOSED MINOR CONTOUR
- 105 PROPOSED MAJOR CONTOUR

0 20 40 80

SCALE: 1" = 40'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-4.0 EROSION CONTROL PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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CHECKED: DSH/JSH
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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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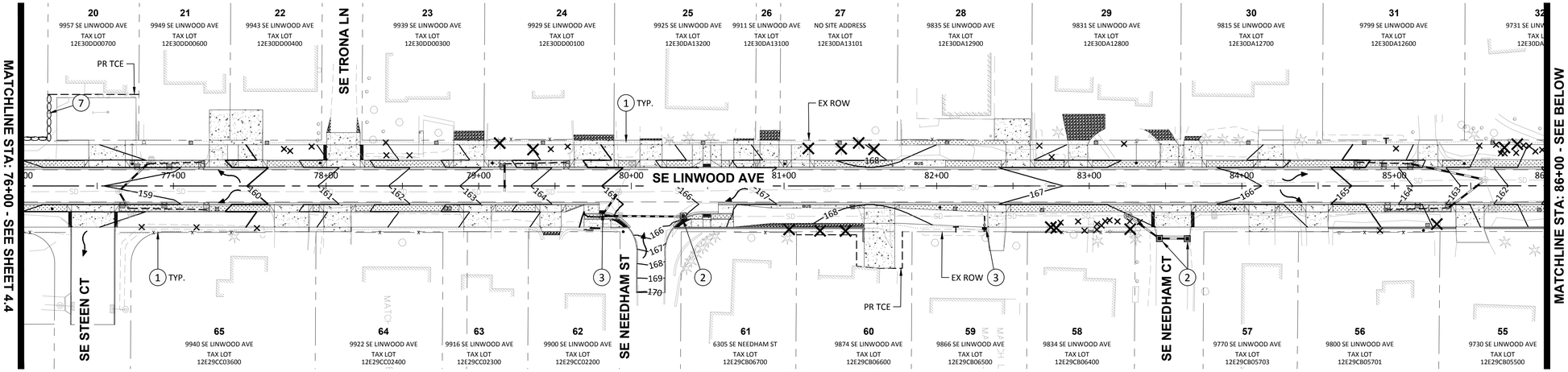
ESCP PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 4.4

JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

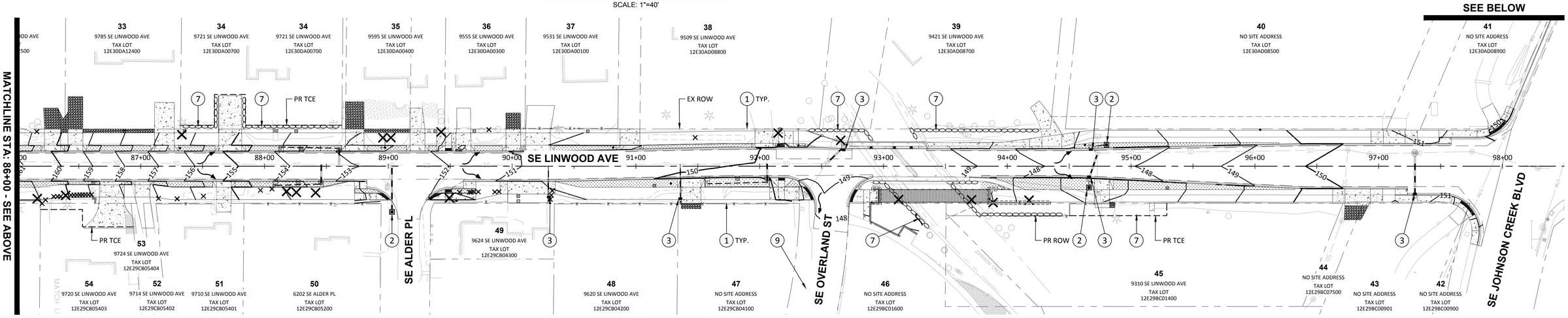
SCALE: 1"=40'

CONSTRUCTION NOTES:

1. INSTALL WATTLES AT PROJECT LIMIT LINE. CONTRACTOR TO DETERMINE NECESSARY LOCATIONS. SEDIMENT RUNOFF TO BE CONTAINED WITHIN PROJECT LIMITS. SEE DETAIL ON SHEET 4.6.
2. INSTALL INLET PROTECTION (TYPE 5) PER DETAIL ON SHEET 4.6.
3. INSTALL INLET PROTECTION (TYPE 4) PER DETAIL ON SHEET 4.6
7. INSTALL WATTLES PER DETAIL ON SHEET 4.6.
9. INSTALL INLET PROTECTION (TYPE 5) AT NEAREST DOWNSTREAM CATCH BASIN.

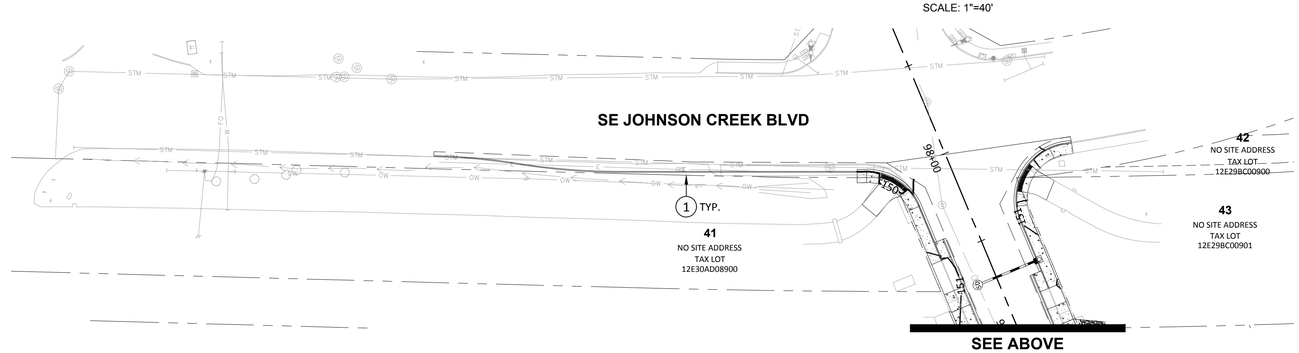
0 20 40 80

SCALE: 1" = 40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



JOHNSON CREEK BLVD PLAN VIEW

SCALE: 1"=40'

0 20 40 80

SCALE: 1" = 40'

TREE REMOVAL (X), SHRUB REMOVAL (×), AND TRIMMING (T) SHOWN ON PLANS. REMOVAL IS TYPICAL WITHIN THE PROPOSED LIMITS OF GRADING (DAYLIGHT/CATCH POINTS). TRIMMING IS TYPICAL FOR ALL EXISTING TREES OR SHRUBS THAT REMAIN ALONG THE BACK OF SHARED-USE-PATH. COORDINATE WITH ENGINEER PRIOR TO REMOVAL OR TRIMMING. STUMPS TO BE GRINDED.

NOTE: CONTRACTOR TO PROVIDE TREE PROTECTION MEASURES, INCLUDING ORANGE CONSTRUCTION FENCING, FOR ALL TREES TO REMAIN WITHIN THE PROJECT LIMITS.

NOTE: CONTRACTOR TO MAINTAIN INLET PROTECTION ON ALL EXISTING DOWNSTREAM STRUCTURES UNTIL THE COMPLETION OF CONSTRUCTION

EROSION CONTROL

- CONSTRUCTION ENTRANCE
- WATTLES
- TREE REMOVAL
- FLOW DIRECTION
- INLET PROTECTION (TYPE 4)
- INLET PROTECTION (TYPE 5)
- TIRE WASH
- 100 EXISTING CONTOUR
- 101 PROPOSED MINOR CONTOUR
- 105 PROPOSED MAJOR CONTOUR

PREPARED FOR

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EXPIRES: 6/30/23

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ESCP PLAN

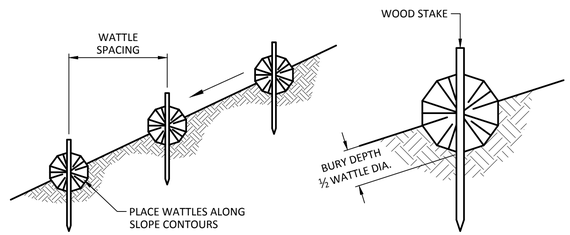
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

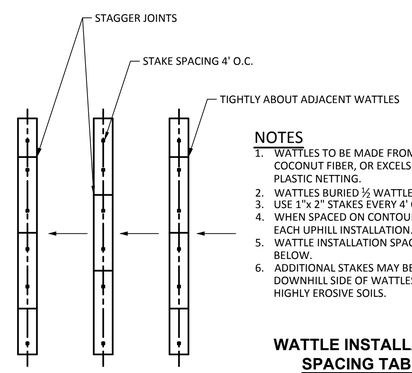
SHEET NO. 4.5

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-4.0 EROSION CONTROL PLAN.dwg



PROFILE **SECTION**



PLAN VIEW

NOTES

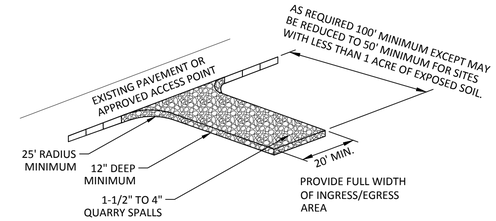
1. WATTLES TO BE MADE FROM RICE STRAW, WOOD, COCONUT FIBER, OR EXCELSIOR PLACED WITHIN A PLASTIC NETTING.
2. WATTLES BURIED ½ WATTLE DIAMETER.
3. USE 1"x 2" STAKES EVERY 4' O.C.
4. WHEN SPACED ON CONTOUR, STAGGER JOINTS ON EACH UPHILL INSTALLATION.
5. WATTLE INSTALLATION SPACING PER TABLE BELOW.
6. ADDITIONAL STAKES MAY BE REQUIRED ON DOWNHILL SIDE OF WATTLES ON STEEP SLOPES OR HIGHLY EROSIVE SOILS.

WATTLE INSTALLATION SPACING TABLE

% SLOPE	SPACING SLOPE	(MAX)
<10%	<10:1	300'
10%>X<15%	10:1>X<7.5:1	150'
15%>X<20%	7.5:1>X<5:1	100'
20%>X<30%	5:1>X<3.5:1	50'
30%>X<50%	3.5:1>X<2:1	25'

EROSION AND SEDIMENT CONTROL WATTLE DETAIL

NTS

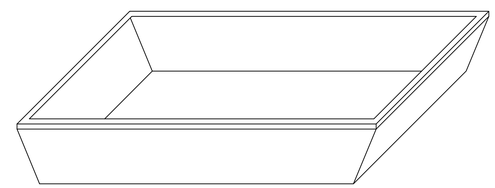


NOTES:

1. IF THE ENTRANCE SITS ON A SLOPE, PLACE A FILTER FABRIC FENCE DOWN GRADIENT TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE. WHEN THE CONSTRUCTION ENTRANCE BECOMES CLOGGED WITH SEDIMENTS, TOP DRESS THE PAD WITH CLEAN 3" MINUS ROCK.
2. ANY SEDIMENT CARRIED FROM THE SITE ONTO THE STREET SHALL BE CLEANED UP IMMEDIATELY.
3. IF EQUIPMENT TRAVELS EXTENSIVELY ON UNSTABILIZED ROADS ON THE SITE, A TIRE AND VEHICLE WHEEL WASH NEAR THE ENTRANCE WILL BE NEEDED. PERFORM WASHING ON CRUSHED ROCK. WASH WATER WILL REQUIRE TREATMENT IN A SEDIMENT POND OR TRAP.

GRAVEL CONSTRUCTION ENTRANCE

NTS

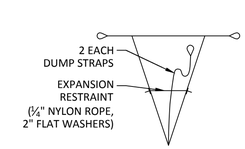


NOTES:

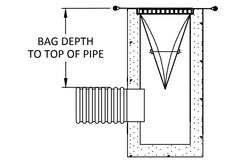
1. COLLECT AND RETAIN ALL THE CONCRETE WASHOUT WATER AND SOLIDS IN A LEAK PROOF BASIN.
2. INSPECT FREQUENTLY. DO NOT OVERFILL BASIN.
3. RECYCLE MATERIALS.
   A. WASHWATER RECYCLING: WASHWATER SHOULD BE PASSED THROUGH A FILTER AND TREATMENT SYSTEM TO REMOVE SOLIDS REDUCE PH. WASHWATER MAY BE REUSED FOR CONCRETE WASHOUT WATER. DISPOSAL OF WASHWATER SHALL BE AT AN APPROVED DISPOSAL FACILITY. DO NOT DRAIN TO STORM OR SANITARY SYSTEM.
   B. SOLIDS RECYCLING: COURSE AGGREGATE MATERIALS THAT ARE SEPARATED FROM WASHWATER MAY BE RETURN TO READY MIX PLANT. COORDINATE WITH READY MIX PLANT PRIOR TO CONSTRUCTION.
   C. HARDENED CONCRETE RECYCLING: ALLOW CONCRETE WASHOUT TO HARDEN IN BASIN. THE HARDEN CONCRETE MAY BE DELIVERED TO RECYCLING PLANTS.

CONCRETE TRUCK WASHOUT BASIN

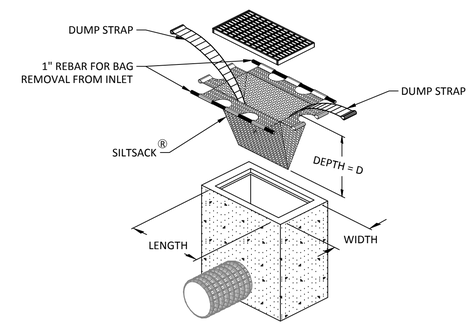
NTS



BAG SECTION



INSTALLATION SECTION



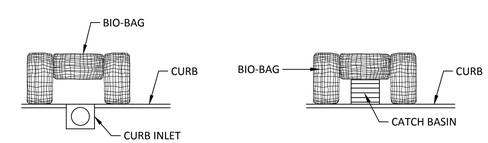
3-D VIEW

NOTE:

1. THE DIMENSION CHART ABOVE IS FOR STANDARD CATCH BASINS AND INLETS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE CORRECT SIZE DEVICE FOR EACH INLET.
2. CATCH BASINS AND INLETS, THE CONTRACTOR SHALL MEASURE FOR NON- CLEAN WATER SERVICES STANDARD DIMENSIONS IN THE FIELD AND ORDER THE APPROPRIATE SIZE(S).
3. THE INLET SEDIMENT CONTROL DEVICE SHALL BE OF HIGH FLOW DESIGN (200 GAL / MIN / FT), AS PER THE MANUFACTURER'S SPECIFICATIONS.
4. THE SEDIMENT CONTROL DEVICE SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED A MINIMUM ONCE PER MONTH OR WITHIN THE 48 HOURS FOLLOWING A STORM EVENT.
5. SUBSTITUTION OF A SHEET OF FILTER FABRIC PLACED OVER THE OPENING OF THE INLET IS NOT APPROVED.

INLET SEDIMENT CONTROL DEVICE (TYPE 5)

NTS



NOTE:

1. NOT ALLOWED FOR USE IN TRAFFIC AREAS.

BIO-BAG PROTECTION (TYPE 4)

ALTERNATE MEASURE

NTS

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-4.0 ESCP DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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205 SE Spokane Street, Suite 200, Portland, OR 97202
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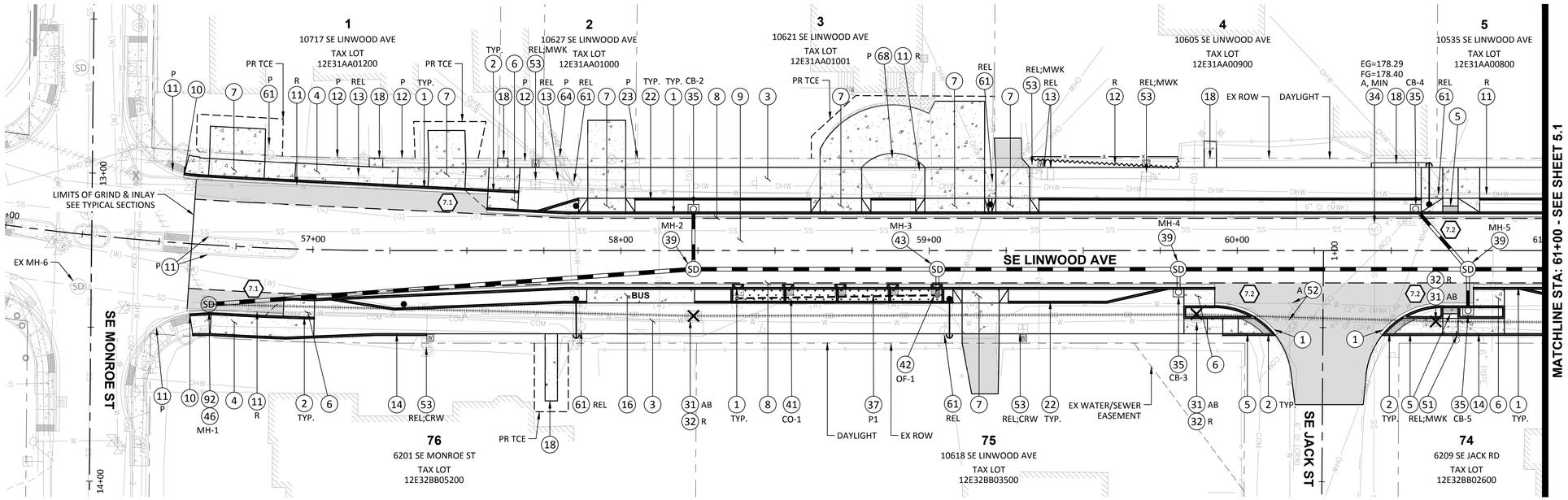
ESCP DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 4.6

JOB NO. CLA-93

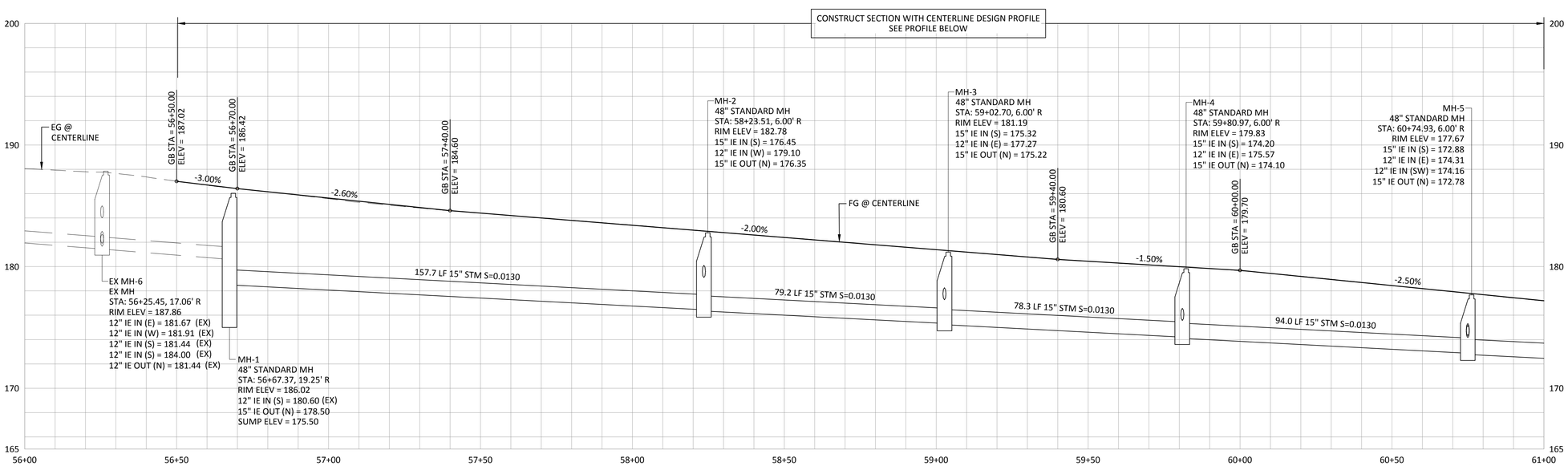


NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

SEE SHEET 5.0A FOR DRAINAGE DATA

0 10 20 40
SCALE: 1" = 20'

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
14. CONSTRUCT STANDARD CURB AT BACK OF SHARED-USE PATH. SEE SHEET 3.0 FOR DETAIL.
16. CONSTRUCT CONCRETE BUS PAD. SEE SIDEWALK SECTION ON SHEET 6.0.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
23. REMOVE (R) OR PROTECT (P) EXISTING COLUMN.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
35. CONSTRUCT STANDARD CURB INLET CATCH BASIN CG-3 AND LATERALS PER ODOT STANDARD DWG RD371 ON SHEET 3.7. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
39. REMOVE EXISTING STORM STRUCTURE AND CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
43. CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
46. REMOVE EXISTING STORM STRUCTURE AND CONSTRUCT 48" STANDARD STORM SEWER MANHOLE WITH 3' SUMP PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
64. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING UTILITY PEDESTAL. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.
68. REMOVE (R) OR PROTECT (P) EXISTING PRIVATE LIGHT POLE.
92. POTHOLE AND FIELD CONFIRM EXISTING STORM LINE LOCATION AND ELEVATION BEFORE BEGINNING WORK. COORDINATE RESULTS WITH ENGINEER.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER
86,200
OREGON
JAN. 10, 2017
JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
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LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

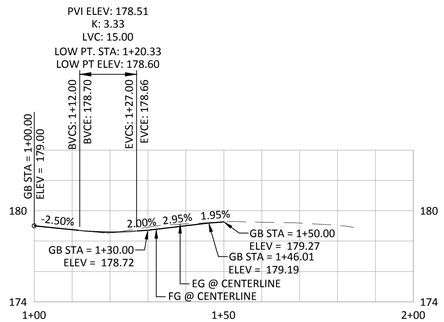
CLACKAMAS COUNTY, OREGON

SHEET NO. 5.0

JOB NO. CLA-93

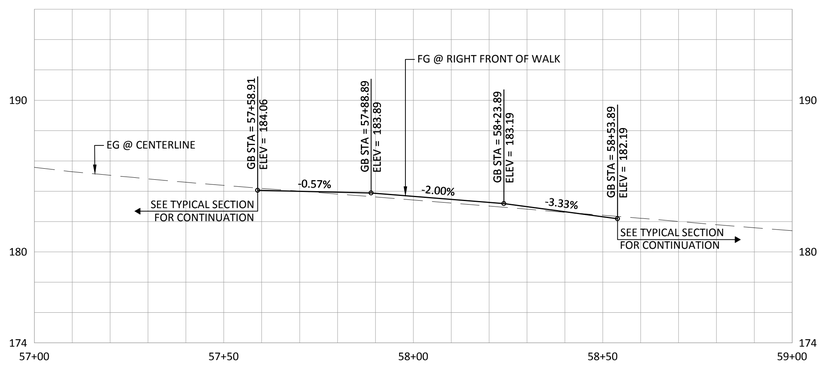
CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING.
CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK.



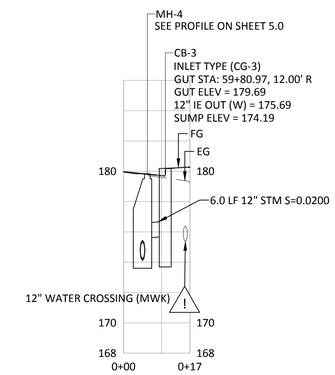
JACK RD - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



LINWOOD - RIGHT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



CB-3 STORM LATERAL

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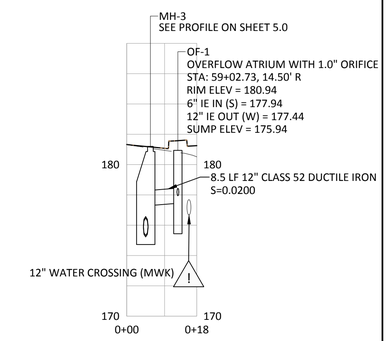
1"=5' (VERT.)



OF-1 STORM LATERAL

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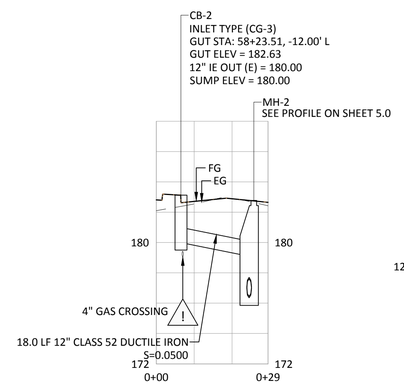

CB-2 STORM LATERAL

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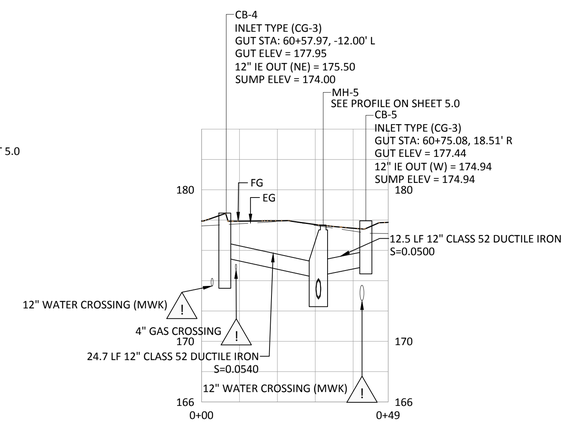
1"=5' (VERT.)



CB-4 & CB-5 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
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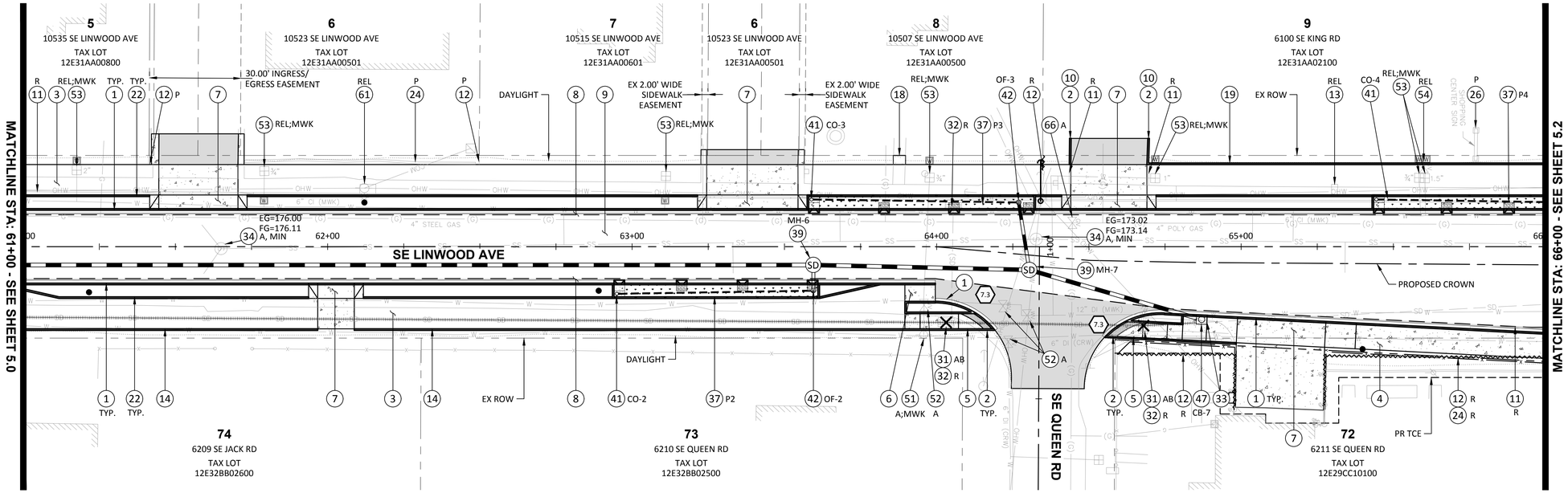
ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.0A

JOB NO. CLA-93

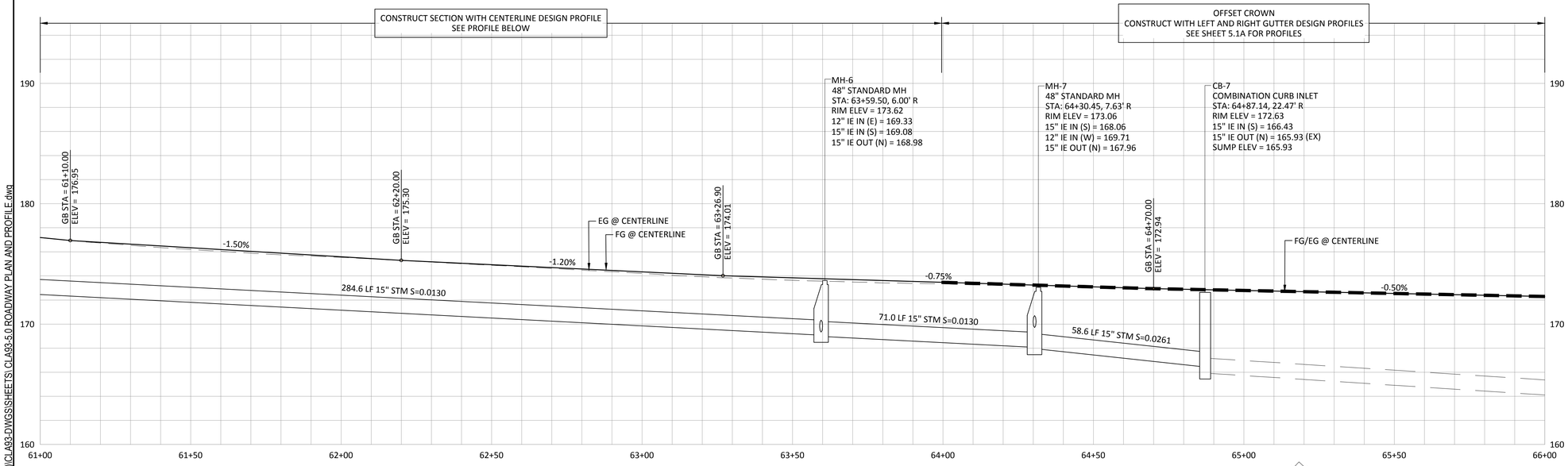


NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.1A FOR STORM INLET PROFILES

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
14. CONSTRUCT STANDARD CURB AT BACK OF SHARED-USE PATH. SEE SHEET 3.0 FOR DETAIL.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
19. CONSTRUCT VERTICAL CURB WALL WITH 12" EXPOSURE PER DETAIL ON SHEET 3.2.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
24. REMOVE (R) OR PROTECT (P) EXISTING WALL.
26. REMOVE (R) OR PROTECT (P) EXISTING COMMERCIAL SIGN.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
39. REMOVE EXISTING STORM STRUCTURE AND CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
47. CONSTRUCT COMBINATION CURB INLET MANHOLE WITH 48" BASE AND CG-3 INLET TOP. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
54. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING IRRIGATION. RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
66. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING GAS VALVE. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
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LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

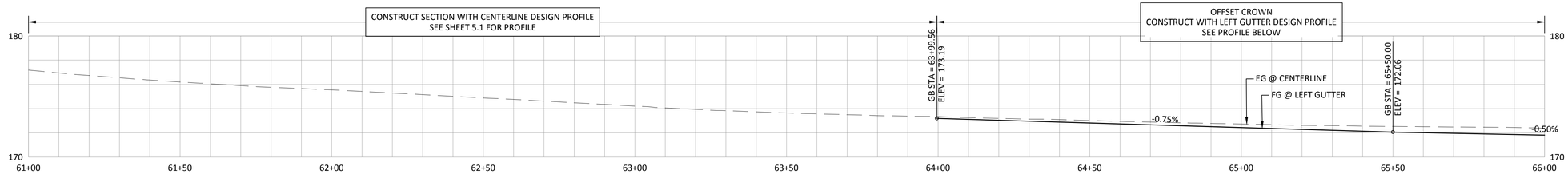
CLACKAMAS COUNTY, OREGON

SHEET NO. 5.1

JOB NO. CLA-93

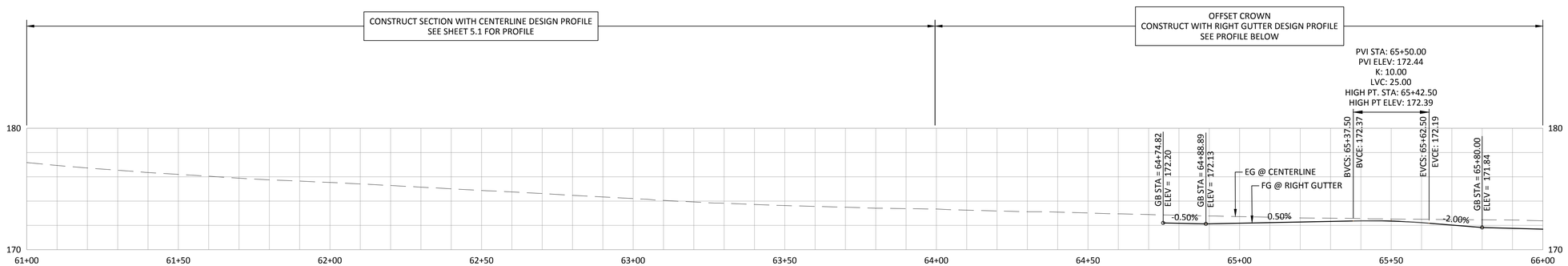
CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING.
CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK.



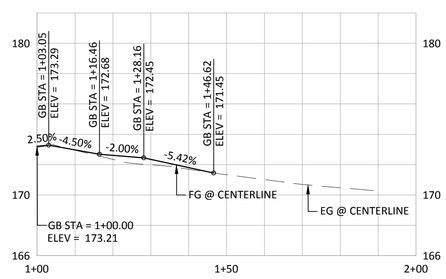
LINWOOD AVE - LEFT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



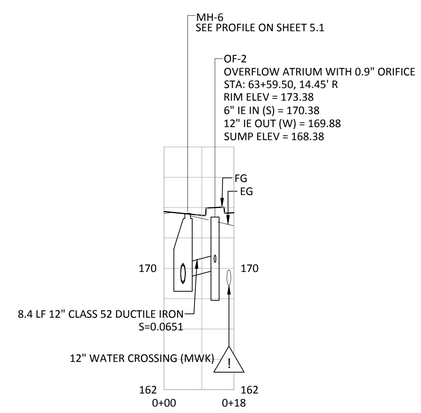
LINWOOD AVE - RIGHT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



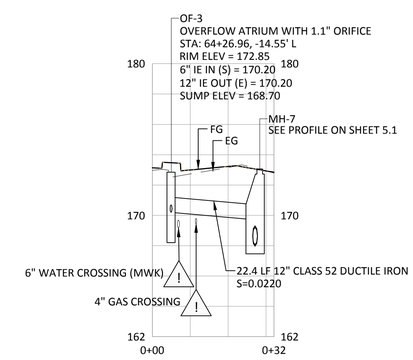
QUEEN RD - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-2 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-3 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

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LINWOOD PLAN AND PROFILE

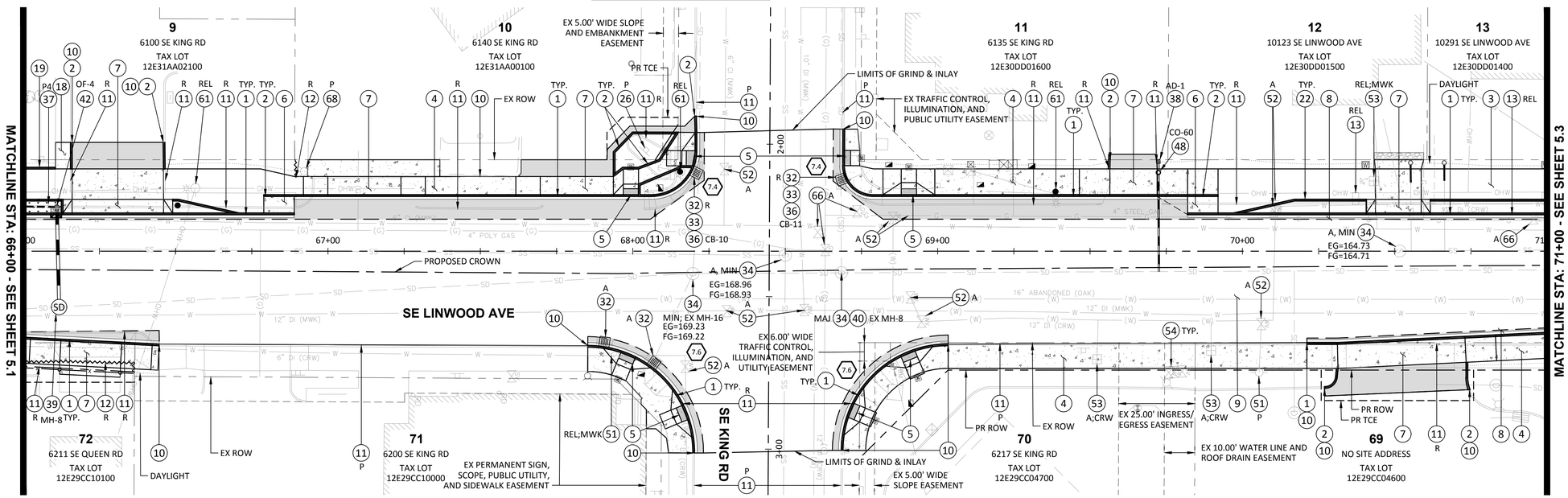
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.1A

JOB NO. CLA-93

SEE SHEET SERIES 12.0 FOR SIGNAL MODIFICATIONS AT SE KING RD INTERSECTION



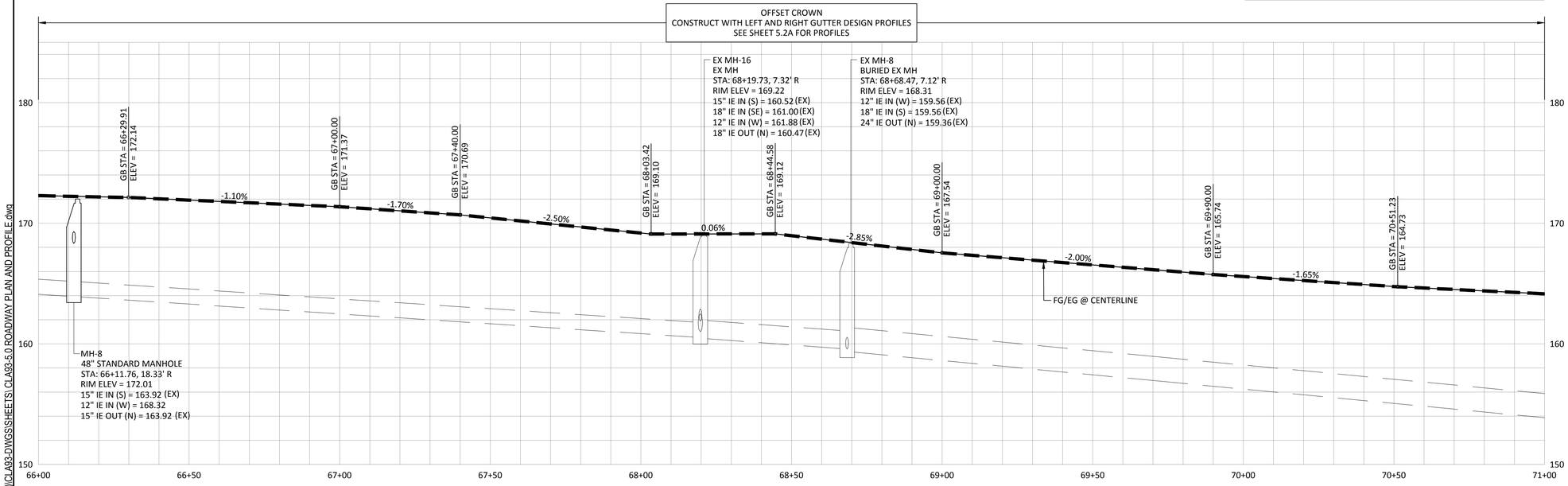
NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
19. CONSTRUCT VERTICAL CURB WALL WITH 12" EXPOSURE PER DETAIL ON SHEET 3.2.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
26. REMOVE (R) OR PROTECT (P) EXISTING COMMERCIAL SIGN.
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
38. CONSTRUCT AREA DRAIN PER DETAIL ON SHEET 3.6. SEE PLAN FOR INVERTS AND DATA.
39. REMOVE EXISTING STORM STRUCTURE AND CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
40. EXISTING MANHOLE BURIED UNDER ASPHALT. LOCATE EXISTING MANHOLE AND ADJUST RIM TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
48. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
54. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING IRRIGATION. RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
66. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING GAS VALVE. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.
68. REMOVE (R) OR PROTECT (P) EXISTING PRIVATE LIGHT POLE.

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.2A FOR DRAINAGE DATA AND STORM INLET PROFILES

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
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CHECKED: DSH/JSH
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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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LINWOOD PLAN AND PROFILE

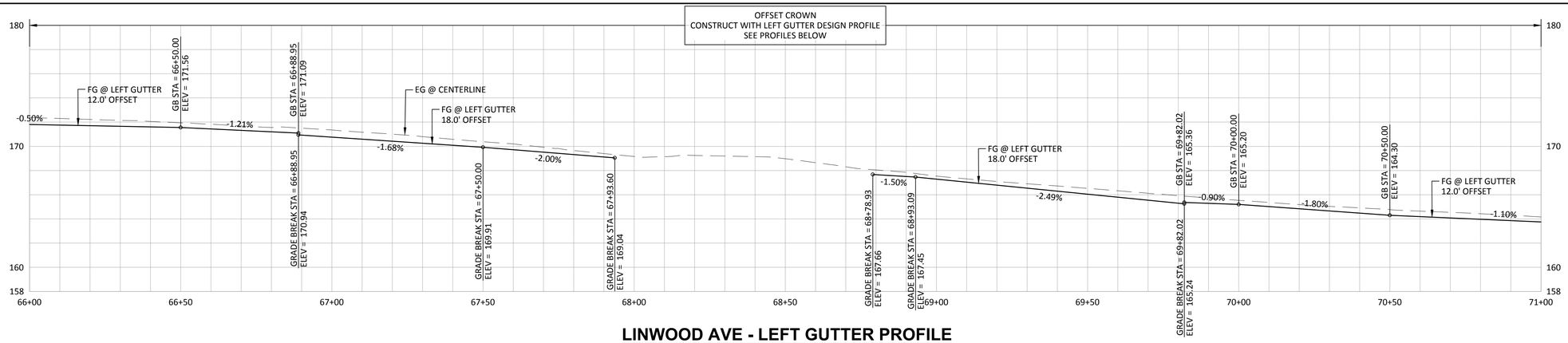
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.2

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

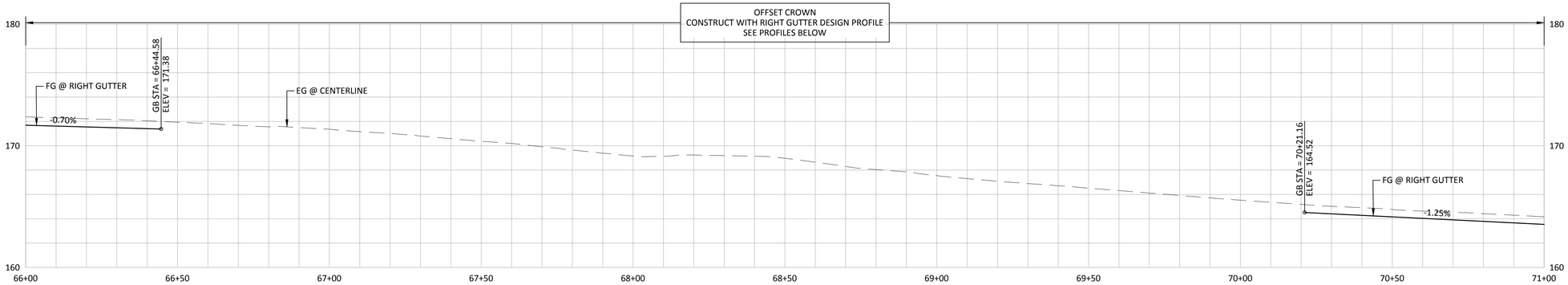


CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING.
CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK.

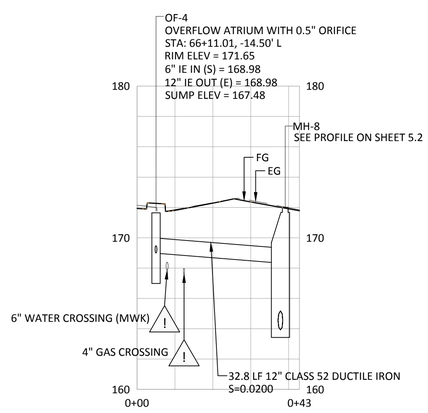
LINWOOD AVE - LEFT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



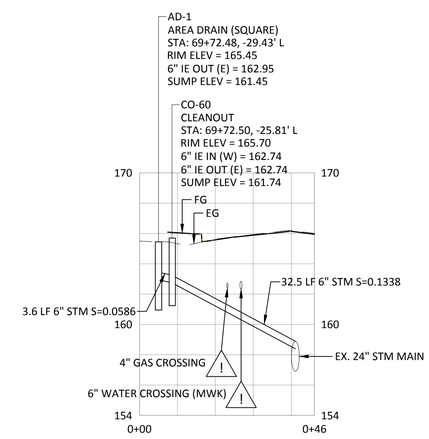
LINWOOD AVE - RIGHT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-4 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



AD-1 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

DRAINAGE DATA

CB-10
INLET TYPE (GB-2)
RIM STA: 68+20.90, -25.70' L
RIM ELEV = 168.50
SUMP ELEV = 162.32
12" IE IN (W) = 163.82 (EX)
12" IE OUT (E) = 163.82 (EX)

CB-11
INLET TYPE (GB-2)
RIM STA: 68+68.44, -23.50' L
RIM ELEV = 168.31
SUMP ELEV = 164.44
12" IE IN (W) = 165.94 (EX)
12" IE OUT (E) = 166.02 (EX)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
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150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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R E V I S I O N S

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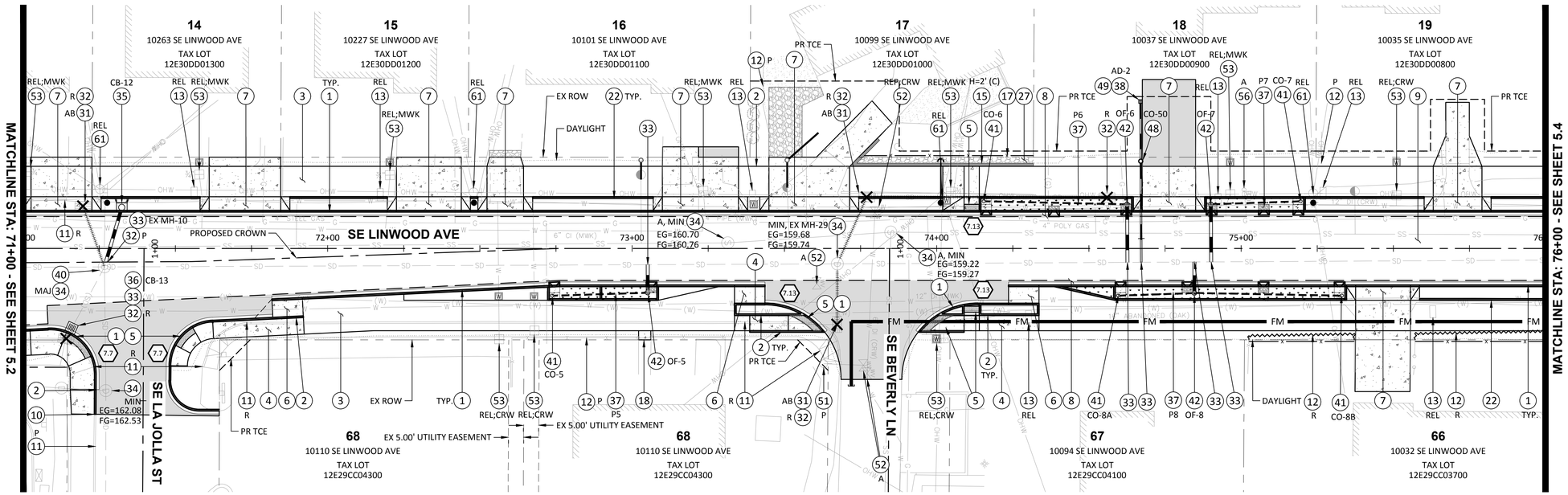
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.2A

JOB NO. CLA-93



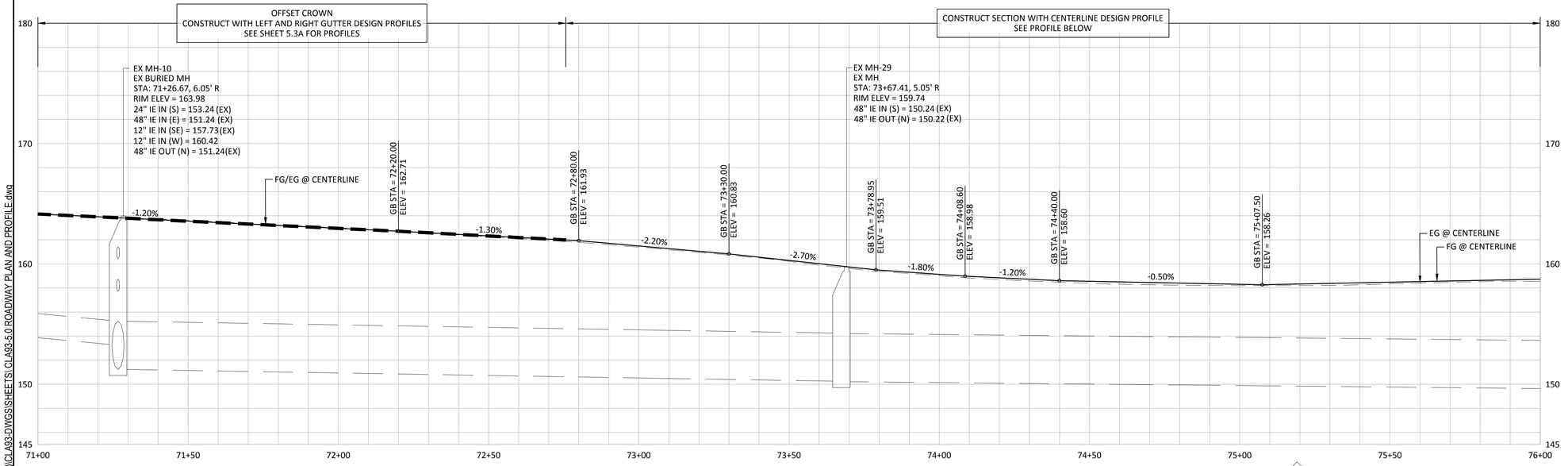
NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.3B FOR STORM INLET PROFILES

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
15. CONSTRUCT SEGMENTAL BLOCK RETAINING WALL PER DETAIL ON SHEET 3.2. HEIGHT (H) NOTED ON PLANS. WALL TYPE CUT (C) OR FILL (F) NOTED ON PLANS.
17. CONSTRUCT NEW FENCE ON PROPERTY LINE. SIZE AND MATERIAL IDENTIFIED IN THE SPECIFICATIONS.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
27. CONSTRUCT LOW MAINTENANCE AGGREGATE GRAVEL BEHIND WALL.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
35. CONSTRUCT STANDARD CURB INLET CATCH BASIN CG-3 AND LATERALS PER ODOT STANDARD DWG RD371 ON SHEET 3.7. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
38. CONSTRUCT AREA DRAIN PER DETAIL ON SHEET 3.6. SEE PLAN FOR INVERTS AND DATA.
40. EXISTING MANHOLE BURIED UNDER ASPHALT. LOCATE EXISTING MANHOLE AND ADJUST RIM TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
48. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8.
49. LOCATE EXISTING BURIED AREA DRAIN. COORDINATE WITH ENGINEER WHETHER EXISTING DRAIN AND LATERAL CAN BE USED IN PLACE OF NEW DRAIN LOCATION.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
56. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING WATER BLOW OFF. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

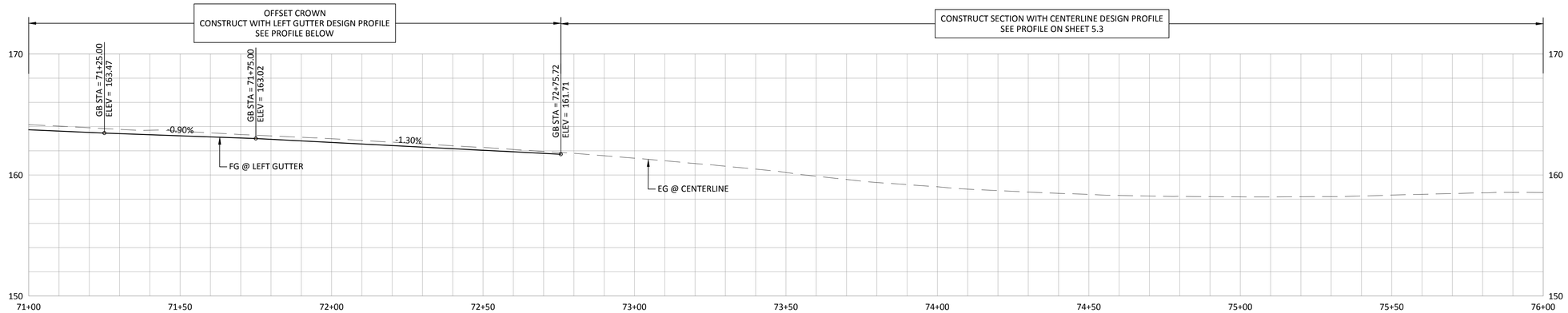
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

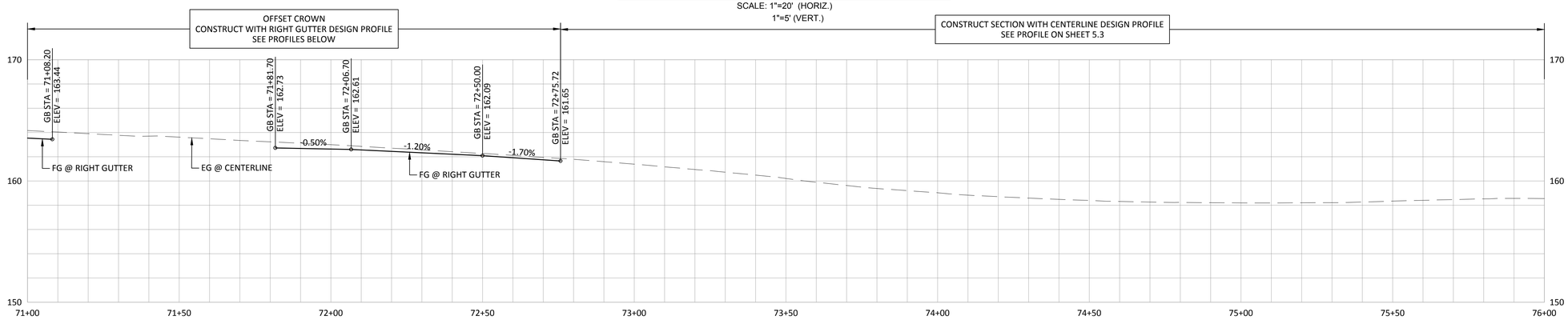
SHEET NO. 5.3

JOB NO. CLA-93



LINWOOD AVE - LEFT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



LINWOOD AVE - RIGHT GUTTER PROFILE

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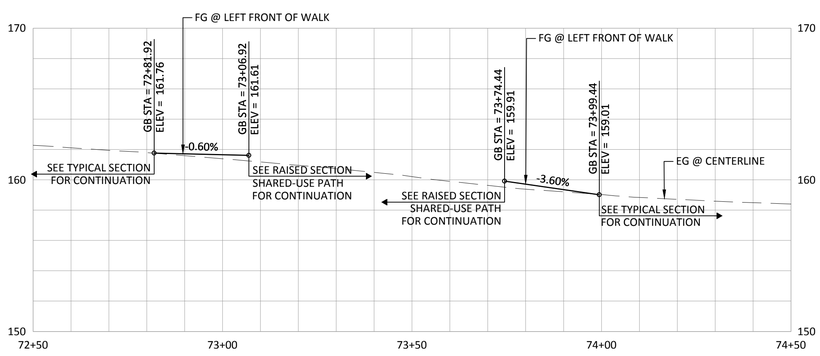

LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
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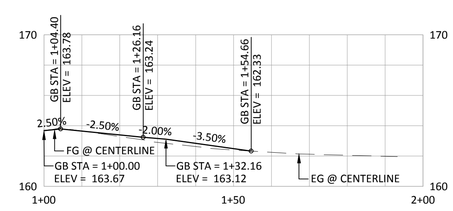

LA JOLLA ST - CENTERLINE PROFILE

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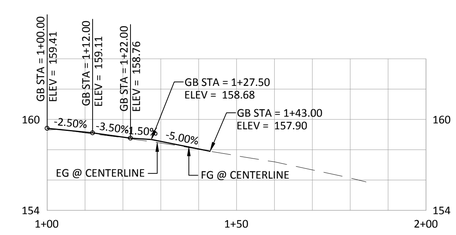
1"=5' (VERT.)



BEVERLY LN - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
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DATE	NO.	DESCRIPTION

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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ENGINEERS • PLANNERS
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205 SE Spokane Street, Suite 200, Portland, OR 97202
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LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

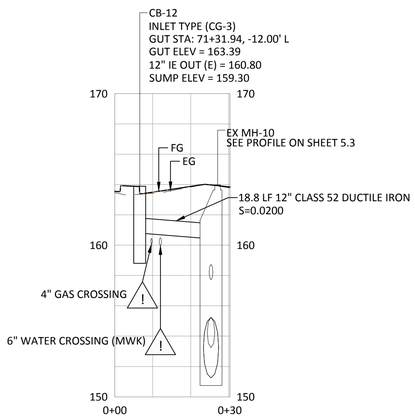
CLACKAMAS COUNTY, OREGON

SHEET NO. 5.3A

JOB NO. CLA-93

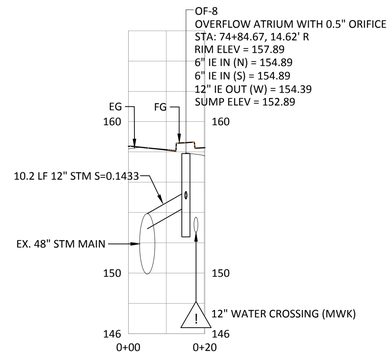
CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING.
CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK.



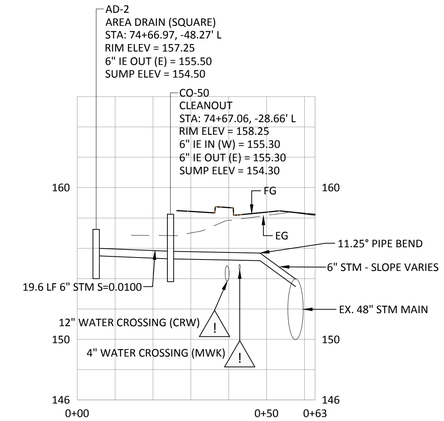
CB-12 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



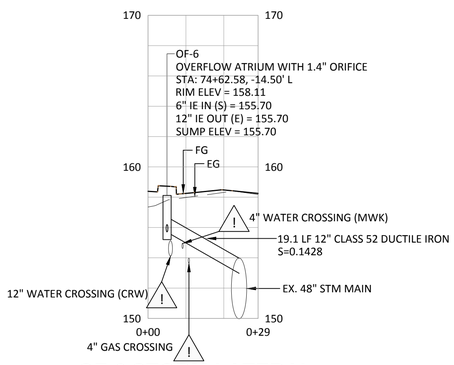
OF-8 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



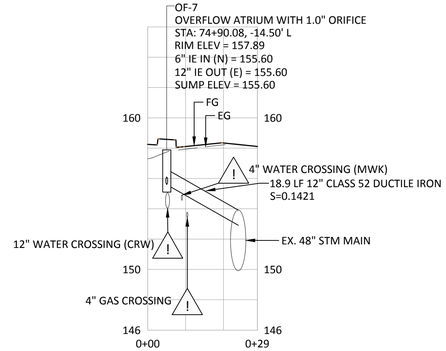
AD-2 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



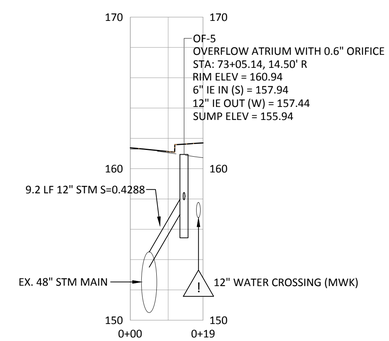
OF-6 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-7 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-5 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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DEVELOPMENT SERVICES BLDG.
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EXPIRES: 6/30/23

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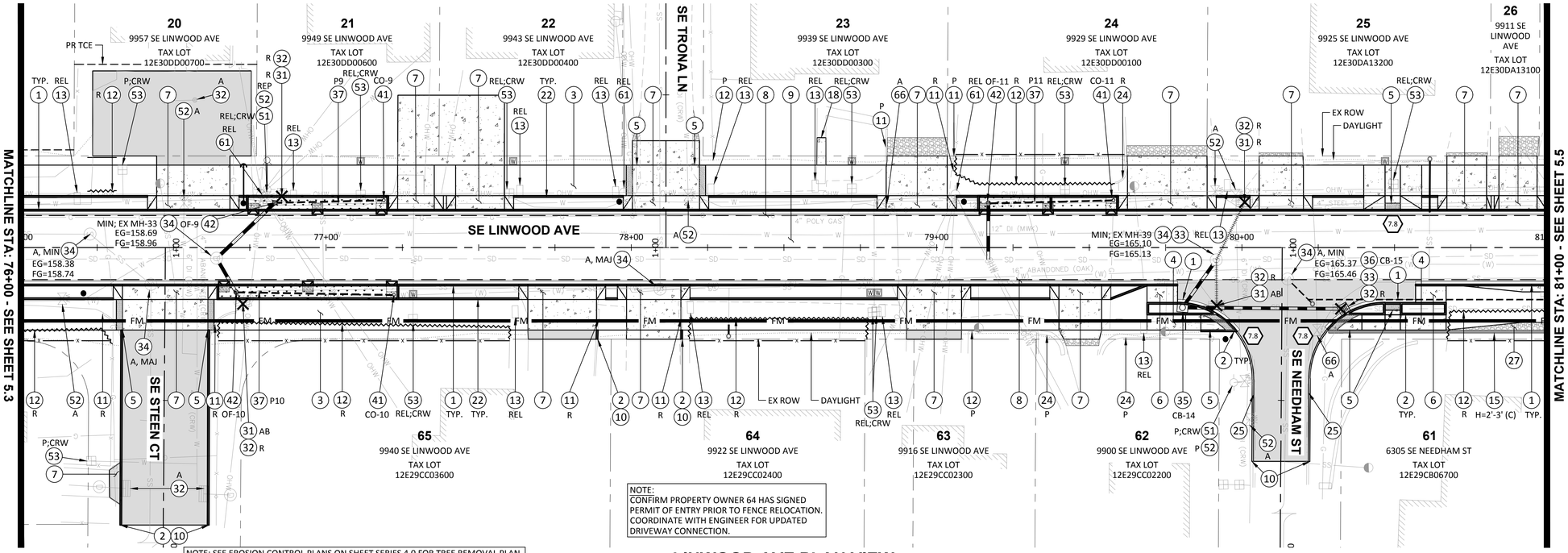
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **5.3B**

JOB NO. CLA-93



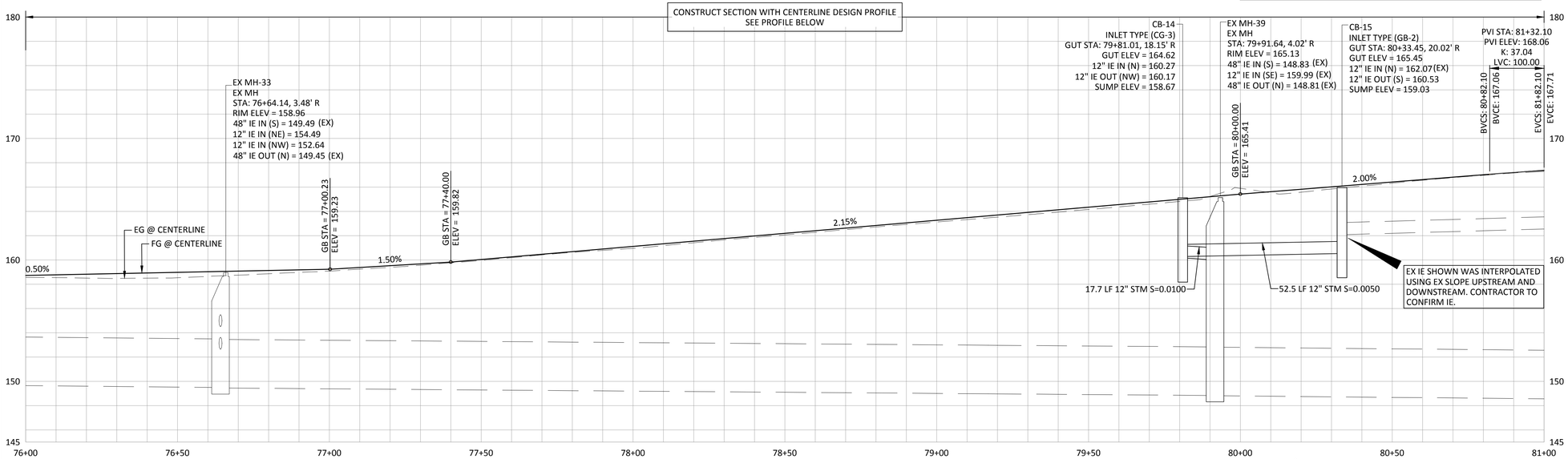
NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.4A FOR STORM INLET PROFILES

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
15. CONSTRUCT SEGMENTAL BLOCK RETAINING WALL PER DETAIL ON SHEET 3.2. HEIGHT (H) NOTED ON PLANS. WALL TYPE CUT (C) OR FILL (F) NOTED ON PLANS.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
24. REMOVE (R) OR PROTECT (P) EXISTING WALL.
25. CONSTRUCT ASPHALT DRAINAGE CURB PER DETAIL ON SHEET 3.0. MATCH SIZE AND TYPE TO EXISTING.
27. CONSTRUCT LOW MAINTENANCE AGGREGATE GRAVEL BEHIND WALL.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
35. CONSTRUCT STANDARD CURB INLET CATCH BASIN CG-3 AND LATERALS PER ODOT STANDARD DWG RD371 ON SHEET 3.7. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
66. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING GAS VALVE. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

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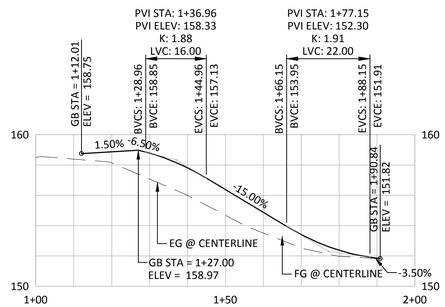
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

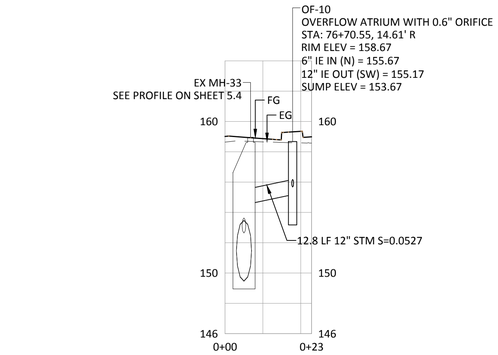
SHEET NO. 5.4

JOB NO. CLA-93



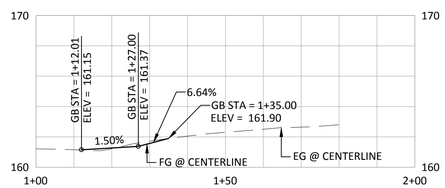
STEEN CT - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



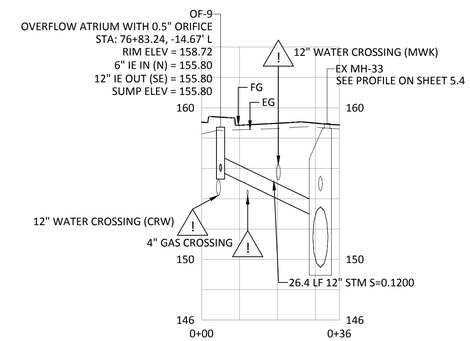
OF-10 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



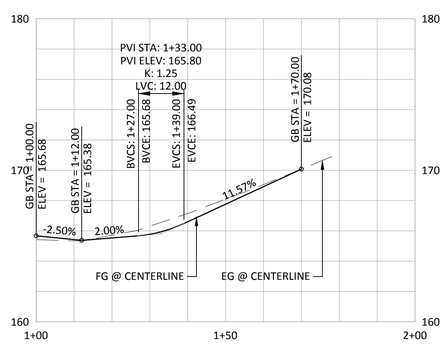
TRONA LN - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



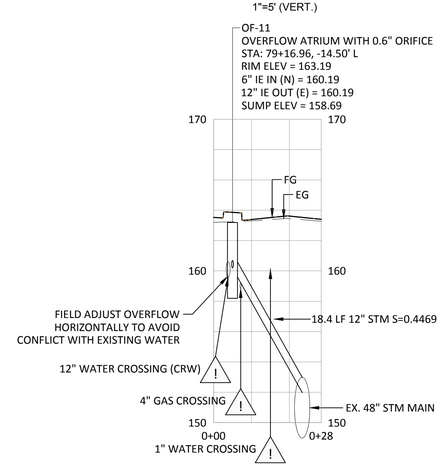
OF-9 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



NEEDHAM ST - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-11 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

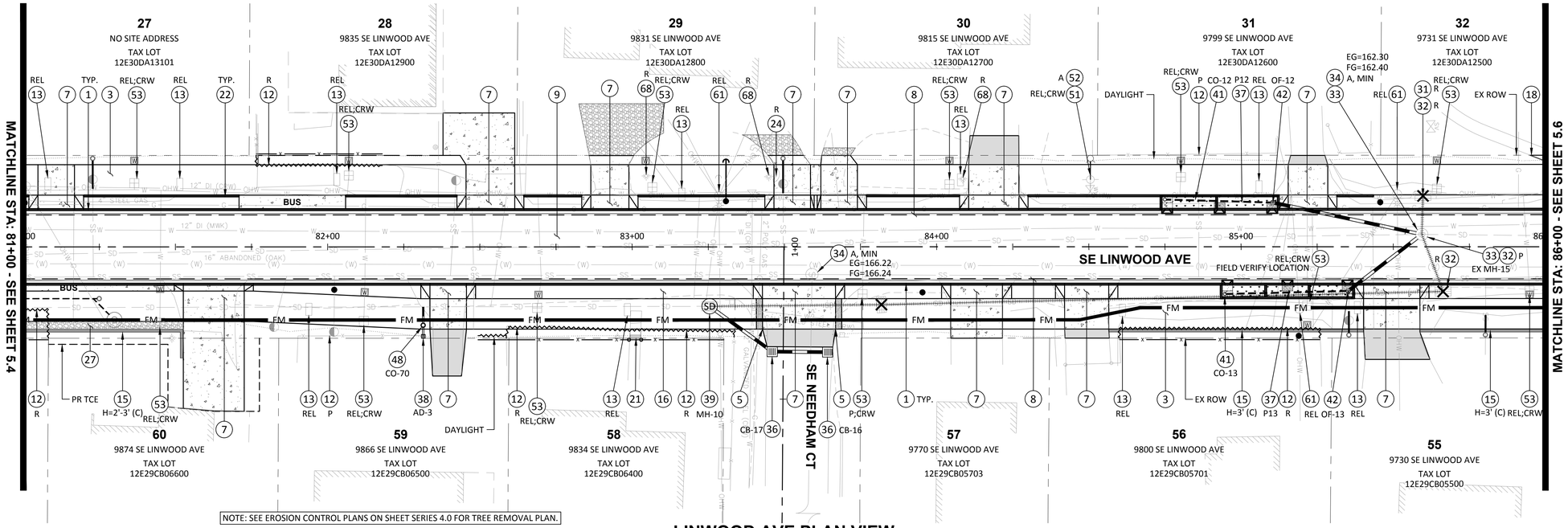
ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.4A

JOB NO. CLA-93

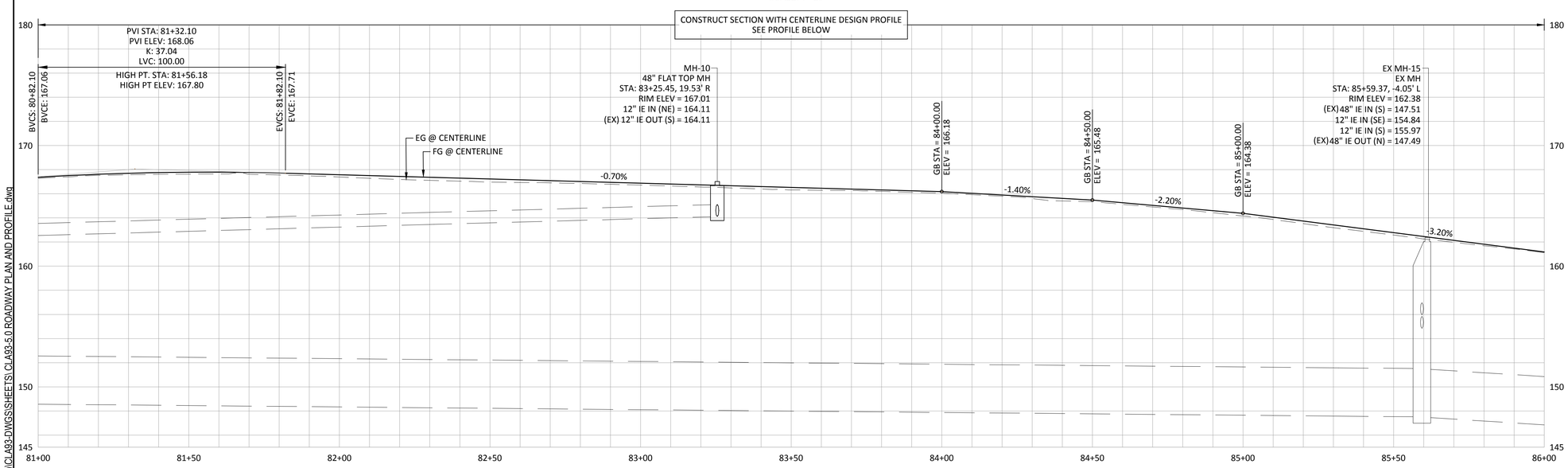


NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
15. CONSTRUCT SEGMENTAL BLOCK RETAINING WALL PER DETAIL ON SHEET 3.2. HEIGHT (H) NOTED ON PLANS. WALL TYPE CUT (C) OR FILL (F) NOTED ON PLANS.
16. CONSTRUCT CONCRETE BUS PAD. SEE SIDEWALK SECTION ON SHEET 6.0.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
21. CONSTRUCT CONCRETE WALK CONNECTION WITH STAIRS. SEE CONCRETE STAIR DETAIL ON SHEET 3.5.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
24. REMOVE (R) OR PROTECT (P) EXISTING WALL.
27. CONSTRUCT LOW MAINTENANCE AGGREGATE GRAVEL BEHIND WALL.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
38. CONSTRUCT AREA DRAIN PER DETAIL ON SHEET 3.6. SEE PLAN FOR INVERTS AND DATA.
39. REMOVE EXISTING STORM STRUCTURE AND CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
48. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
68. REMOVE (R) OR PROTECT (P) EXISTING PRIVATE LIGHT POLE.

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.5A FOR STORM INLET PROFILES

PREPARED FOR

CLACKAMAS COUNTY
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EXPIRES: 6/30/23

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LINWOOD PLAN AND PROFILE

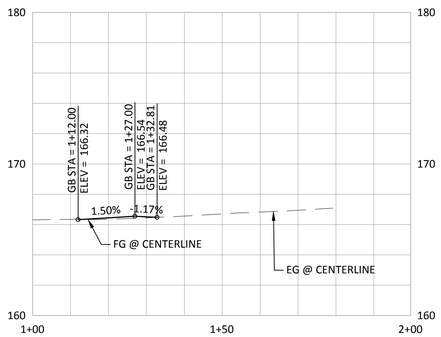
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.5

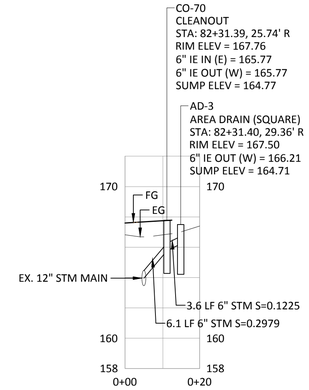
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg



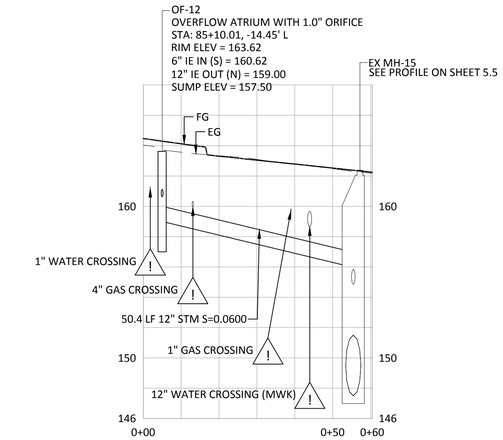
NEEDHAM CT - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



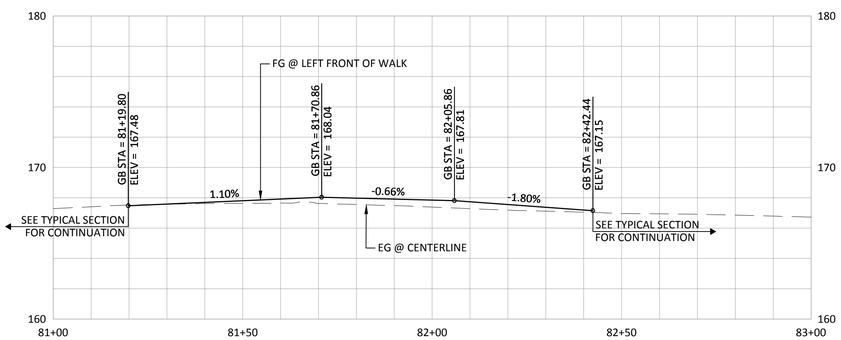
AD-3 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



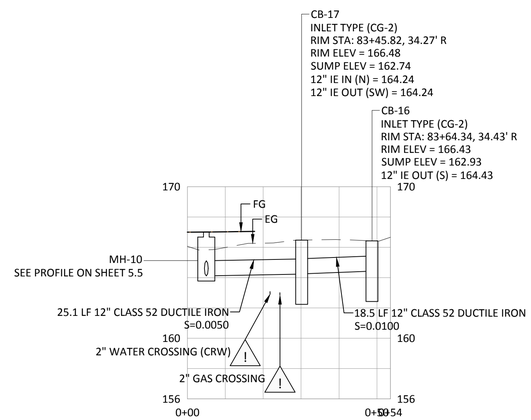
OF-12 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



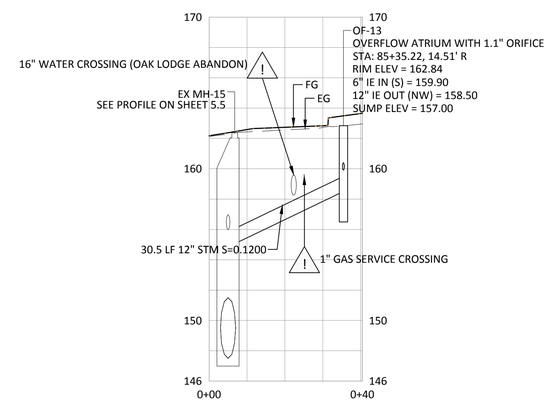
LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



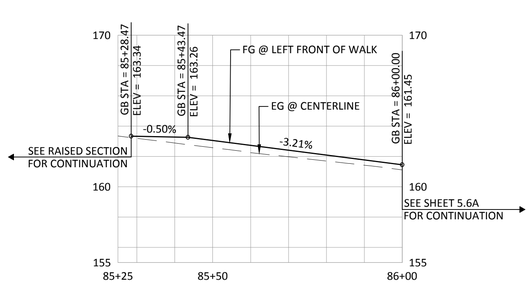
CB-16 & CB-17 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-13 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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EXPIRES: 6/30/23

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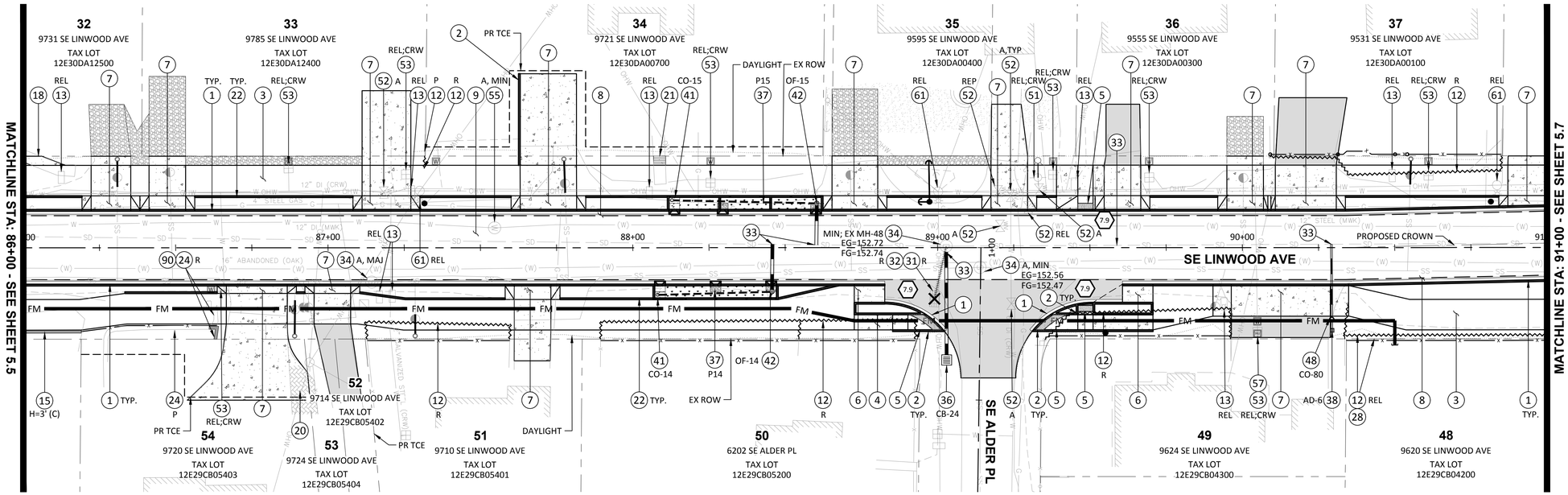
ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.5A

JOB NO. CLA-93



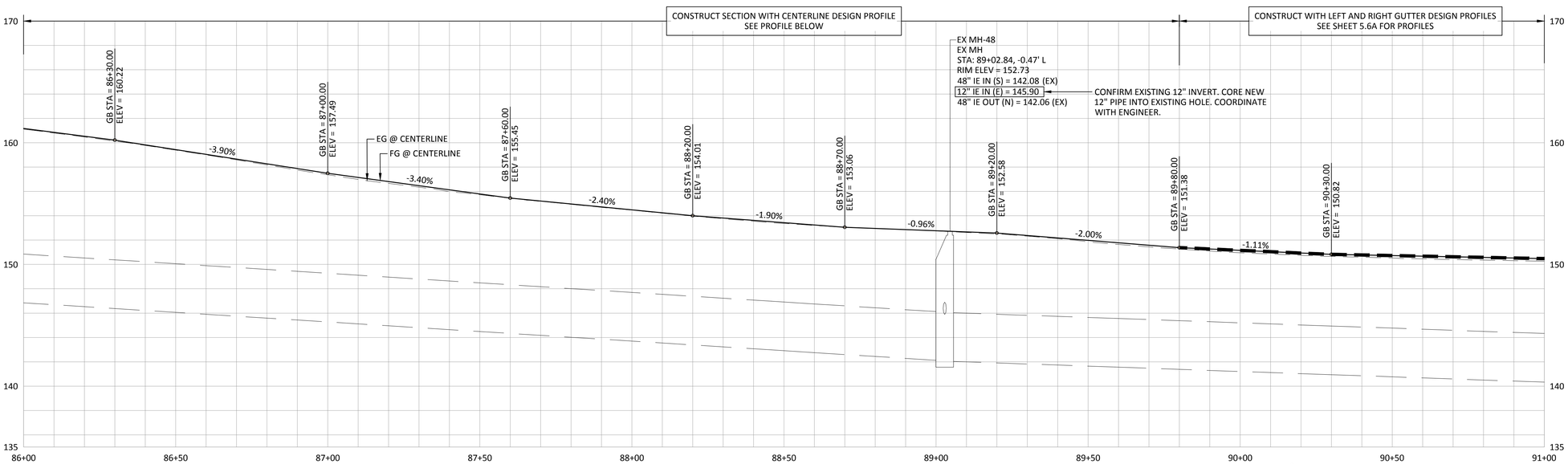
NOTE: SEE EROSION CONTROL PLANS ON SHEET SERIES 4.0 FOR TREE REMOVAL PLAN.

NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.6A FOR STORM INLET PROFILES

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
15. CONSTRUCT SEGMENTAL BLOCK RETAINING WALL PER DETAIL ON SHEET 3.2. HEIGHT (H) NOTED ON PLANS. WALL TYPE CUT (C) OR FILL (F) NOTED ON PLANS.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
20. REMOVE PAVERS TO LIMITS SHOWN. CONTRACTOR TO SALVAGE AND RECONSTRUCT PAVERS AT FINISH DRIVEWAY GRADE. COORDINATE WITH PROPERTY OWNER.
21. CONSTRUCT CONCRETE WALK CONNECTION WITH STAIRS. SEE CONCRETE STAIR DETAIL ON SHEET 3.5.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
24. REMOVE (R) OR PROTECT (P) EXISTING WALL.
28. REINSTALL CHAIN LINK FENCE PER DETAIL ON SHEET 3.5.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
38. CONSTRUCT AREA DRAIN PER DETAIL ON SHEET 3.6. SEE PLAN FOR INVERTS AND DATA.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
48. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
55. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING WATER MANHOLE/VAULT. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
57. INSTALL PRESSURE REDUCING VALVE (PRV) IN SEPARATE METER BOX. COORDINATE WITH CRW FOR LOCATION. CONFIRM SIGNED ACCESS AGREEMENT HAS BEEN OBTAINED BEFORE INSTALLATION ON PRIVATE PROPERTY.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
90. SALVAGE AND RESTACK REMOVED WALL BLOCKS. SEE PLAN FOR LIMITS OF RECONSTRUCTION.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.6

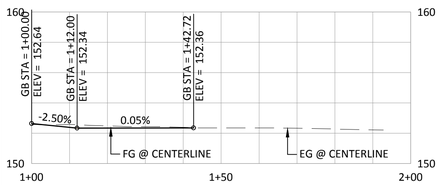
JOB NO. CLA-93

LINWOOD AVE - LEFT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

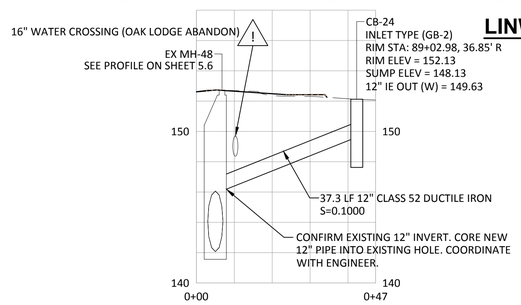
LINWOOD AVE - RIGHT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



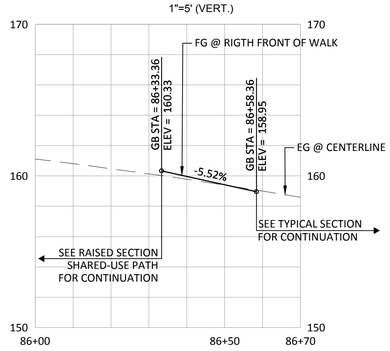
ALDER PL - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



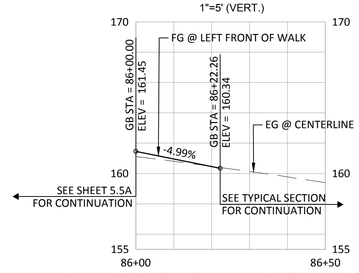
CB-24 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



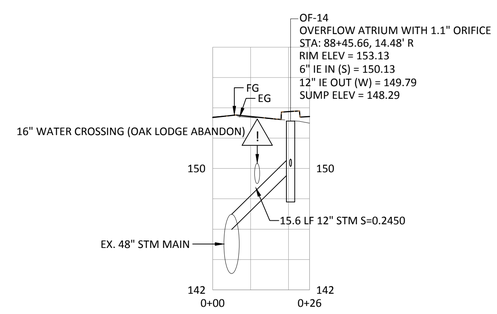
LINWOOD AVE - RIGHT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



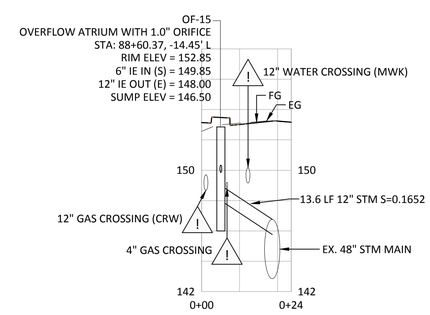
LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



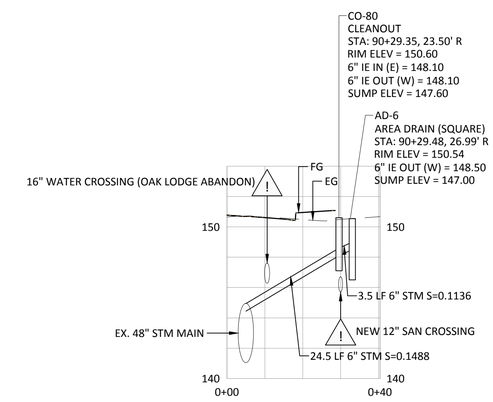
OF-14 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-15 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



AD-6 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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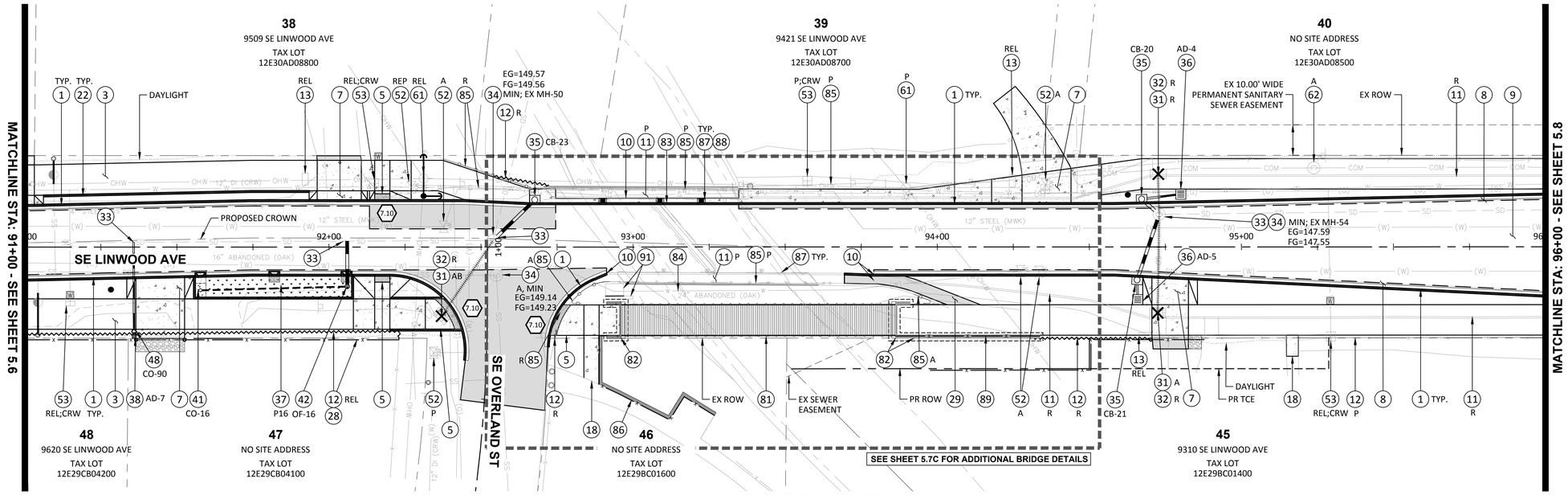
ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.6A

JOB NO. CLA-93

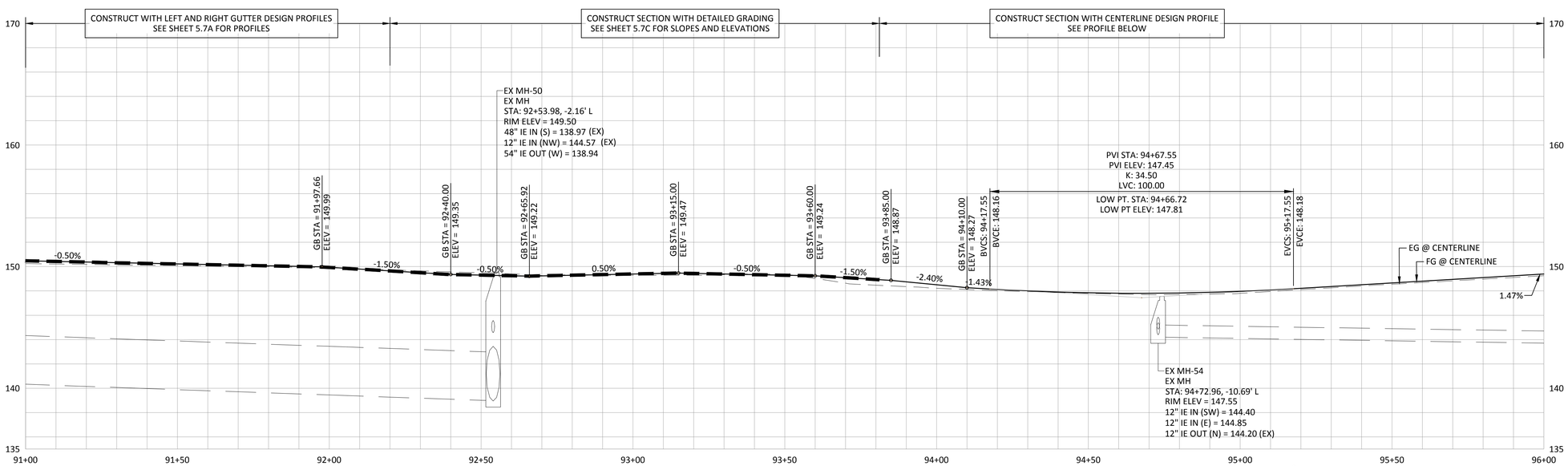


NOTE: SEE SHEET SERIES 15.0 FOR SANITARY PLAN AND PROFILE.

LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

SEE SHEET 5.7B FOR STORM INLET PROFILES

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
13. RELOCATE (REL), PROTECT (P), OR DEMOLISH (D) EXISTING MAILBOX(ES). FOR ANY RELOCATION OR ADJUSTMENT, SEE ODOT STANDARD DRAWING RD100 AND RD101 ON SHEET 3.12. COORDINATE LOCATION WITH ENGINEER.
18. CONSTRUCT PRIVATE CONCRETE WALK CONNECTION. SEE DETAIL S960 ON SHEET 3.0 AND SECTION DETAIL ON SHEET 6.0.
22. CONSTRUCT STANDARD TYPE C CURB WITH 0.4' EXPOSURE ON SHARED-USE PATH SIDE PER DETAIL S100 ON SHEET 3.0.
28. REINSTALL CHAIN LINK FENCE PER DETAIL ON SHEET 3.5.
29. CONSTRUCT IMPERVIOUS ASPHALT CONNECTION PER AC DRIVEWAY SECTION ON SHEET 6.0.
31. PROTECT (P), REMOVE (R), OR PLUG AND ABANDON IN-PLACE (AB) EXISTING STORM PIPE IN-PLACE AS REQUIRED AND DIRECTED. UPON ABANDON IN-PLACE, FILL PIPE WITH CONTROLLED DENSITY FILL (CDF).
32. PROTECT (P), REMOVE (R), ADJUST (A), OR PLUG AND ABANDON (AB) EXISTING STORM STRUCTURE. UPON REMOVAL, FILL ANY VOID WITH CONTROLLED DENSITY FILL (CDF).
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
35. CONSTRUCT STANDARD CURB INLET CATCH BASIN CG-3 AND LATERALS PER ODOT STANDARD DWG RD371 ON SHEET 3.7. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
36. CONSTRUCT STANDARD CATCH BASIN GB-2 AND LATERALS PER STANDARD DWG SWM CB-5.0 ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
37. CONSTRUCT STORMWATER TREATMENT PLANTER PER DETAIL ON SHEET 3.9. SEE DETAILED PLANTER GRADING ON SHEET SERIES 8.0 FOR CURB CUT STATIONING AND PLANTER GRADING.
38. CONSTRUCT AREA DRAIN PER DETAIL ON SHEET 3.6. SEE PLAN FOR INVERTS AND DATA.
41. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
42. CONSTRUCT OVERFLOW BEEHIVE INLET PER STANDARD DETAIL ON SHEET 3.8 AND 3.9. SEE DETAILED PLANTER GRADING IN SERIES 8.0 FOR INVERTS, ORIFICE SIZE AND LOCATION.
48. CONSTRUCT STORM SEWER CLEANOUT PER STANDARD DETAIL SWM ST-4.0 ON SHEET 3.8.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
53. RELOCATE (REL), ADJUST (A). OR PROTECT (P) EXISTING WATER METER, BOX, AND SERVICE. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW METER LOCATIONS SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
62. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING UTILITY MANHOLE/VAULT. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
81. CONSTRUCT PEDESTRIAN BRIDGE. SEE DETAILS ON SHEET 5.7C AND 5.7D.
82. CONSTRUCT PEDESTRIAN BRIDGE ABUTMENT FOUNDATIONS. SEE DETAILS ON SHEET 5.7D.
83. CONSTRUCT MONOLITHIC CURB AND SIDEWALK. MATCH BACK OF PROPOSED SIDEWALK GRADE TO EXISTING CURB AND SIDEWALK GRADE. SEE DETAIL ON SHEET 5.7C.
84. EXISTING WATERLINE ON EXISTING GIRDER TO BE REMOVED. CONTRACTOR TO COORDINATE WITH UTILITY. REMOVE ALL MATERIALS TO A MINIMUM DPETH OF 2' BELOW EXISTING GROUND. REMOVE EXISTING STEEL GIRDER ADJACENT TO EXISTING BRIDGE.
85. ADJUST (A), PROTECT (P), OR REMOVE (R) EXISTING GUARDRAIL. FOR REMOVALS, REMOVE EXISTING GUARDRAIL TO REMOVAL LIMITS SHOWN AND INSTALL NEW GUARDRAIL AT LOCATIONS SPECIFIED IN THE PLANS. FOR ADJUSTMENTS, REMOVE EXISTING GUARDRAIL TO REMOVAL LIMITS SHOWN AND INSTALL END PIECES AT THE NEW END. CONTRACTOR TO COORDINATE. SEE DETAIL RD403, RD407, AND RD417 ON SHEET 3.13.
86. CONSTRUCT ROCKERY WALL. SEE DETAIL ON SHEET 5.7C.
87. PROTECT EXISTING BRIDGE DRAIN.
88. CONSTRUCT TRENCH GRATE OVER EXISTING BRIDGE DRAINS. SEE DETAIL ON SHEET 5.7C.
89. INSTALL NEW 4' BLACK VINYL CHAIN LINK FENCE WITH TOP RAIL ON BRIDGE ABUTMENT WALL. SEE SHEET 5.7D FOR WALL DETAILS. SEE SHEET 3.5 FOR FENCE DETAILS.
91. REMOVE VERTICAL CONCRETE WAL BY SAWCUT. PROTECT CONCRETE PAD.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

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DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER
EX 86,200
OREGON
JAN. 10, 2017
JAMES S. HOUF
EXPIRES: 6/30/23

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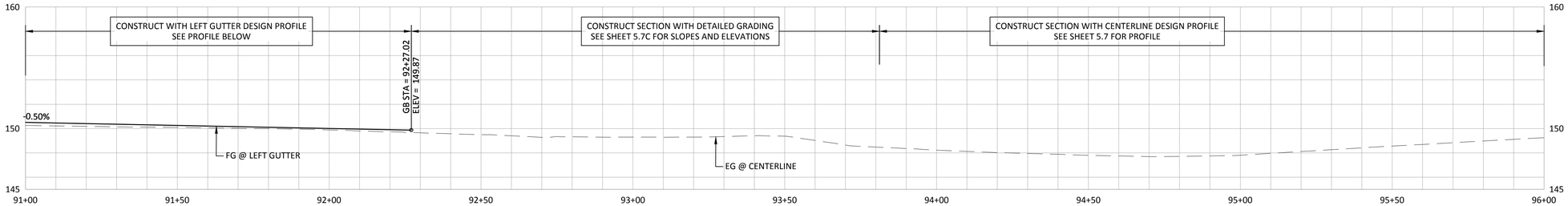
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

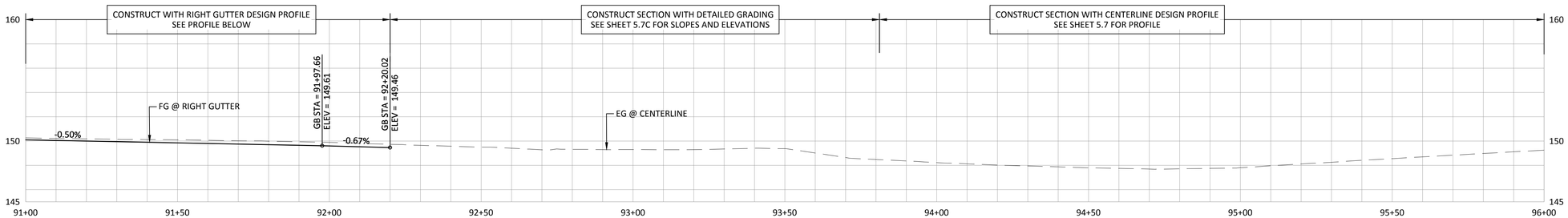
SHEET NO. 5.7

JOB NO. CLA-93



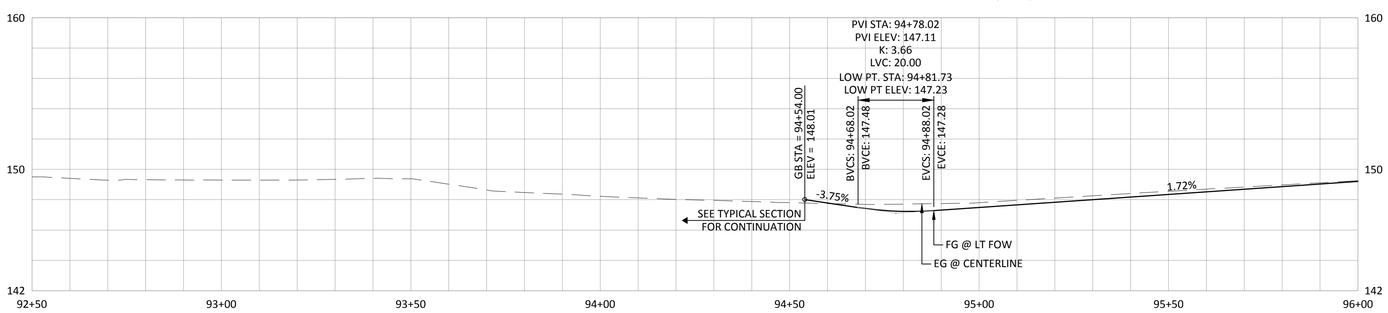
LINWOOD AVE - LEFT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



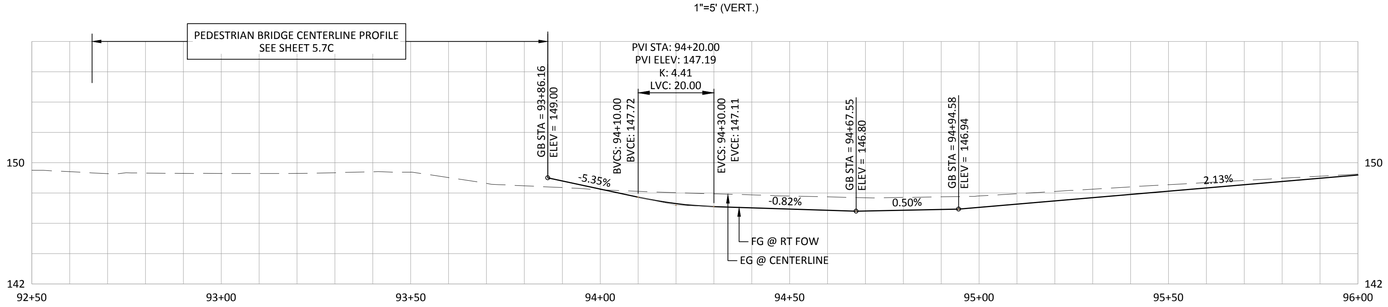
LINWOOD AVE - RIGHT GUTTER PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



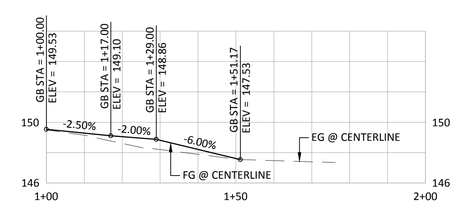
LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



LINWOOD AVE - RIGHT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OVERLAND ST - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

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ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.7A

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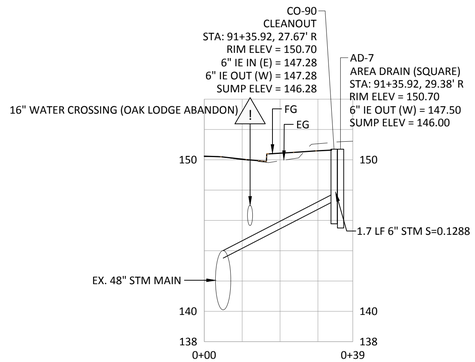
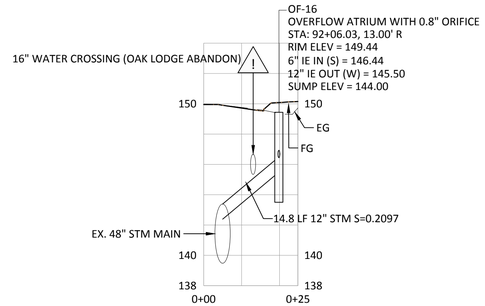


AD-7 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



OF-16 STORM LATERAL

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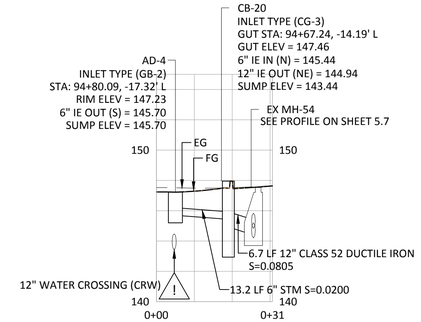
1"=5' (VERT.)



AD-4 & CB-20 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
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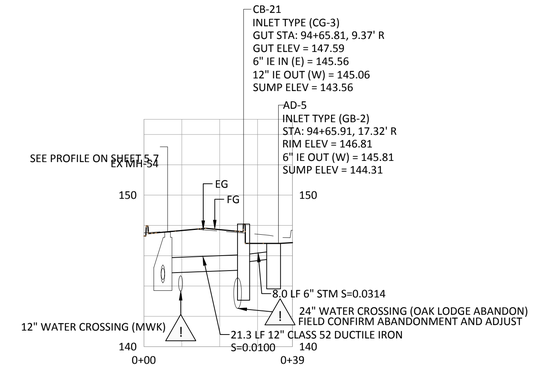

AD-5 & CB-21 STORM LATERAL

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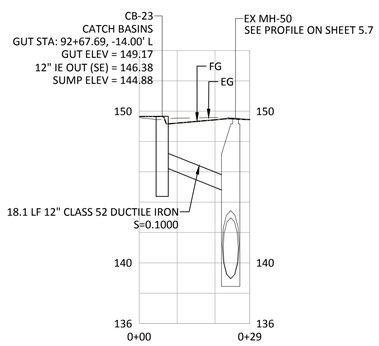

CB-23 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

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ROADWAY PLAN AND PROFILE

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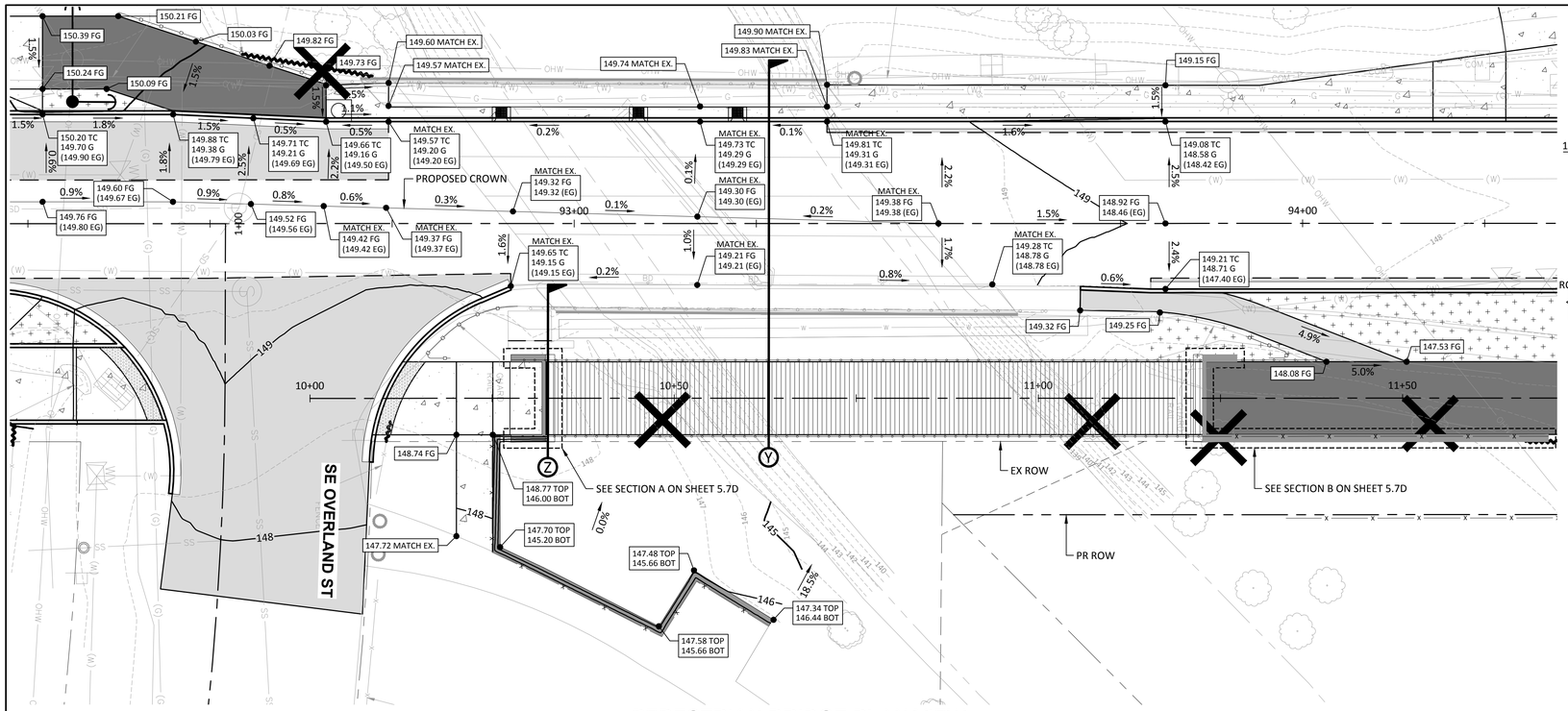
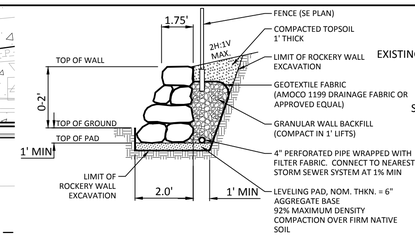


PEDESTRIAN BRIDGE PLAN VIEW

SCALE: 1"=10'

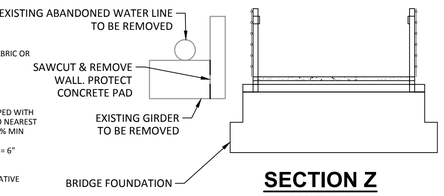
0 5 10 20

SCALE: 1" = 10'



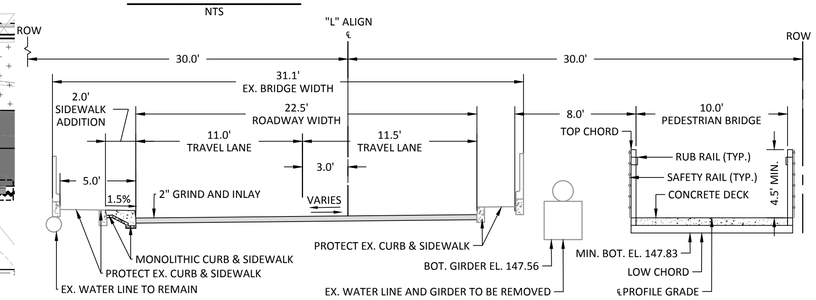
ROCKERY WALL

NTS



SECTION Z

SCALE: 1"=5'

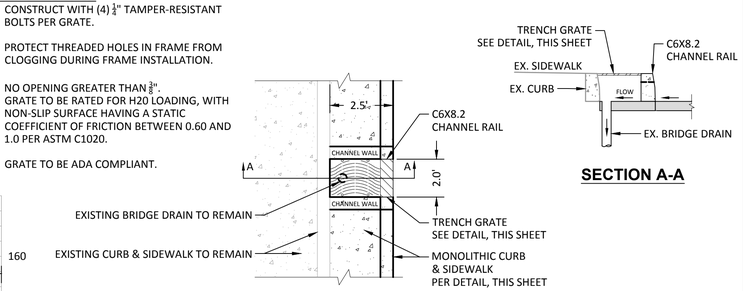


SECTION Y

SCALE: 1"=5'

TRENCH GRATE NOTES:

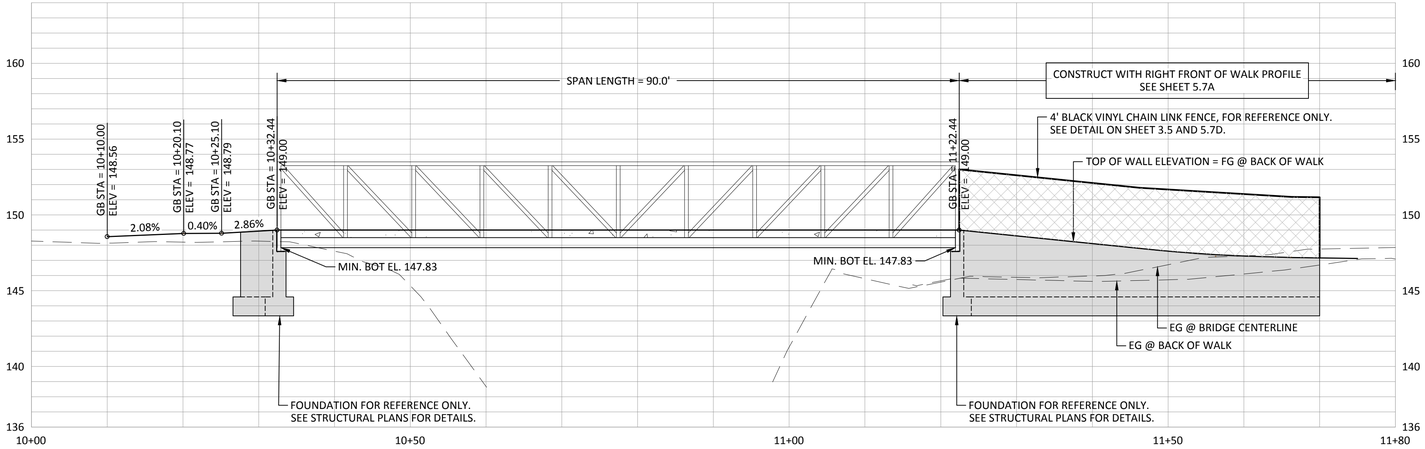
1. CONSTRUCT WITH (4) $\frac{1}{4}$" TAMPER-RESISTANT BOLTS PER GRATE.
2. PROTECT THREADED HOLES IN FRAME FROM CLOGGING DURING FRAME INSTALLATION.
3. NO OPENING GREATER THAN $\frac{3}{8}$".
4. GRATE TO BE RATED FOR H20 LOADING, WITH NON-SLIP SURFACE HAVING A STATIC COEFFICIENT OF FRICTION BETWEEN 0.60 AND 1.0 PER ASTM C1020.
5. GRATE TO BE ADA COMPLIANT.



SECTION A-A

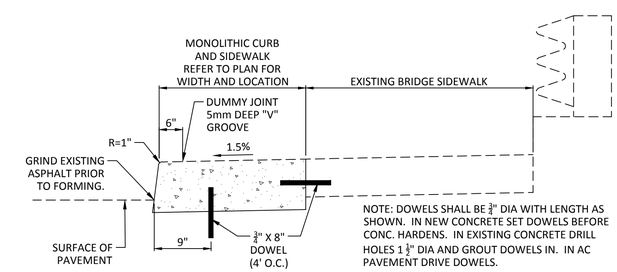
TRENCH GRATE - BRIDGE DRAIN DETAIL

SCALE: NTS



PEDESTRIAN BRIDGE - CENTERLINE PROFILE

SCALE: 1"=10' (HORIZ.)
1"=5' (VERT.)



MONOLITHIC BRIDGE CURB AND SIDEWALK

NTS

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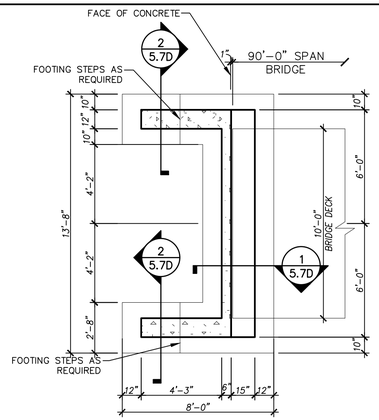
PEDESTRIAN BRIDGE PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.7C

JOB NO. CLA-93

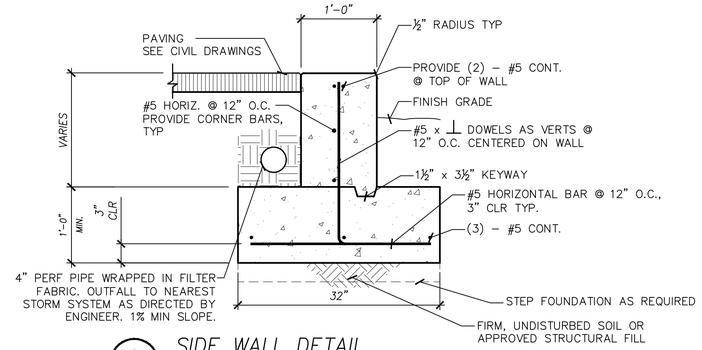


A 5.7D PEDESTRIAN BRIDGE SOUTH FOUNDATION PLAN

SCALE: 1/4" = 1'-0"

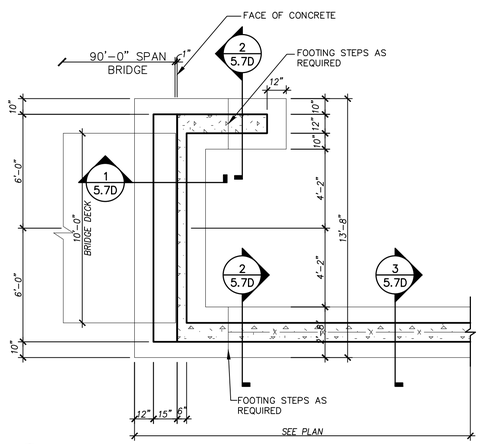
NOTES:

1. SEE CIVIL DRAWINGS FOR ALIGNMENT & ALL DIMENSIONS.
2. SEE CIVIL DRAWINGS FOR ALL ELEVATIONS AND GRADES.
3. VERIFY ALL BEARING DETAILS, DIMENSIONS, ANCHORS WITH BRIDGE DESIGNER PRIOR TO CONSTRUCTION.
4. CONTRACTOR SHALL SUBMIT BRIDGE DRAWINGS TO EOR FOR REVIEW AND APPROVAL PRIOR TO TO FORMING FOUNDATION OR WALL.



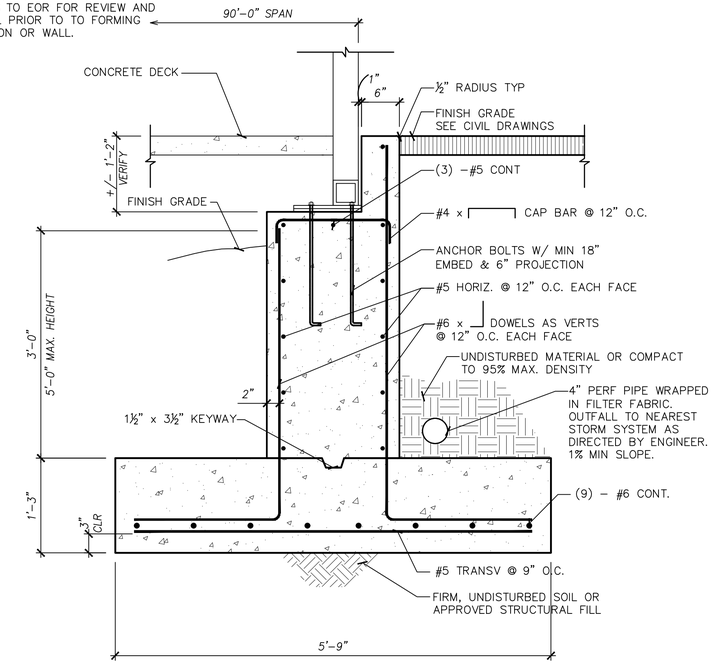
2 5.7D SIDE WALL DETAIL

SCALE: 1" = 1'-0"



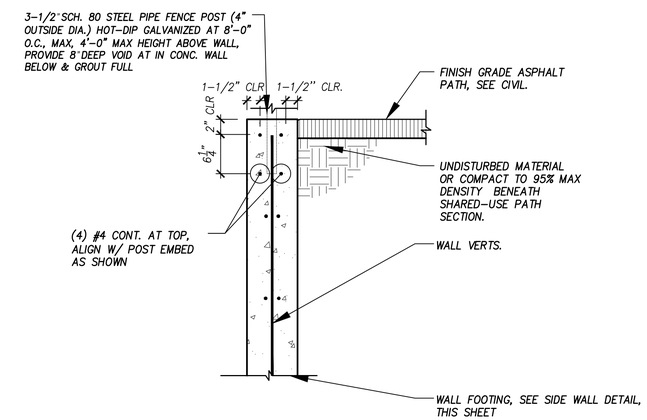
B 5.7D PEDESTRIAN BRIDGE NORTH FOUNDATION PLAN

SCALE: 1/4" = 1'-0"



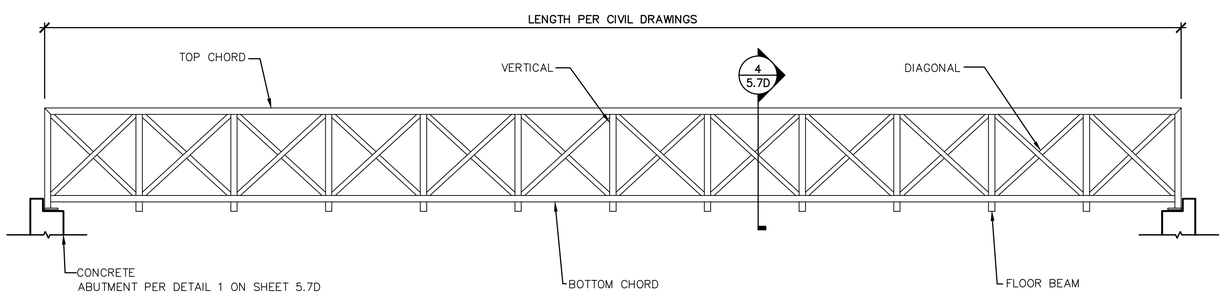
1 5.7D BRIDGE SUPPORT WALL DETAIL

SCALE: 1" = 1'-0"



3 5.7D SIDE WALL AT FENCE DETAIL

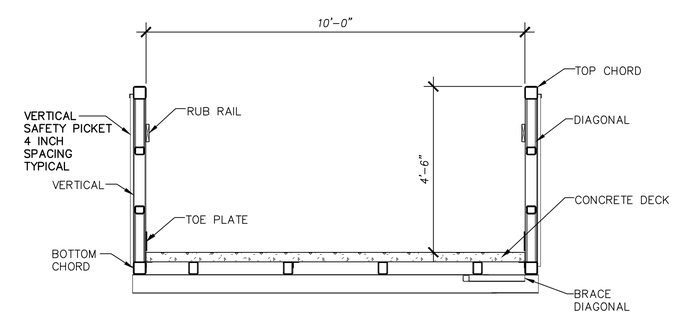
SCALE: 1" = 1'-0"



NOTE: SCHEMATIC ONLY. CONTRACTOR TO CONFIRM ACTUAL CONFIGURATION.

C 5.7D BRIDGE ELEVATION

SCALE: 1/4" = 1'-0"



4 5.7D BRIDGE SECTION

SCALE: 1/2" = 1'-0"

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-5.7D PED BRIDGE DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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ENGINEERS • PLANNERS
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PEDESTRIAN BRIDGE DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **5.7D**

JOB NO. CLA-93

STRUCTURAL NOTES:

GENERAL:

1. THESE STRUCTURAL NOTES SUPPLEMENT THE SPECIFICATIONS. ANY DISCREPANCY FOUND AMONG THE DRAWINGS, SPECIFICATIONS, THESE NOTES, AND ANY SITE CONDITIONS SHALL BE REPORTED IN A TIMELY MANNER TO THE ARCHITECT/ENGINEER DESIGN TEAM, WHO SHALL RESPOND TO ANY DISCREPANCY IN WRITING. ANY WORK DONE BY THE CONTRACTOR AFTER DISCOVERY OF SUCH DISCREPANCY SHALL BE DONE AT THE CONTRACTOR'S OWN RISK.
2. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE DIMENSIONS AMONG ALL DRAWINGS PRIOR TO PROCEEDING WITH ANY WORK OR FABRICATION.
3. THE CONTRACTOR IS RESPONSIBLE FOR ALL DEMOLITION AND CONSTRUCTION METHODS, TECHNIQUES, SEQUENCING, AND SAFETY REQUIRED FOR THE WORK.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ALL ERECTION BRACING, FORM WORK, AND TEMPORARY SHORING REQUIRED FOR THE WORK.
5. THESE NOTES SET MINIMUM STANDARDS FOR CONSTRUCTION.THE DRAWINGS GOVERN OVER THE STRUCTURAL NOTES TO THE EXTENT SHOWN.
6. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS ON DRAWINGS AND IN THE FIELD. COORDINATE LOCATIONS OF OPENINGS THROUGH FLOOR, ROOFS AND WALLS WITH ARCHITECTURAL, MECHANICAL, AND ELECTRICAL PLANS. NOTIFY OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES.
7. DETAILS SHOWN ON THE DRAWINGS ARE INTENDED TO APPLY AT ALL SIMILAR CONDITIONS AND LOCATIONS.
8. DO NOT SCALE INFORMATION FROM STRUCTURAL DRAWINGS.
9. UNLESS OTHERWISE NOTED, ALL MATERIAL AND DESIGN SPECIFICATIONS CITED HEREIN SHALL CONFORM TO THE MOST RECENTLY ADOPTED SPECIFICATION OR CODE.
10. ALL PRODUCTS AND MATERIALS USED BY THE CONTRACTOR SHALL BE APPLIED, PLACED, ERECTED OR INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
11. ALL FEATURES OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF THE SAME TYPE AND CHARACTER AS SHOWN FOR SIMILAR CONDITIONS SUBJECT TO REVIEW BY THE ARCHITECT AND ENGINEER.

DESIGN CODE:

1. 2019 OREGON STRUCTURAL SPECIALTY CODE (OSSC) & AASHTO GUIDE SPECIFICATION FOR THE DESIGN OF PEDESTRIAN BRIDGES (CURRENT VERSION)
2. ASCE 7–16
3. ALL REFERENCE TO OTHER CODES AND STANDARDS (ACI, ASTM, AASHTO...) SHALL BE PER THE LATEST OR MOST CURRENT EDITION AVAILABLE.
4. DESIGN LOADS:

BRIDGE DECK	75 PSF
LIVE LOAD	90 PSF (PEDESTRIAN)
GVW VEHICLE	10,000 POUNDS (AASHTO H 5 VEHICLE LOADING)
WIND	98 MPH, EXPOSURE C, RISK CATEGORY II
SEISMIC	DESIGN CATEGORY D, SITE CLASS D S1=0.887, Sds=0.677, Sd1=0.494

FOUNDATIONS:

1. MAXIMUM DESIGN SOIL BEARING PRESSURE = 3,000 PSF PER SOILS REPORT BY GEODESIGN, INC.
2. FOOTINGS SHALL BE FOUNDED ON FIRM, UNDISTURBED SOIL OR ON APPROVED STRUCTURAL FILL
3. STRUCTURAL FILL SHALL CONSIST OF CLEAN WELL–GRADED SAND, SAND AND GRAVEL, OR CRUSHED ROCK.
4. THE STRUCTURAL FILL SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING 8" IN THICKNESS AND THOROUGHLY COMPACTED TO A DENSE, NON–YIELDING STATE.
5. STRUCTURAL FILL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS OBTAINED BY ASTM MODIFIED PROCTOR.
6. ALL FOOTINGS SHALL BE A MINIMUM OF 1'–6" BELOW FINAL GRADES OR 1'–0" BELOW EXISTING GRADE, WHICHEVER IS LOWER.
7. BOTTOM OF FOOTINGS SHALL BE STEPPED FROM ELEVATION TO ELEVATION AT 2'–0" HORIZONTAL TO 1'–0" VERTICAL STEPS.
8. DO NOT EXCAVATE GREATER THAN A 2H:1V SLOPE BELOW FOOTING.
9. ALL DISTURBED SOIL SHALL BE REMOVED BY HAND OPERATION FROM FOOTING EXCAVATIONS TO NEAT LINES AND REPLACED WITH ENGINEERED FILL IF NECESSARY.
10. PLACEMENT OF ALL FILL SHALL BE OBSERVED AND TESTED FOR RELATIVE COMPACTION BY A QUALIFIED TECHNICIAN AS APPROVED BY THE SOILS ENGINEER.

CONCRETE (CAST IN PLACE) & GROUT:

1. ALL CONCRETE SHALL BE NORMAL WEIGHT AND SHALL DEVELOP A MINIMUM 28 DAY LABORATORY CURED COMPRESSIVE – CYLINDER STRENGTH AS FOLLOWS:
   FOUNDATIONS / WALLS = 3,500 PSI
   CONCRETE DECK = 4,000 PSI
2. CONCRETE FORMS, MIXING, PLACING, AND CURING SHALL CONFORM TO ACI MANUAL OF CONCRETE PRACTICE, LATEST EDITION AND SPECIFICATIONS.
3. CONCRETE SHALL HAVE A MAXIMUM SLUMP OF 4 INCHES FOR FOUNDATIONS AND OTHER CONCRETE.
4. CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION.
5. ALL BOLTS IN CONCRETE SHALL CONFORM TO ASTM SPECIFICATION A307 AND SHALL BE OF THE SIZE INDICATED ON THE DRAWINGS, TYPICAL UNLES NOTED OTHERWISE.
6. CONCRETE WATER CEMENT RATIO SHALL NOT EXCEED 0.50.
7. CONCRETE EXPOSED TO FREEZE/THAW CYCLES SHALL HAVE 5% +/– 1% ENTRAINED AIR.
8. A MINIMUM OF 4 CONCRETE TEST CYLINDERS SHALL BE PROVIDED FOR EACH 100 CU. YARDS OF EACH CONCRETE STRENGTH, EACH DAY. SLUMP, AIR ENTRAPMENT, LOCATION IN STRUCTURE, ETC., SHALL BE MEASURED AND RECORDED FOR EACH SET OF CYLINDERS, PER ASTM. CYLINDERS SHALL BE TESTED AS FOLLOWS: 1 AT 7 DAYS, 2 AT 28 DAYS, AND 1 HOLD.
9. CONCRETE CYLINDER MAKING AND TESTING SHALL CONFORM TO ASTM SPECIFICATIONS.
10. CONCRETE, FORMS, MIXING, PLACING AND CURING SHALL CONFORM TO ACI MANUAL OF CONCRETE PRACTICE, LATEST EDITION, AND SPECIFICATIONS.
11. THE SIZE AND LOCATION OF SLEEVES THRU FLOORS OR WALLS FOR MECHANICAL OR ELECTRICAL ACCESS SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACING CONCRETE.
12. GROUT SHALL BE HIGH STRENGTH NON–SHRINK MASTERFLOW 713 BY MASTER BUILDERS OR APPROVED EQUAL.
13. PLACE 2'–0" x 2'–0" BARS @ CORNERS AND INTERSECTIONS OF FOUNDATIONS EQUAL IN SIZE AND SPACING OF HORIZONTAL REINFORCING.
14. REINFORCEMENT SHALL NOT BE DISPLACED FOR THE CONVENIENCE OF OTHER TRADES UNLESS APPROVED BY ENGINEER OF RECORD.

CONCRETE REINFORCING STEEL:

1. REINFORCING BARS SHALL BE NEW BILLET STEEL AND SHALL CONFORM TO ASTM A615 GRADE 60 FOR ALL REINFORCEMENT.
2. ALL WELDED REINFORCING STEEL, METAL INSERTS AND CONNECTIONS SHALL CONFORM TO ALL APPLICABLE CODES AND STANDARDS.
3. REINFORCEMENT SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH ACI CODE 318 AND ACI MANUAL 315, UNLESS OTHERWISE NOTED.
4. ALL REINFORCEMENT SHALL BE FREE OF LOOSE MILL AND RUST SCALE, OIL, DIRT AND COATINGS OF ANY MANNER THAT WILL REDUCE BOND.
5. REINFORCEMENT SHALL BE SECURED IN FORMS WITH SUITABLE TIES AND ANCHORAGE TO PREVENT DISPLACEMENT. BARS ADJACENT TO EARTH SHALL BE SUPPORTED BY CEMENT MORTAR CUBES.
6. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT, U.N.O.:

A. CONCRETE CAST AGAINST THE EARTH	3"
B. CONCRETE EXPOSED TO EARTH OR WEATHER	
#6 AND LARGER	2"
#5 AND SMALLER	1–1/2"
C. CONCRETE NOT EXPOSED TO EARTH OR WEATHER	1–1/2"

7. REINFORCEMENT SPLICES, SHALL BE 42 BAR DIAMETER (24" MIN.) LAPS.
8. PLACE 2'–0" x 2'–0" BARS @ CORNERS AND INTERSECTIONS OF FOUNDATIONS EQUAL IN SIZE AND SPACING OF HORIZONTAL REINFORCING.
9. REINFORCEMENT SHALL NOT BE DISPLACED FOR THE CONVENIENCE OF OTHER TRADER UNLESS APPROVED BY ENGINEER OF RECORD.

STRUCTURAL OBSERVATION:

1. STRUCTURAL OBSERVATION SHALL BE PERFORMED ON THE PROJECT. OBSERVATION WILL BE REQUIRED AT THE FOLLOWING STAGES:
   A. PRIOR TO CONCRETE POUR FOR FOUNDATIONS
2. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF RECORD AT LEAST FOUR DAYS (4) IN ADVANCE OF COMPLETION REQUIRING SITE OBSERVATION.

SPECIAL INSPECTION:

INSPECTOR IS TO BE CONTRACTED BY OWNER, ENGINEER OR ARCHITECT PER (IBC) CODE REQUIREMENT AND LOCAL ORDINANCES. A PRE–CONSTRUCTION MEETING SHALL TAKE PLACE PRIOR TO FOUNDATION INSTALLATION. THE CONTRACTOR , ARCHITECT, ENGINEER AND INSPECTOR SHALL ATTEND SPECIAL INSPECTIONS SHALL BE PERFORMED ON ON THE FOLLOWING WORK:

1. SUBGRADE:
   A. OBSERVATION OF SITE PREPARATION, GRADING PLACEMENT AND COMPACTION OF OPERATIONS. (PERIODIC)
2. CONCRETE:
   A. POST INSTALLED EPOXY, EXPANSION, OR SCREW ANCHORS – AS REQUIRED BY APPROVED ICC REPORT (PERIODIC, MIN)
   B. PLACEMENT OF CONCRETE FOUNDATIONS (CONTINUOUS)
   C. TAKING OF TEST SPECIMENS – AIR, STRENGTH AND SLUMP (CONTINUOUS)
   D. BOLTS CAST IN CONCRETE (PERIODIC)
   E. PLACEMENT OF REINFORCING STEEL (PERIODIC)

IT IS THE CONTRACTORS RESPONSIBILITY TO CONTACT THE INSPECTOR, 48 HR. MINIMUM NOTICE), FOR INSPECTION SERVICES. THE INSPECTOR SHALL BE PRESENT AT THE PRE–CONSTRUCTION MEETING TO COORDINATE WORK WITH THE CONTRACTOR, ENGINEER AND OWNER. ALL INSPECTORS SHALL BE CERTIFIED TO PERFORM NECESSARY INSPECTION PER OSSC, ACI, AWS, OR OTHER APPROVED GOVERNING INSTITUTION. SUBMIT COPIES OF THE SPECIAL INSPECTION REPORTS TO THE BUILDING OFFICIAL AND ENGINEER OF RECORD FOR REVIEW.

DEFERRED SUBMITTALS:

1. CONTRACTOR TO PROVIDE ALL DESIGN, ENGINEERING, DRAWINGS, AND DETAILS FOR THE FOLLOWING DEFERRED SUBMITTAL IN A BIDDER/DESIGN FORMAT.
   A. PRE–ENGINEERED STEEL BRIDGE
2. CONTRACTOR TO SUBMIT ALL NECESSARY DESIGN AND DOCUMENTS TO THE DESIGN TEAM FOR REVIEW. SUBMITTAL SHALL INCLUDE ALL DRAWINGS, DIAGRAMS, DETAILS, CONNECTIONS, AND CALCULATIONS SUITABLE FOR SUBMITTAL TO BUILDING AUTHORITY, ALL STAMPED & SIGNED BY REGISTERED STRUCTURAL ENGINEER IN OREGON.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.7D PED BRIDGE DETAILS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
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205 SE Spokane Street, Suite 200, Portland, OR 97202
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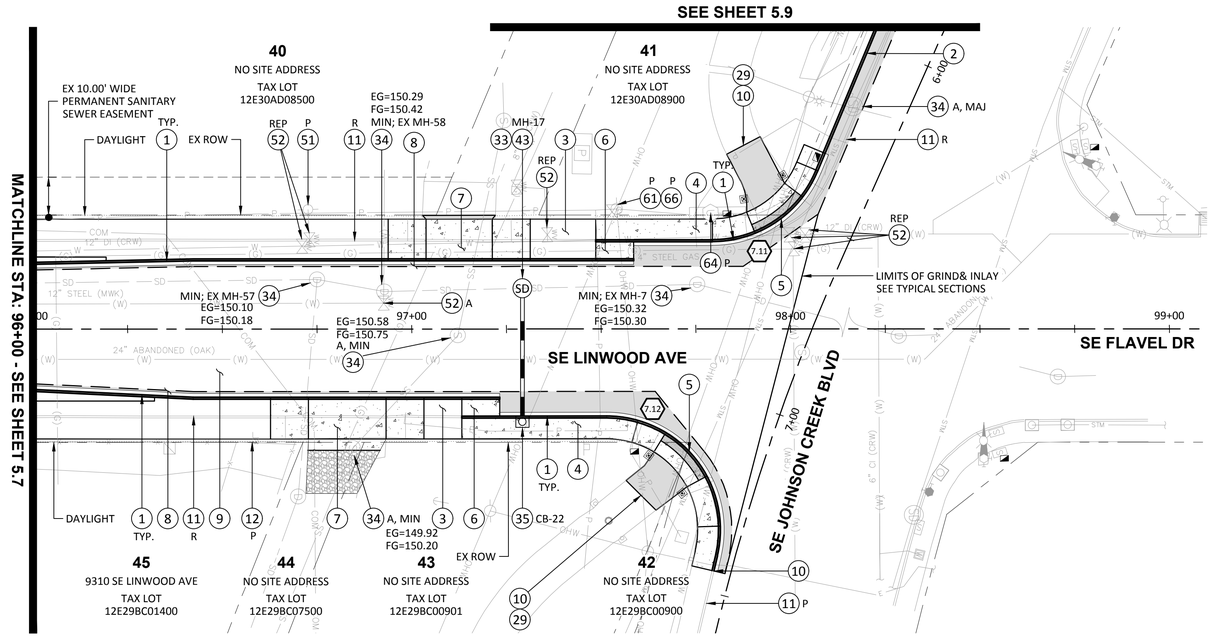
PEDESTRIAN BRIDGE NOTES

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **5.7E**

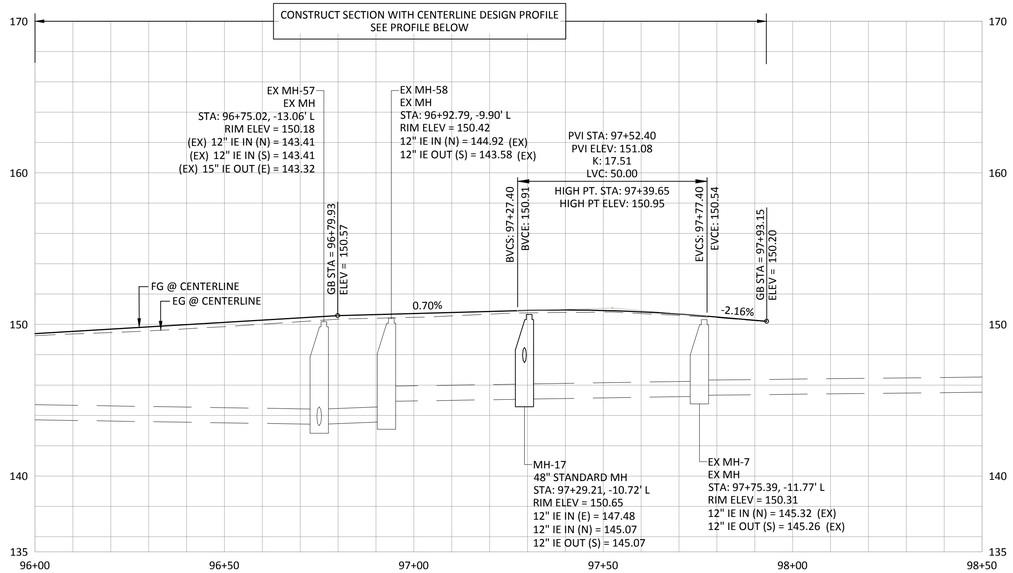
JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP INFORMATION



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

CONSTRUCTION NOTES:

1. CONSTRUCT CURB AND GUTTER PER DETAIL S150 ON SHEET 3.0.
2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
3. CONSTRUCT PERVIOUS SHARED-USE PATH. SEE SECTION DETAIL ON SHEET 6.0.
4. CONSTRUCT CONCRETE SIDEWALK PER DETAIL S960 ON SHEET 3.0. SEE SECTION DETAIL ON SHEET 6.0.
5. CONSTRUCT SIDEWALK RAMP WITH TACTILE WARNING PER ODOT STANDARD DRAWINGS RD902, RD904, RD905, RD910 ON SHEETS 3.3 AND 3.4. SEE SPOT ELEVATIONS ON SHEET SERIES 7.0.
6. CONSTRUCT CONCRETE BICYCLE RAMP PER DETAIL ON SHEET 3.5. SEE SPOT GRADE ELEVATIONS ON SHEET SERIES 7.0.
7. CONSTRUCT CONCRETE DRIVEWAY APPROACH PER ODOT STANDARD DWG RD740 AND RD750 ON SHEET 3.1. MATCH EXISTING WIDTH AND MATERIAL BEHIND APPROACH UNLESS NOTED OTHERWISE. SAWCUT AND REMOVE EXISTING SURFACE AS REQUIRED. MINIMUM STRUCTURAL SECTION BEHIND APPROACH: 3" AC PAVEMENT OVER 8" AGGREGATE BASE OR 6" P.C.C. OVER 8" AGGREGATE BASE, OR MATCH EXISTING SECTION, WHICHEVER IS GREATER. SEE DRIVEWAY TABLE FOR DIMENSIONS AND MATERIAL TYPE ON SHEET 8.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
9. CONSTRUCT VARIABLE GRIND (0-4") OF EXISTING AC AND REPLACE WITH 4" INLAY. PRE-LEVEL AS REQUIRED. SEE CENTERLINE PROFILES, TYPICAL SECTIONS, AND CROSS SECTIONS.
10. MATCH NEW CURB TO EXISTING CURB AND/OR MATCH NEW SIDEWALK TO EXISTING SIDEWALK. SAWCUT AS REQUIRED AND DIRECTED.
11. REMOVE (R) OR PROTECT (P) EXISTING CONCRETE CURB AND/OR SIDEWALK. SAWCUT NEAT LINE AT LIMIT OF REMOVAL.
12. REMOVE (R), PROTECT (P), OR RELOCATE (REL) EXISTING FENCE & GATES. FOR REMOVALS, REMOVE EXISTING FENCE WITHIN ROW LIMITS. INSTALL NEW FENCE AND/OR GATE ON PROPERTY LINE AT LOCATIONS IDENTIFIED IN THE SPECIFICATIONS.
29. CONSTRUCT IMPERVIOUS ASPHALT CONNECTION PER AC DRIVEWAY SECTION ON SHEET 6.0.
33. CONNECT TO EXISTING PIPE OR STRUCTURE PER DETAIL ON SHEET 3.6.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
35. CONSTRUCT STANDARD CURB INLET CATCH BASIN CG-3 AND LATERALS PER ODOT STANDARD DWG RD371 ON SHEET 3.7. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
43. CONSTRUCT 48" STANDARD STORM SEWER MANHOLE PER STANDARD DWG SWM MH-9.0 ON SHEET 3.7. CONNECT TO EXISTING PIPE PER DETAIL ON SHEET 3.6. SEE PROFILE AND DRAINAGE DATA FOR INVERTS AND LOCATION.
51. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING FIRE HYDRANT. CLACKAMAS RIVER WATER (CRW) RELOCATIONS AND ADJUSTMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. APPROXIMATE LOCATION OF NEW HYDRANT SHOWN ON PLANS. CONTRACTOR TO COORDINATE.
52. RELOCATE (REL), ADJUST (A), PROTECT (P), OR REPLACE (REP) EXISTING WATER VALVE BOX. CLACKAMAS RIVER WATER (CRW) RELOCATIONS, ADJUSTMENTS, AND REPLACEMENTS BY CONTRACTOR. CITY OF MILWAUKIE (MWK) RELOCATIONS AND ADJUSTMENTS BY OTHERS. CONTRACTOR TO COORDINATE.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
64. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING UTILITY PEDESTAL. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.
66. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING GAS VALVE. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.

SEE SHEET 5.8B FOR DRAINAGE DATA

0 10 20 40
SCALE: 1" = 20'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

PREPARED FOR

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EXPIRES: 6/30/23

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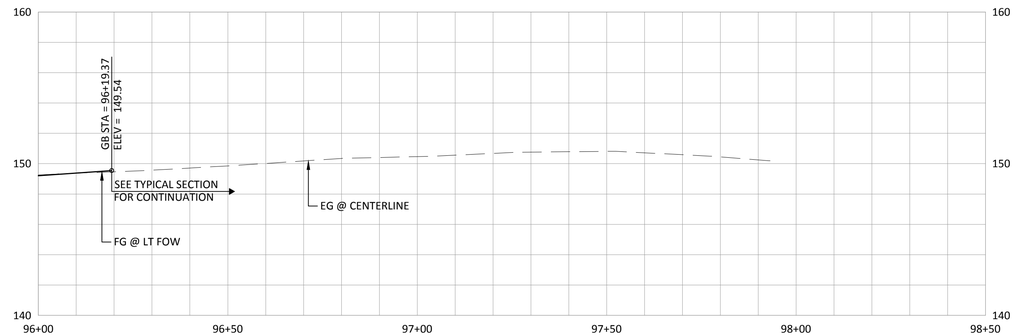
LINWOOD PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

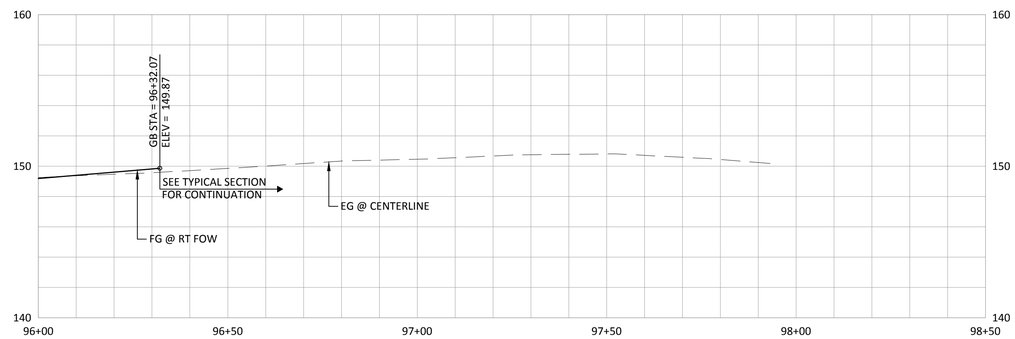
SHEET NO. 5.8

JOB NO. CLA-93



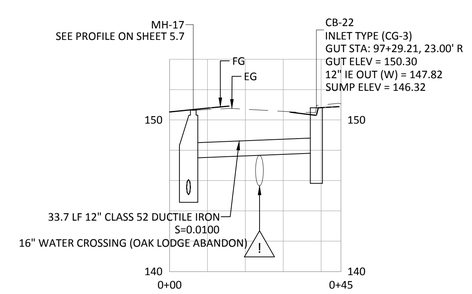
LINWOOD AVE - LEFT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



LINWOOD AVE - RIGHT FRONT OF WALK PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)



CB-22 STORM LATERAL

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg

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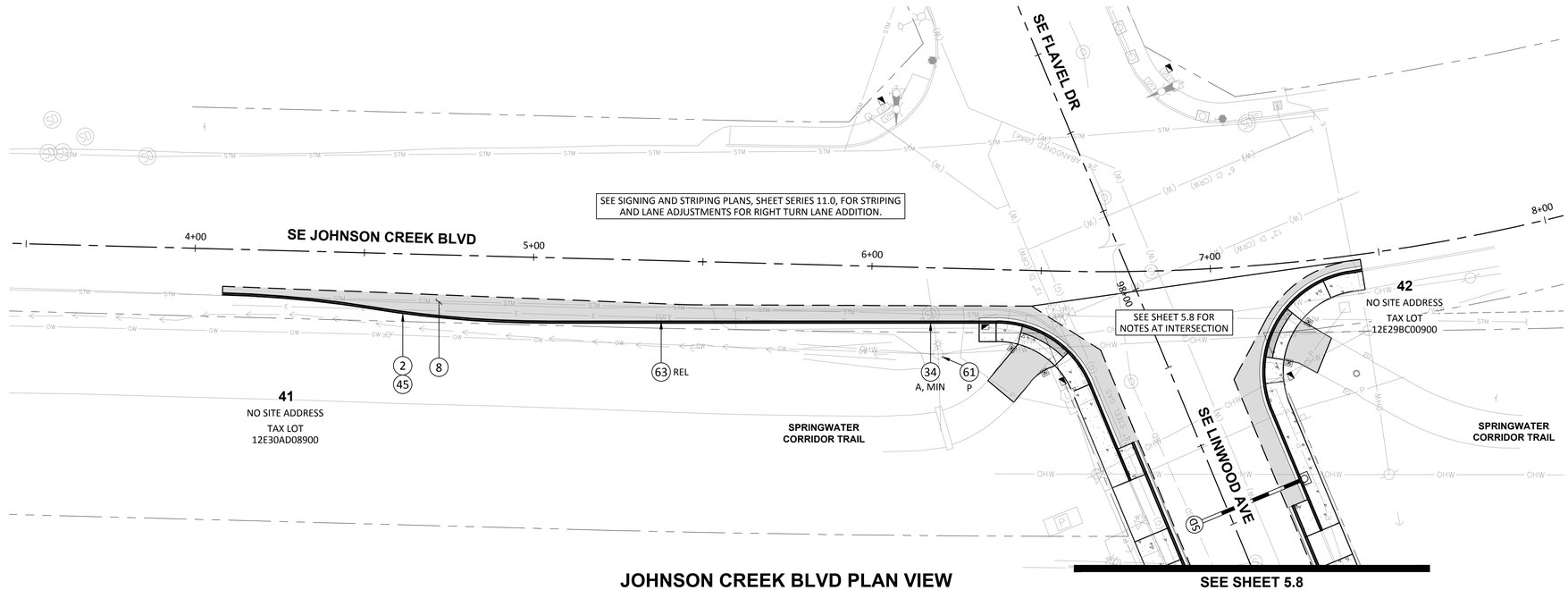
ROADWAY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.8A

JOB NO. CLA-93

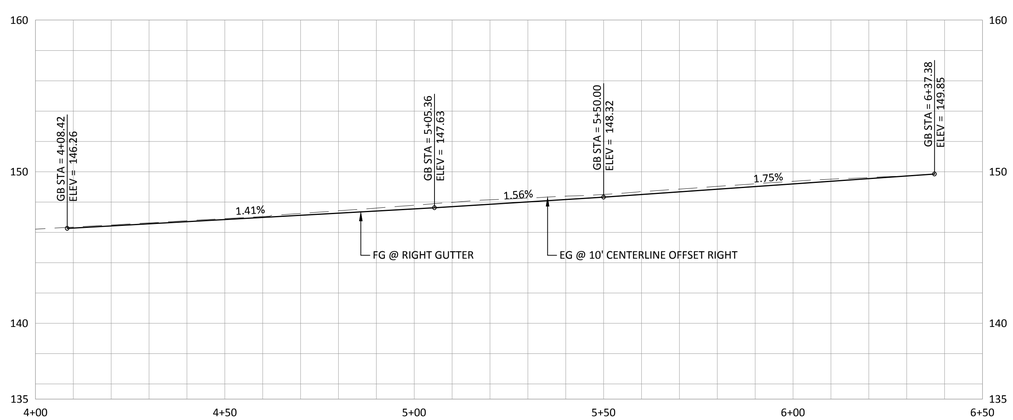


JOHNSON CREEK BLVD PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

2. CONSTRUCT STANDARD CURB PER DETAIL S100 ON SHEET 3.0.
8. CONSTRUCT FULL DEPTH ROADWAY SECTION. SAWCUT TO LIMITS SHOWN AND AS REQUIRED. SEE SECTION DETAIL ON SHEET 6.0.
34. ADJUST STRUCTURE RIM, COVER, OR FRAME TO FINISH GRADE PER ODOT STANDARD DWG RD360 AND STANDARD DWG SWM MH-2.0 ON SHEET 3.8. MAJ = MAJOR ADJUSTMENT, MIN = MINOR ADJUSTMENT.
45. PROVIDE CURB CUT OPENING EVERY 30' O.C.
61. RELOCATE (REL), REMOVE (R), OR PROTECT (P) EXISTING UTILITY POLE. REMOVAL OR RELOCATION BY UTILITY. CONTRACTOR TO COORDINATE POLE AND WIRE RELOCATIONS WITH APPROPRIATE UTILITIES.
63. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING UTILITY BOX. RELOCATION OR ADJUSTMENT BY UTILITY. CONTRACTOR TO COORDINATE.



JOHNSON CREEK BLVD - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

ROADWAY PLAN AND PROFILE

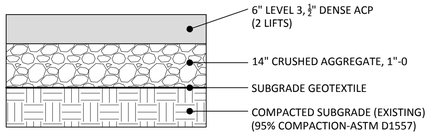
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 5.9

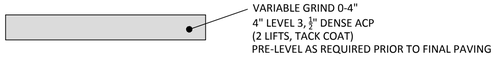
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-5.0 ROADWAY PLAN AND PROFILE.dwg



FULL DEPTH ROADWAY - AC PAVEMENT SECTION

N.T.S.



0-4" GRIND AND 4" INLAY SECTION

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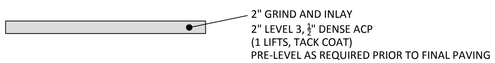
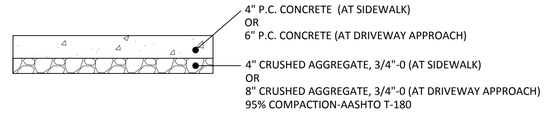


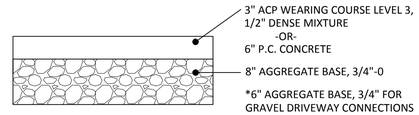
2" GRIND AND INLAY SECTION (EXISTING BRIDGE ONLY)

N.T.S.



CONCRETE SIDEWALK & DRIVEWAY SECTION

N.T.S.



DRIVEWAY CONNECTION SECTION

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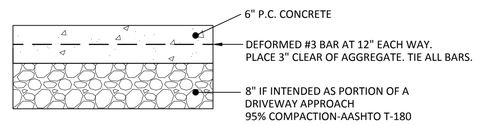

REINFORCED CONCRETE DRIVEWAY SECTION

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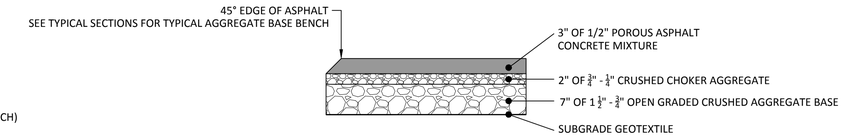

PERVIOUS PAVEMENT SECTION

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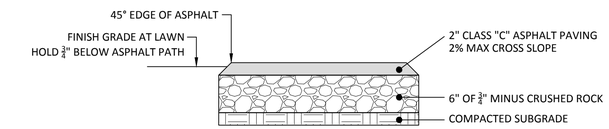

SPRINGWATER CORRIDOR ASPHALT PATH

N.T.S.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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PAVING SECTION DETAILS

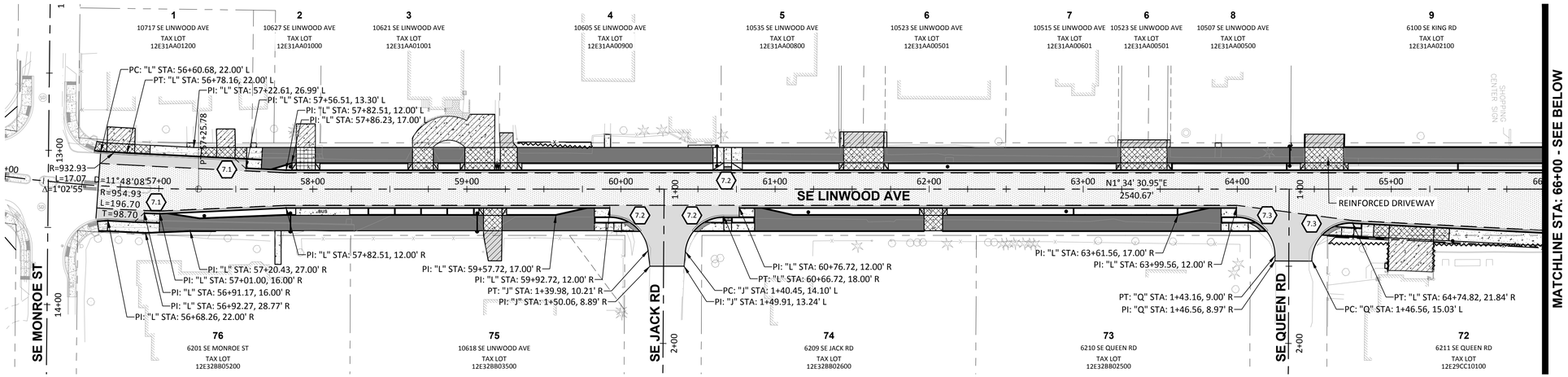
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 6.0

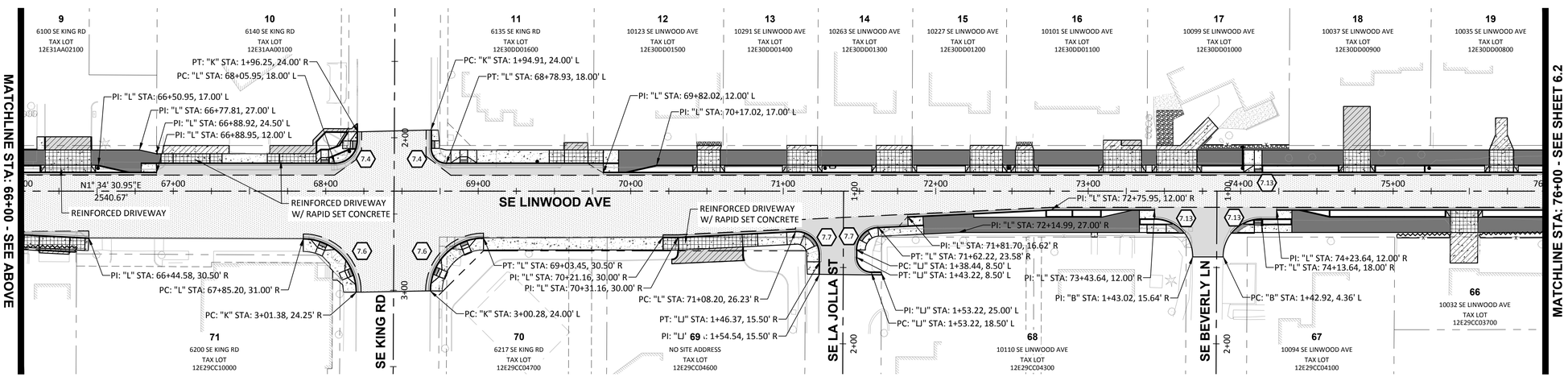
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-6.0 GEOMETRY AND PAVING PLAN.dwg



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

LEGEND

- FULL DEPTH AC SECTION
- 0-4" GRIND AND 4" INLAY (PRE-LEVEL AS REQUIRED)
- 2" GRIND AND INLAY
- PERVIOUS AC MULTI-USE PATH
- CONCRETE SIDEWALK
- CONCRETE DRIVEWAY APPROACH
- CONCRETE DRIVEWAY CONNECTION
- ASPHALT DRIVEWAY CONNECTION

SEE SHEET 6.0 FOR SECTION DETAILS

(#) SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP GEOMETRY

0 20 40 80

SCALE: 1" = 40'

PREPARED FOR

CLACKAMAS COUNTY
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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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GEOMETRY AND PAVING PLAN

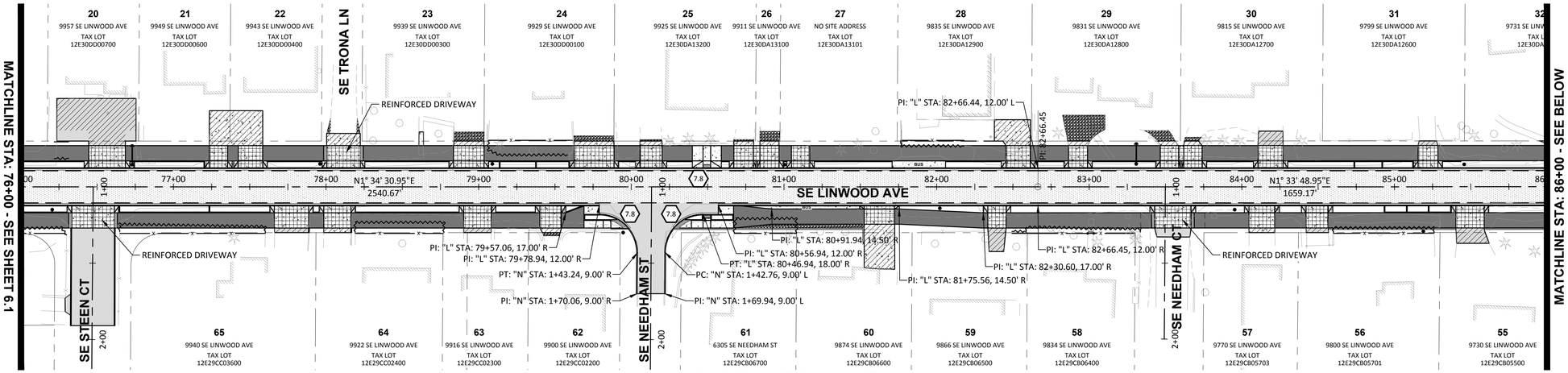
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 6.1

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\CLA93-6.0 GEOMETRY AND PAVING PLAN.dwg



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

LEGEND

- FULL DEPTH AC SECTION
- 0-4" GRIND AND 4" INLAY (PRE-LEVEL AS REQUIRED)
- 2" GRIND AND INLAY
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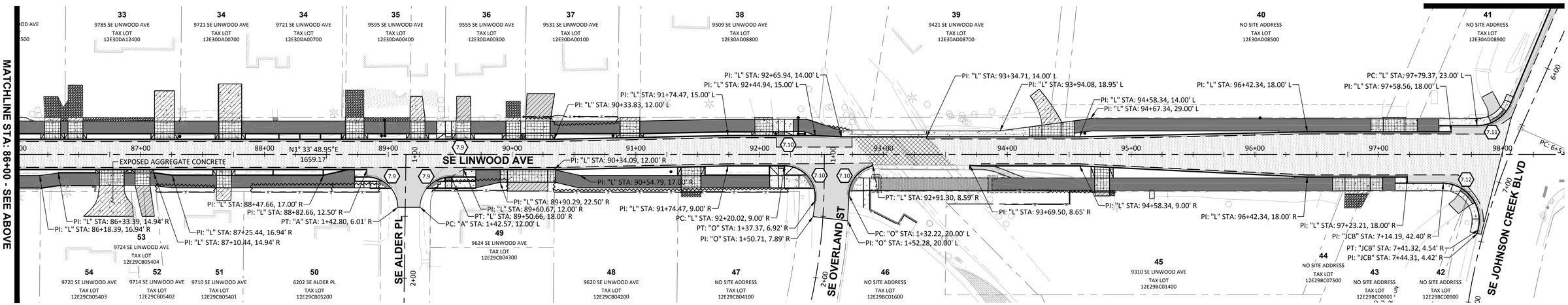
- CONCRETE DRIVEWAY CONNECTION
- ASPHALT DRIVEWAY CONNECTION

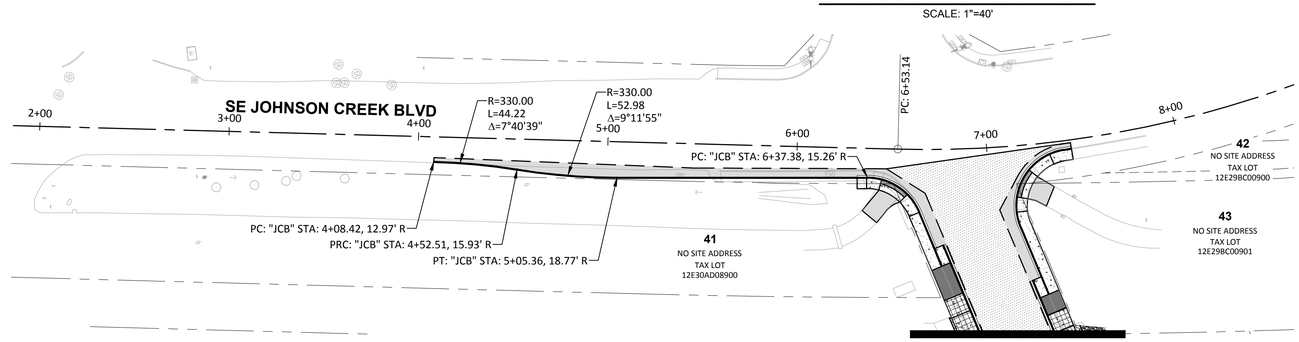
SEE SHEET 6.0 FOR SECTION DETAILS

SEE SHEET SERIES 7.0 FOR CURB RETURN AND RAMP GEOMETRY



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



JOHNSON CREEK BLVD PLAN VIEW

SCALE: 1"=40'

0 20 40 80

SCALE: 1" = 40'

0 20 40 80

SCALE: 1" = 40'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-6.0 GEOMETRY AND PAVING PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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CHECKED: DSH/JSH
DATE: 11-11-2022

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EXPIRES: 6/30/23

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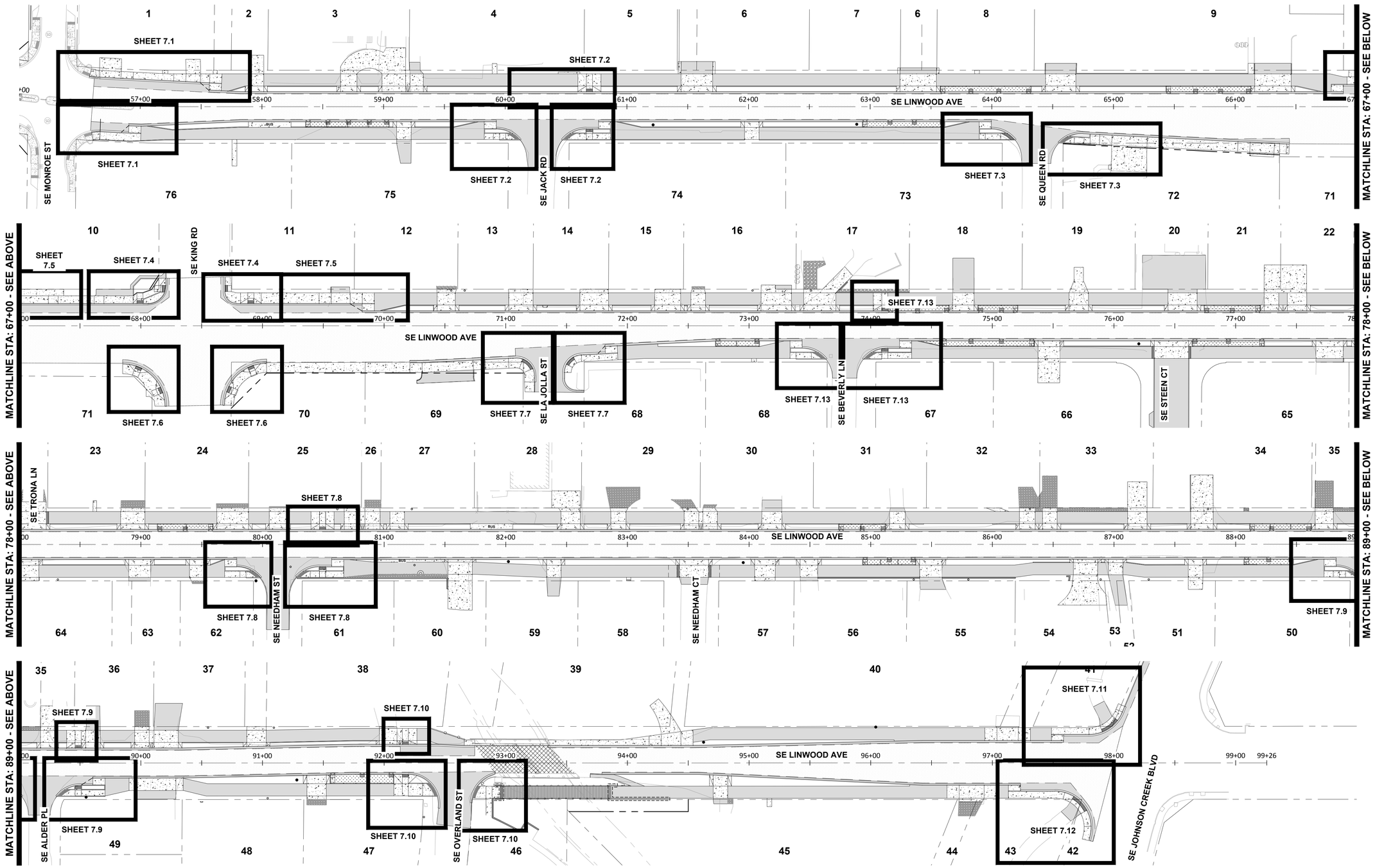
GEOMETRY AND PAVING PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 6.2

JOB NO. CLA-93



GRADING INDEX SHEET - PLAN VIEW

SCALE: 1"=40'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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GRADING INDEX SHEET

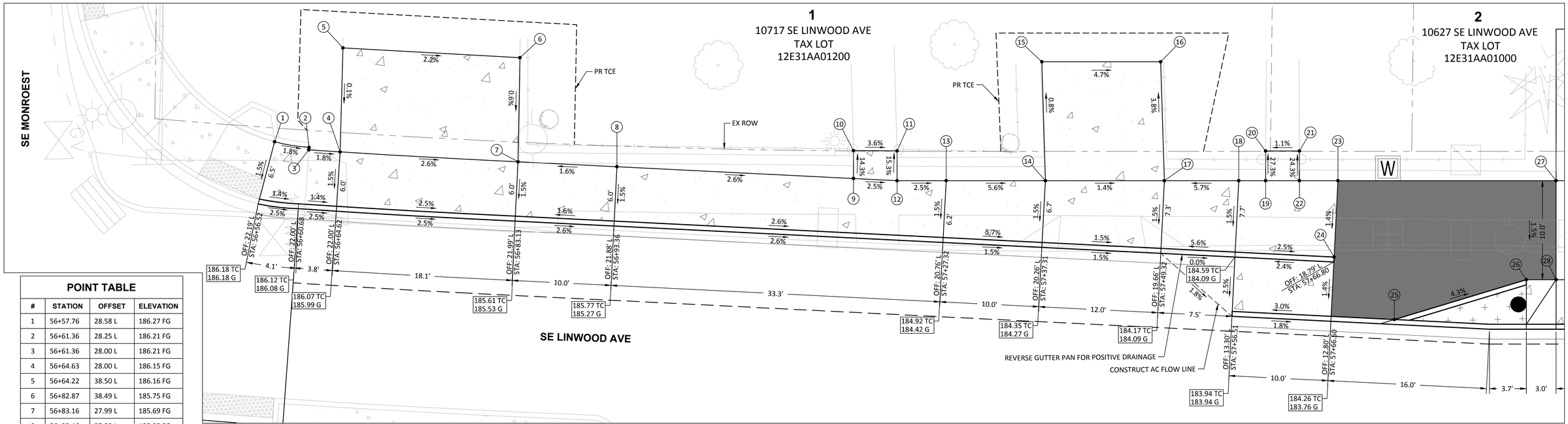
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 7.0

JOB NO. CLA-93

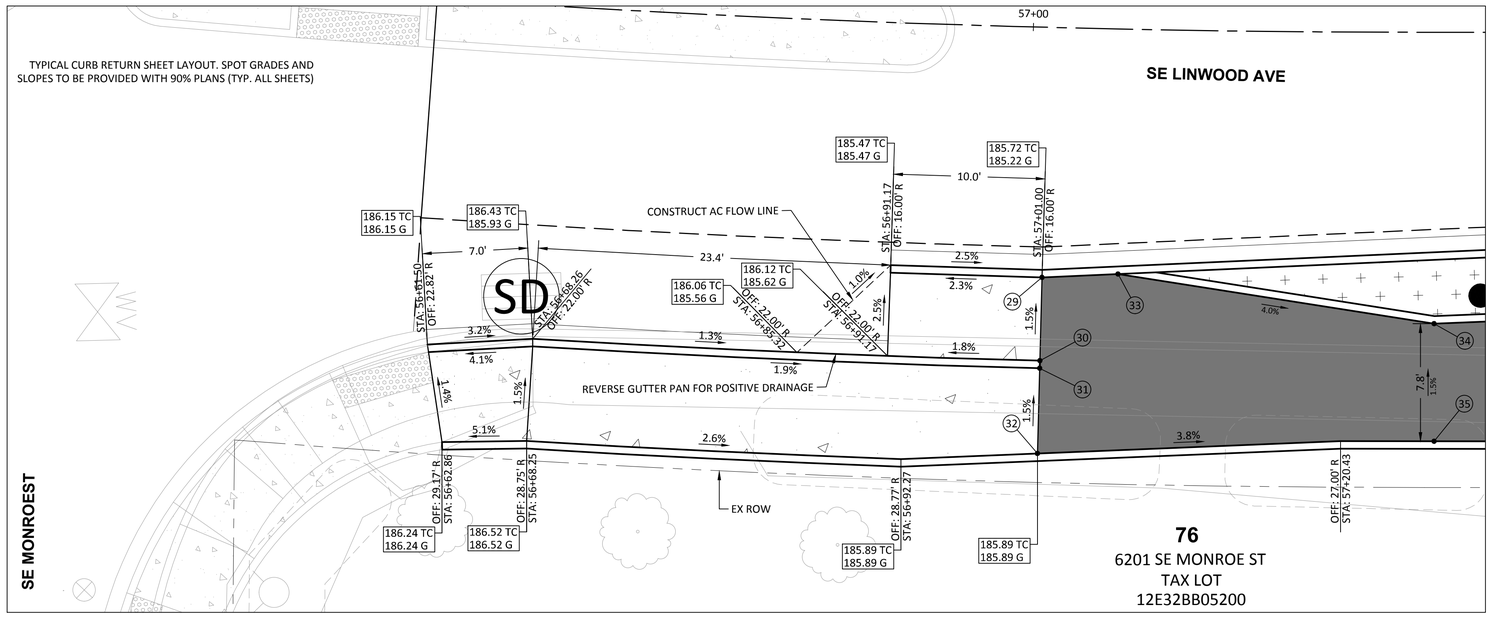
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-7.0 GRADING INDEX SHEET.dwg

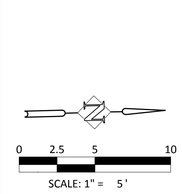


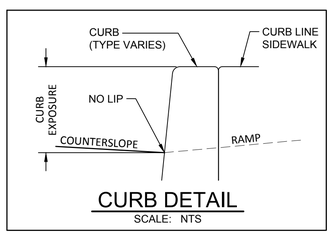
CURB RETURN MONROE-1

POINT TABLE			
#	STATION	OFFSET	ELEVATION
1	56+57.76	28.58 L	186.27 FG
2	56+61.36	28.25 L	186.21 FG
3	56+61.36	28.00 L	186.21 FG
4	56+64.63	28.00 L	186.15 FG
5	56+64.22	38.50 L	186.16 FG
6	56+82.87	38.49 L	185.75 FG
7	56+83.16	27.99 L	185.69 FG
8	56+93.46	27.88 L	185.85 FG
9	57+18.08	27.19 L	185.24 FG
10	57+18.05	30.00 L	184.81 FG
11	57+22.60	30.00 L	184.66 FG
12	57+22.61	26.99 L	185.13 FG
13	57+27.66	27.00 L	185.01 FG
14	57+37.67	27.00 L	184.44 FG
15	57+37.31	39.00 L	184.33 FG
16	57+49.31	39.00 L	183.77 FG
17	57+49.68	27.00 L	184.27 FG
18	57+57.19	27.00 L	184.70 FG
19	57+59.90	27.00 L	184.63 FG
20	57+59.90	30.00 L	183.74 FG
21	57+63.32	30.00 L	183.78 FG
22	57+63.32	27.00 L	184.54 FG
23	57+67.21	27.00 L	184.45 FG
24	57+66.82	19.29 L	184.34 TC 184.34 G
25	57+72.91	12.98 L	184.13 TC 184.13 G
26	57+86.23	17.00 L	183.94 TC 183.54 G
27	57+89.23	27.00 L	183.62 FG
28	57+89.23	17.00 L	183.48 FG
29	57+01.00	16.50 R	185.72 FG
30	57+01.00	22.00 R	185.81 TC 185.81 G
31	57+01.00	22.50 R	185.81 TC 185.81 G
32	57+01.00	28.13 R	185.89 TC 185.89 G
33	57+05.92	16.16 R	185.60 TC 185.60 G
34	57+26.45	19.23 R	185.15 TC 184.75 G
35	57+26.45	26.99 R	184.87 TC 184.87 G

CURB RETURN MONROE-2







SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
UNLESS OTHERWISE NOTED.
(SEE DRG. NO. RD902 & RD904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
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EXPIRES: 6/30/23

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CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

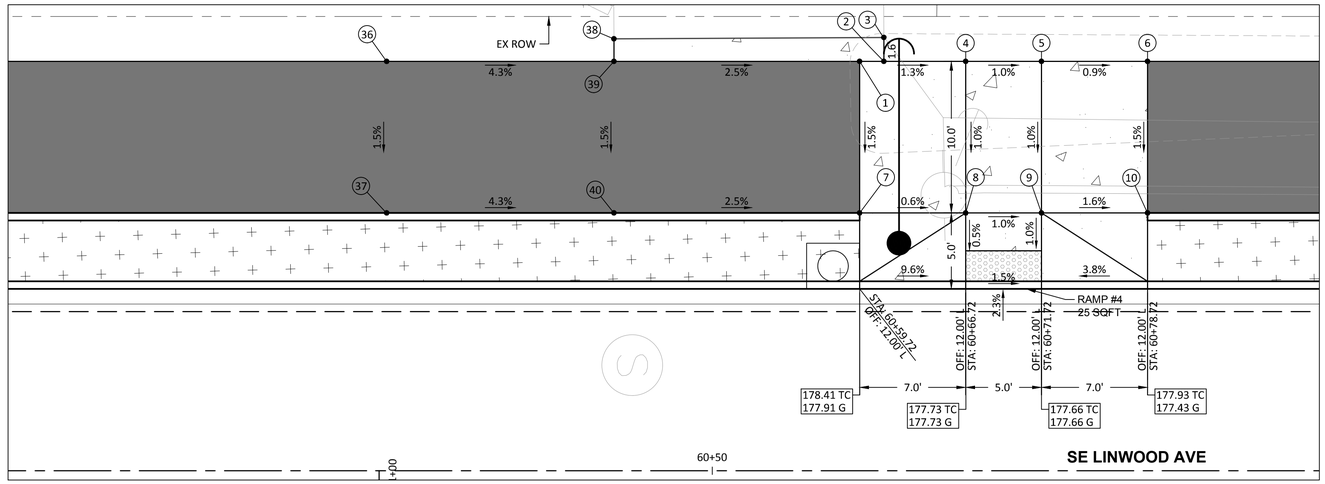
SHEET NO. 7.1

JOB NO. CLA-93

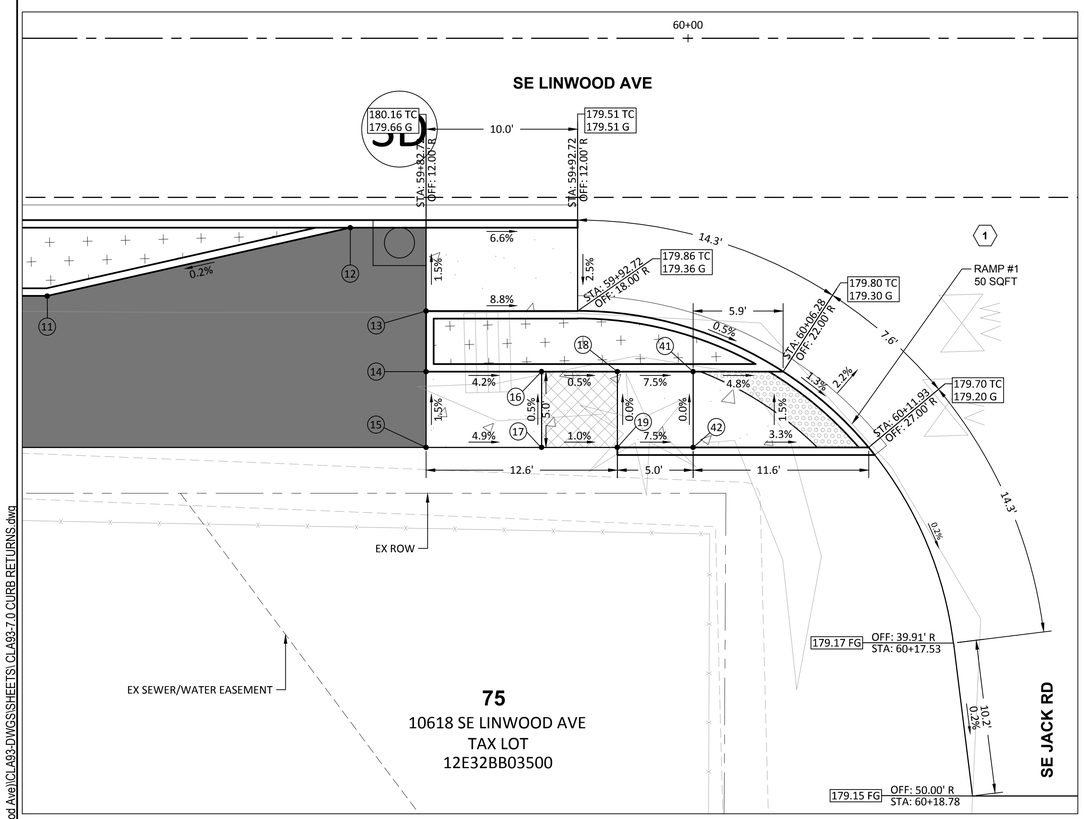
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-7.0 CURB RETURNS.dwg

CURVE DATA TABLE				
	DELTA	RADIUS	TANGENT	LENGTH
1	82°54'29"	25.0'	22.08'	36.18'
2	84°22'09"	25.0'	22.66'	36.81'

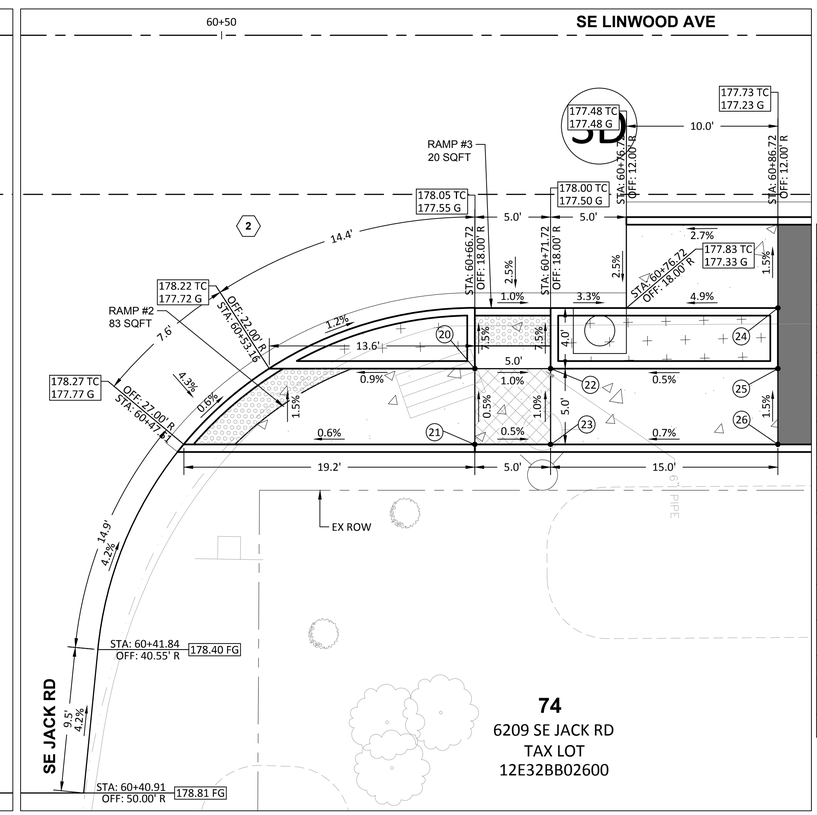
	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	7.5%	1.2%	7.5%	1.0%
	CROSS SLOPE	1.0%	1.0%	1.0%	1.0%
	GUTTER FLOW SLOPE	0.5%	1.0%	1.0%	1.5%
	COUNTER SLOPE	-2.3%	4.5%	2.5%	2.3%
	RAMP LENGTH	12.6	19.2	4.0	5.0
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	5.0	5.0	5.0	10.0
	SLOPE x	1.0%	1.0%	1.0%	1.0%
	SLOPE y	1.0%	1.0%	1.0%	1.0%



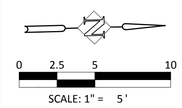
SIDEWALK RAMP JACK-3

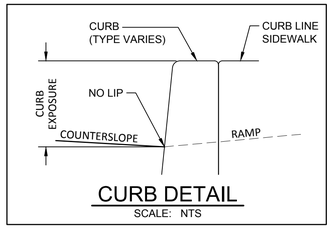


CURB RETURN JACK-1



CURB RETURN JACK-2





SIDEWALK

TURNING SPACE
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4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
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(SEE DRG. NO. RD902 & RD904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

POINT TABLE			
#	STATION	OFFSET	ELEVATION
1	60+59.72	27.00 L	177.95 FG
2	60+61.32	27.00 L	177.93 FG
3	60+61.32	28.59 L	177.95 FG (MATCH)
4	60+66.72	27.00 L	177.86 FG
5	60+71.72	27.00 L	177.81 FG
6	60+78.72	27.00 L	177.75 FG
7	60+59.72	17.00 L	177.80 FG
8	60+66.72	17.00 L	177.76 FG
9	60+71.72	17.00 L	177.71 FG
10	60+78.72	17.00 L	177.60 FG
11	59+57.72	17.02 R	180.60 TC 180.20 G
12	59+77.72	12.50 R	180.24 TC 180.24 G
13	59+82.72	18.00 R	180.24 TC 180.24 G
14	59+82.72	22.00 R	180.30 TC 180.30 G
15	59+82.72	27.00 R	180.38 FG
16	59+90.34	22.00 R	179.98 TC 179.98 G
17	59+90.34	27.00 R	180.01 FG

POINT TABLE			
#	STATION	OFFSET	ELEVATION
18	59+95.34	22.00 R	179.96 TC 179.96 G
19	59+95.34	27.00 R	179.96 TC 179.96 G
20	60+66.72	22.00 R	178.11 TC 177.85 G
21	60+66.72	27.00 R	177.88 TC 177.88 G
22	60+71.72	22.00 R	178.06 TC 177.80 G
23	60+71.72	27.00 R	177.85 TC 177.85 G
24	60+86.72	18.00 R	177.82 TC 177.82 G
25	60+86.72	22.00 R	177.88 TC 177.88 G
26	60+86.72	27.00 R	177.96 TC 177.96 G
36	60+28.51	27.00 L	179.00 FG
37	60+28.51	17.00 L	179.25 TC 178.85 G
38	60+43.51	28.49 L	178.36 FG (MATCH)
39	60+43.51	27.00 L	178.35 FG
40	60+43.51	17.00 L	178.87 TC 178.20 G
41	60+00.34	22.00 R	179.88 TC 179.58 G
42	60+00.34	27.00 R	179.90 TC 179.58 G

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-7.0 CURB RETURNS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

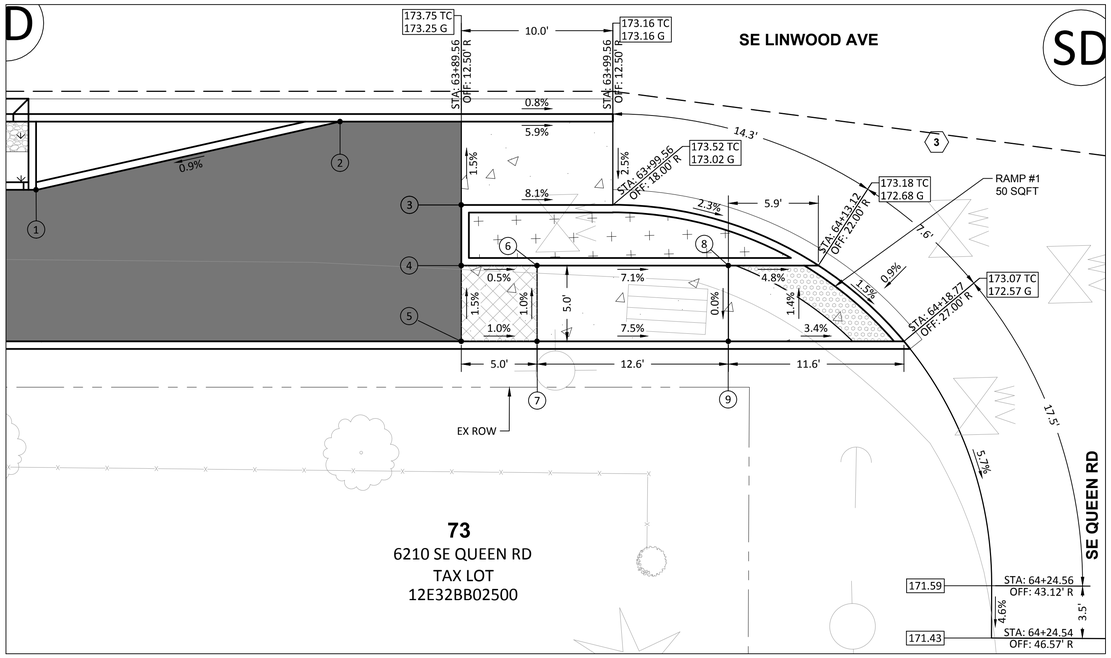
CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

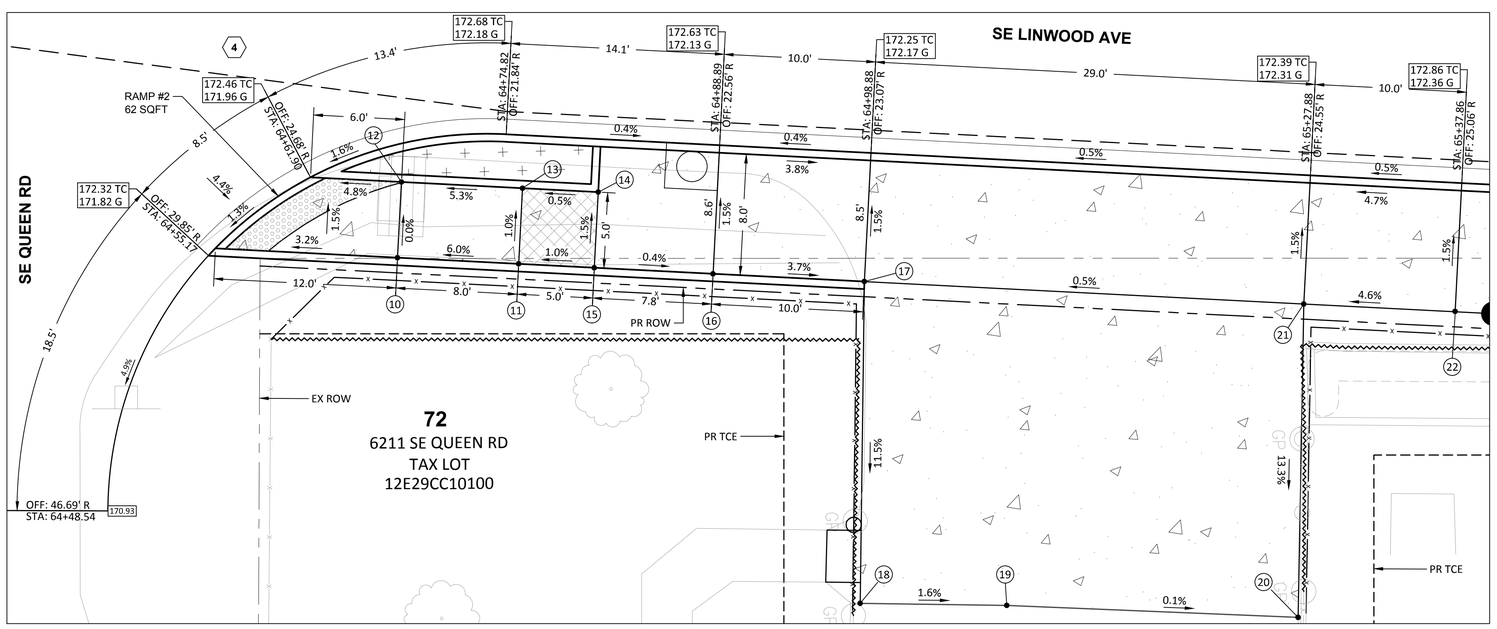
CLACKAMAS COUNTY, OREGON

SHEET NO. 7.2

JOB NO. CLA-93



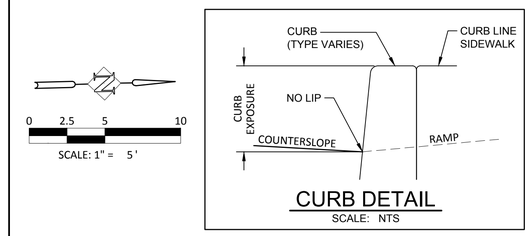
CURB RETURN QUEEN-1



CURB RETURN QUEEN-2

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	63+61.50	17.00 R	174.02 TC 173.62 G
2	63+81.56	12.50 R	173.81 TC 173.81 G
3	63+89.56	18.00 R	173.83 TC 173.83 G
4	63+89.56	22.00 R	173.89 TC 173.89 G
5	63+89.56	27.00 R	173.96 TC 173.96 G
6	63+94.56	22.00 R	173.87 TC 173.87 G
7	63+94.56	27.00 R	173.91 TC 173.91 G
8	64+07.18	22.00 R	173.39 TC 172.97 G
9	64+07.18	27.00 R	172.97 TC 172.97 G
10	64+67.64	29.98 R	172.57 TC 172.24 G
11	64+75.63	30.39 R	172.72 TC 172.72 G
12	64+67.90	24.99 R	172.55 TC 172.24 G
13	64+75.89	25.40 R	172.67 TC 172.67 G
14	64+80.88	25.65 R	172.70 TC 172.70 G
15	64+80.63	30.65 R	172.77 TC 172.77 G
16	64+88.46	31.05 R	172.74 TC 172.74 G
17	64+98.45	31.56 R	172.37 TC 172.37 G
18	64+98.17	52.78 R	169.91 FG (MATCH)
19	65+07.84	52.92 R	160.76 FG (MATCH)
20	65+27.07	53.71 R	169.75 FG (MATCH)
21	65+27.44	33.04 R	172.51 FG
22	65+37.43	33.52 R	172.97 FG



SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
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(SEE DRG. NO. RD902 & RD904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

	ITEM	VALUES	
		RAMP 1	RAMP 2
RAMP	RUNNING SLOPE	7.5%	7.1%
	CROSS SLOPE	1.0%	1.0%
	GUTTER FLOW SLOPE	1.5%	1.0%
	COUNTER SLOPE	2.0%	4.3%
	RAMP LENGTH	12.6	15.0
TURNING SPACE	WIDTH x	5.0	5.0
	LENGTH y	5.0	5.0
	SLOPE x	1.0%	1.0%
	SLOPE y	1.0%	1.0%

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
3	90°16'28"	25.0'	25.12'	39.39'
4	92°38'46"	25.0'	26.18'	40.42'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

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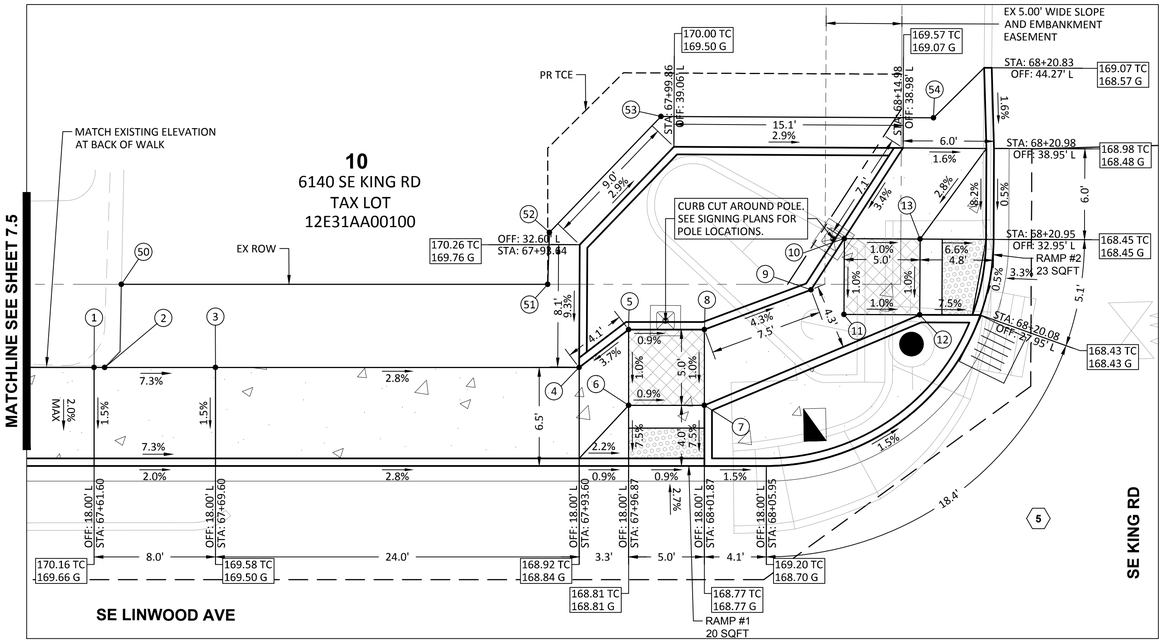
CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 7.3

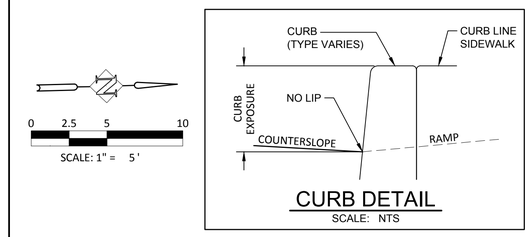
JOB NO. CLA-93



CURB RETURN KING-1

CURVE DATA TABLE				
	DELTA	RADIUS	TANGENT	LENGTH
5	89°42'38'	15.0'	14.92'	23.49'
6	90°17'22"	10.0'	10.05'	15.76'

	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	7.5%	7.5%	1.0%	7.5%
	CROSS SLOPE	0.9%	1.0%	1.0%	1.0%
	GUTTER FLOW SLOPE	0.9%	0.5%	1.0%	1.5%
	COUNTER SLOPE	2.7%	3.3%	3.1%	2.9%
	RAMP LENGTH	4.0	4.9	5.5	4.5
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	5.0	5.0	5.5	4.5
	SLOPE x	0.9%	1.0%	1.0%	1.0%
	SLOPE y	1.0%	1.0%	1.0%	1.0%



SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

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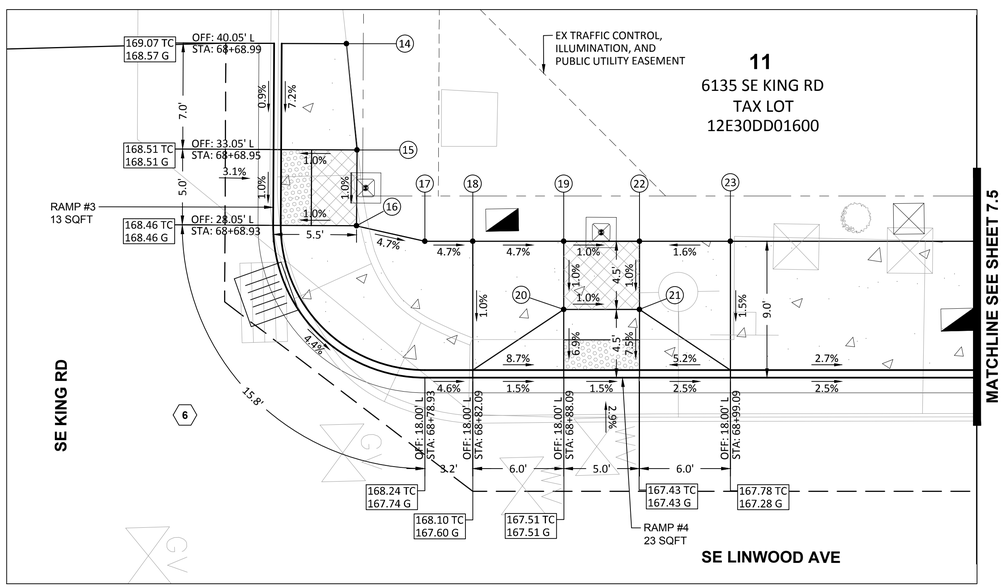

CURB RETURN KING-2

POINT TABLE			
#	STATION	OFFSET	ELEVATION
1	67+61.60	24.50 L	170.25 FG
2	67+62.30	24.50 L	170.21 FG
3	67+69.60	24.50 L	169.67 FG
4	67+93.60	24.50 L	169.51 TC 169.01 G
5	67+96.87	27.00 L	169.66 TC 169.16 G
6	67+96.87	22.00 L	169.61 TC 169.11 G
7	68+01.87	22.00 L	169.57 TC 169.07 G
8	68+01.87	27.00 L	169.62 TC 169.12 G
9	68+08.91	29.62 L	169.29 TC 168.79 G
10	68+11.10	33.00 L	168.33 TC 168.83 G
11	68+11.08	28.00 L	168.78 FG
12	68+16.08	27.97 L	169.23 TC 168.73 G
13	68+16.10	32.97 L	168.78 FG
14	68+73.76	40.03 L	169.04 FG (MATCH)
15	68+74.45	33.02 L	168.57 FG

POINT TABLE			
#	STATION	OFFSET	ELEVATION
16	68+74.43	28.02 L	168.52 FG
17	68+78.93	27.00 L	168.30 FG
18	68+82.09	27.00 L	168.15 FG
19	68+88.09	27.00 L	167.86 FG
20	68+88.09	22.50 L	167.82 FG
21	68+93.09	22.50 L	167.77 FG
22	68+93.09	27.00 L	167.81 FG
23	68+99.09	27.00 L	167.91 FG
50	67+63.40	29.98 L	170.29 FG (MATCH0
51	67+91.53	29.98 L	169.76 FG (MATCH)
52	67+91.64	33.41 L	169.82 FG (MATCH)
53	67+99.01	41.06 L	169.55 FG (MATCH)
54	68+16.99	40.97 L	168.86 FG (MATCH)

PREPARED FOR

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DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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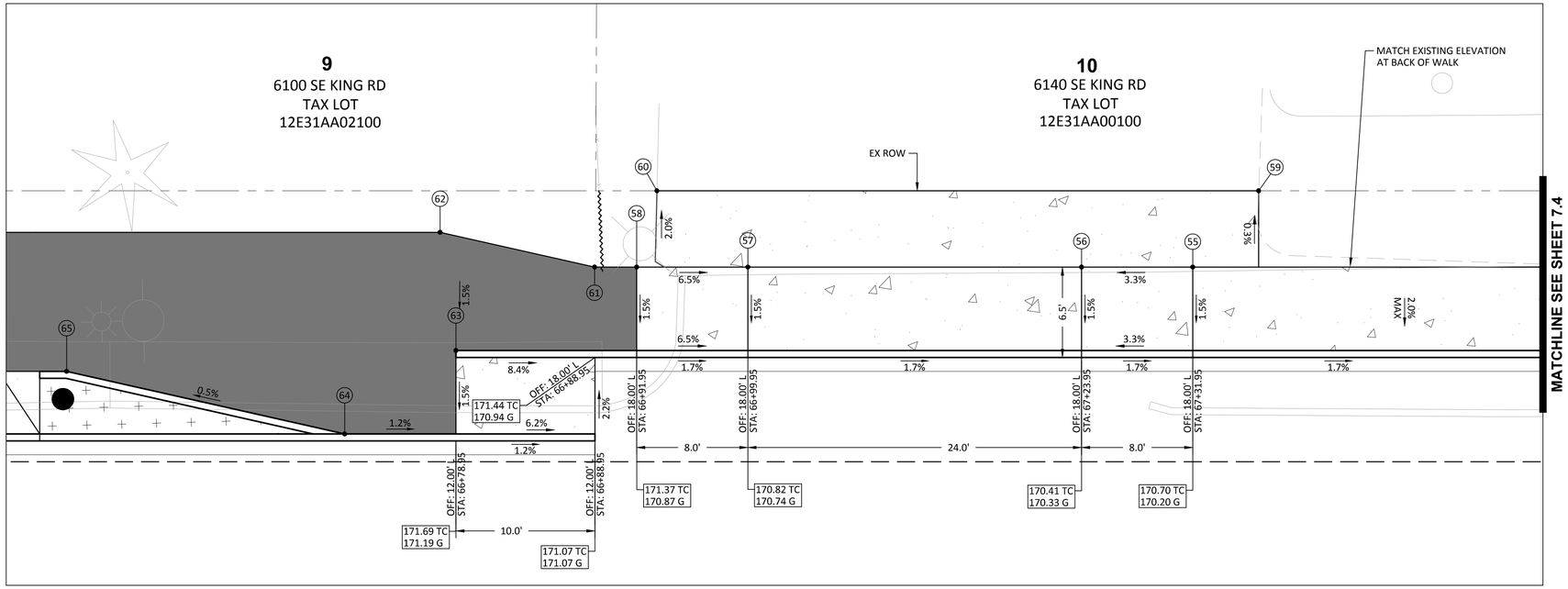
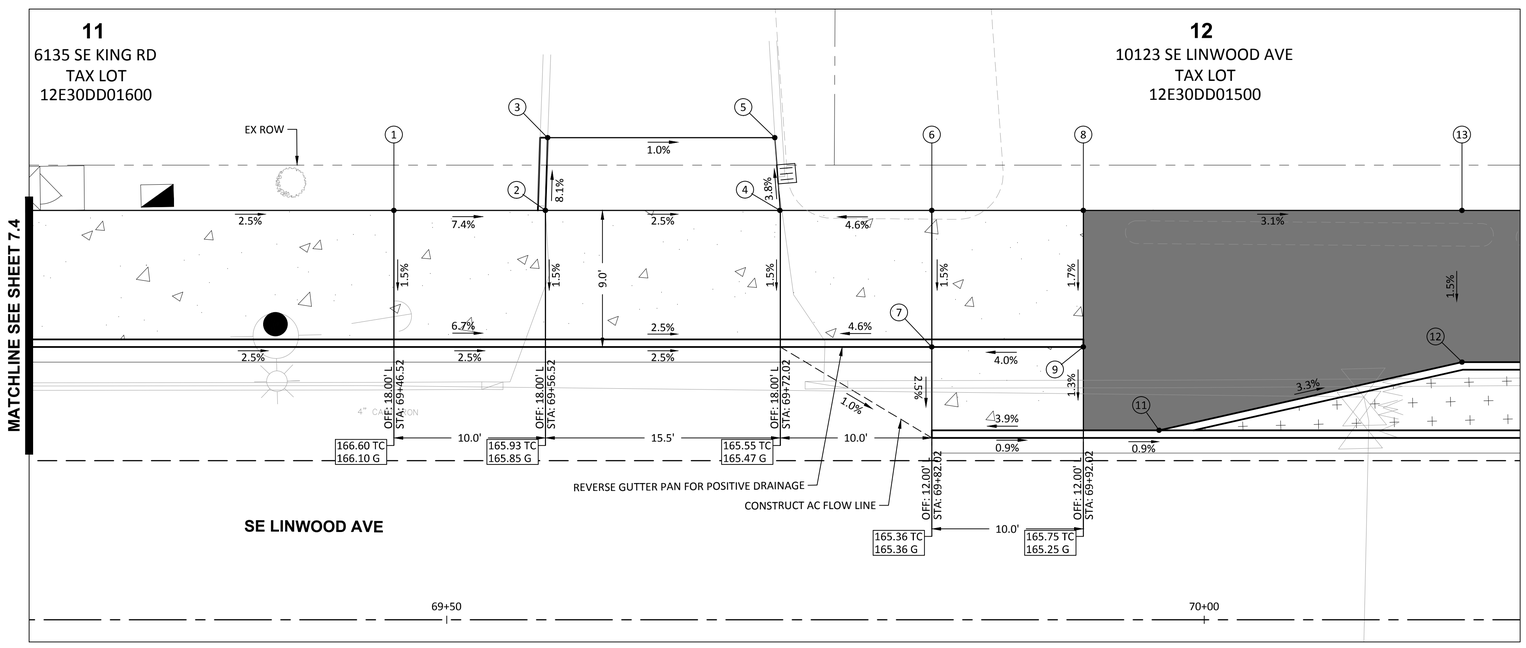
CURB RETURNS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 7.4
JOB NO. CLA-93

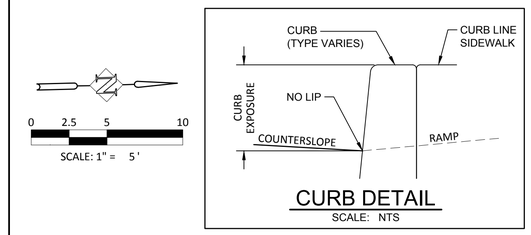
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS.dwg



PROPERTY 9 & 10



PROPERTY 11 & 12



SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

POINT TABLE				POINT TABLE			
#	STATION	OFFSET	ELEVATION	#	STATION	OFFSET	ELEVATION
1	69+46.52	27.00 L	166.73 FG	56	67+23.95	24.50 L	170.53 FG
2	69+56.52	27.00 L	166.05 FG	57	66+99.95	24.50 L	170.94 FG
3	69+56.67	31.80 L	165.66 FG (MATCH)	58	66+91.95	24.50 L	171.46 FG
4	69+72.00	27.00 L	165.68 FG	59	67+36.69	29.98 L	170.68 FG (MATCH)
5	69+71.66	31.80 L	165.50 FG (MATCH)	60	66+93.40	29.98 L	171.25 FG (MATCH)
6	69+82.02	27.00 L	166.13 FG	61	66+88.92	24.50 L	171.75 FG
7	69+82.02	18.00 L	166.01 TC 165.51 G	62	66+77.81	27.00 L	171.92 FG
8	69+92.02	27.00 L	165.97 FG	63	66+78.95	18.50 L	171.78 TC 171.78 G
9	69+92.02	18.00 L	165.82 TC 165.82 G	64	66+70.95	12.50 L	171.79 TC 171.79 G
11	69+97.02	12.50 L	165.70 TC 165.70 G	65	66+50.95	17.00 L	172.09 TC 171.69 G
12	70+17.02	17.00 L	165.43 TC 165.03 G				
13	70+17.02	27.00 L	165.18 FG				
55	67+31.95	24.50 L	170.79 FG				

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-7.0 CURB RETURNS.dwg

PREPARED FOR

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DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
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DATE: 11-11-2022

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EXPIRES: 6/30/23

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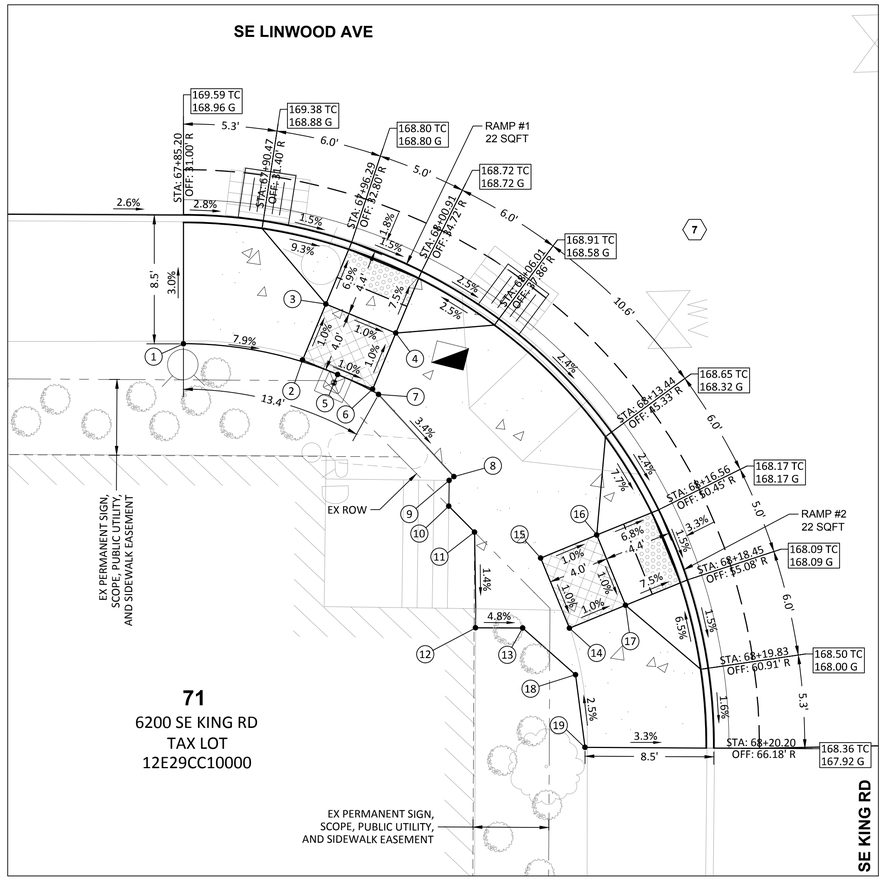
CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

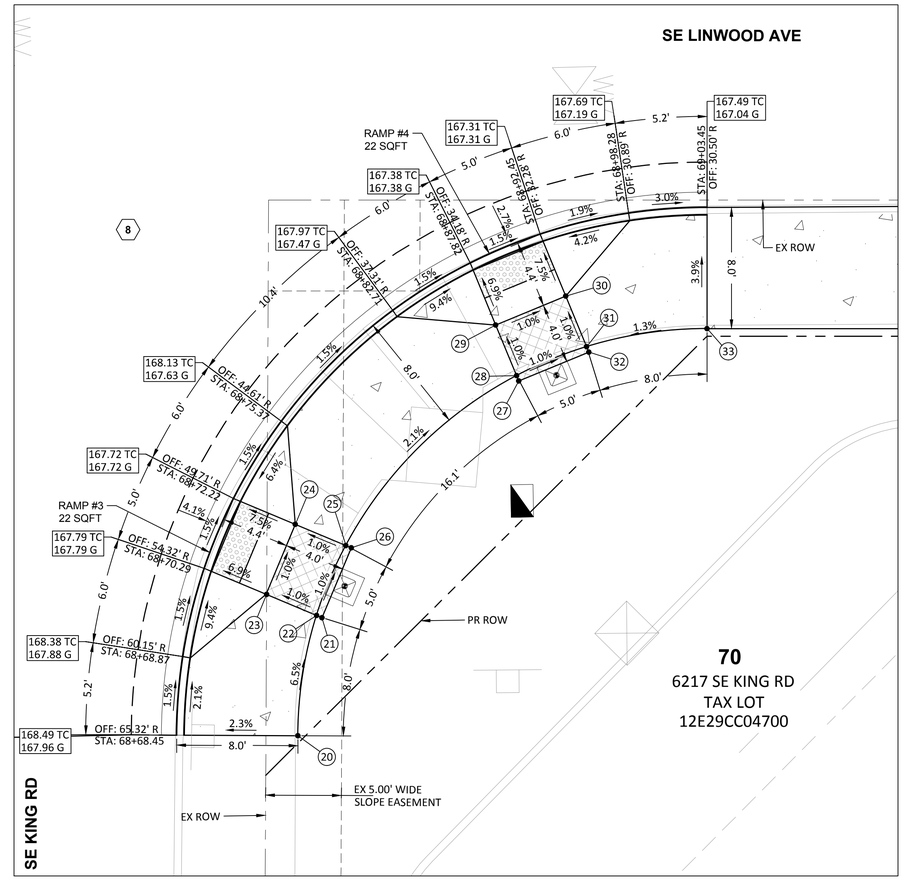
CLACKAMAS COUNTY, OREGON

SHEET NO. 7.5

JOB NO. CLA-93



CURB RETURN KING-3



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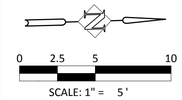

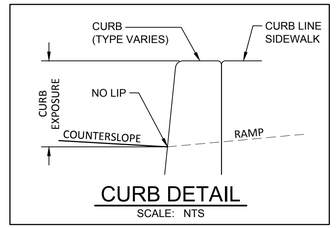

SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	67+85.20	39.50 R	169.77 FG
2	67+93.06	40.57 R	169.14 FG
3	67+94.60	36.88 R	169.10 FG
4	67+99.22	38.80 R	169.05 FG
5	67+95.37	41.53 R	169.12 FG
6	67+97.68	42.49 R	169.09 FG
7	67+98.08	42.84 R	169.10 FG
8	68+03.05	48.27 R	168.85 FG
9	68+02.73	48.52 R	168.85 FG
10	68+02.71	50.21 R	168.83 FG
11	68+04.41	51.93 R	168.77 FG
12	68+04.48	58.24 R	168.68 FG
13	68+07.58	58.25 R	168.53 FG
14	68+10.67	58.26 R	168.46 FG
15	68+08.77	53.64 R	168.51 FG
16	68+12.47	52.12 R	168.47 FG
17	68+14.37	56.75 R	168.42 FG
18	68+11.07	61.34 R	168.50 FG

POINT TABLE

#	STATION	OFFSET	ELEVATION
19	68+11.70	66.13 R	168.62 FG
20	68+76.45	65.36 R	168.66 FG
21	68+78.04	57.57 R	168.14 FG
22	68+77.69	57.42 R	168.13 FG
23	68+74.39	56.04 R	168.10 FG
24	68+76.29	51.42 R	168.05 FG
25	68+79.62	52.81 R	168.08 FG
26	68+79.98	52.96 R	168.09 FG
27	68+91.03	41.96 R	167.73 FG
28	68+90.89	41.60 R	167.72 FG
29	68+89.51	38.26 R	167.69 FG
30	68+94.13	36.35 R	167.64 FG
31	68+95.51	39.70 R	167.67 FG
32	68+95.66	40.05 R	167.68 FG
33	69+03.45	38.50 R	167.78 FG

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
7	90°17'22"	35.0'	35.18'	55.15'
8	89°42'38"	35.0'	34.82'	54.82'

	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	7.5%	7.5%	7.5%	7.5%
	CROSS SLOPE	1.0%	1.0%	1.0%	1.0%
	GUTTER FLOW SLOPE	1.5%	1.5%	1.5%	1.5%
	COUNTER SLOPE	1.8%	3.3%	4.1%	2.7%
	RAMP LENGTH	4.5	4.5	4.5	4.5
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	4.0	4.0	4.0	4.0
	SLOPE x	1.0%	1.0%	1.0%	1.0%
	SLOPE y	1.0%	1.0%	1.0%	1.0%

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

CURB RETURNS

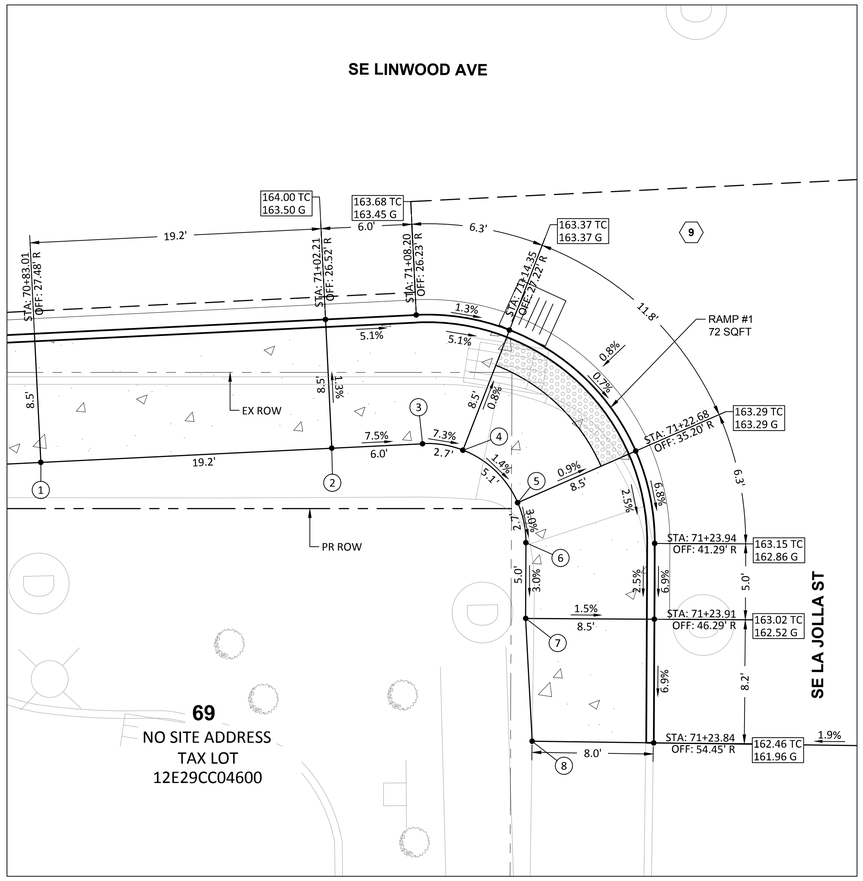
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

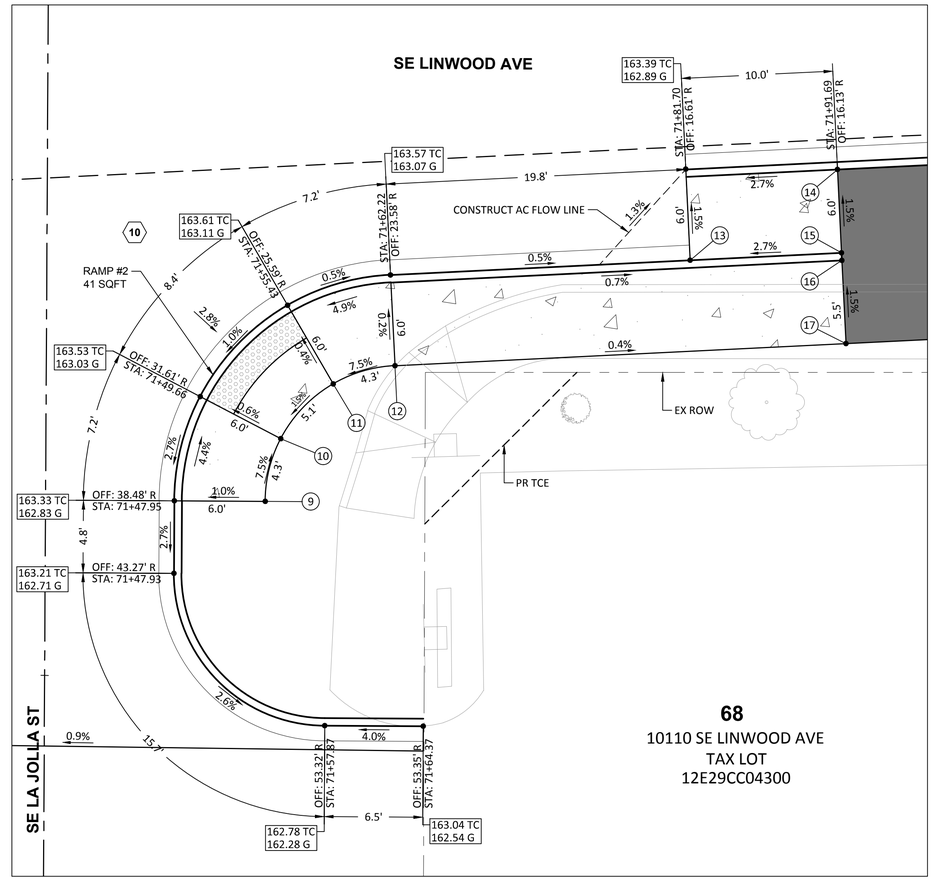
SHEET NO. 7.6

JOB NO. CLA-93

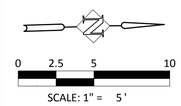
P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS.dwg

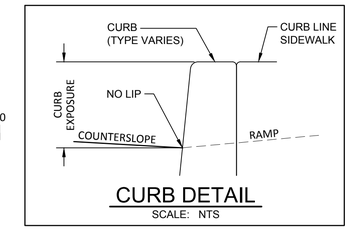


CURB RETURN LA JOLLA-1



CURB RETURN LA JOLLA-2





SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
UNLESS OTHERWISE NOTED.
(SEE DRG. NO. RD902 & 904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	70+83.43	35.95 R	164.34 FG
2	71+02.63	35.01 R	164.09 FG
3	71+08.62	34.72 R	163.64 FG
4	71+11.28	35.15 R	163.44 FG
5	71+14.89	38.60 R	163.37 FG
6	71+15.44	41.24 R	163.29 FG
7	71+15.43	46.24 R	163.14 FG
8	71+15.84	54.35 R	162.68 FG (MATCH)
9	71+53.95	38.51 R	163.38 FG
10	71+54.98	34.39 R	163.06 FG
11	71+58.44	30.78 R	163.14 FG
12	71+62.51	29.57 R	163.46 FG
13	71+81.99	22.61 R	162.98 FG
14	71+91.71	16.63 R	163.16 TC 162.66 G
15	71+91.98	22.12 R	163.24 TC 163.24 G
16	71+92.00	22.62 R	163.25 TC 163.25 G
17	71+92.27	28.12 R	163.33 FG

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
9	93°06'40"	15.0'	15.84'	24.38'
10	86°53'20"	15.0'	14.21'	22.75'

	ITEM	VALUES	
		RAMP 1	RAMP 2
RAMP	RUNNING SLOPE	0.9%	0.6%
	CROSS SLOPE	1.4%	1.5%
	GUTTER FLOW SLOPE	0.7%	1.0%
	COUNTER SLOPE	0.8%	2.8%
	RAMP LENGTH	8.5	6.0
TURNING SPACE	WIDTH x	5.1	5.1
	LENGTH y	8.5	6.0
	SLOPE x	1.4%	1.5%
	SLOPE y	0.9%	0.6%

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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CURB RETURNS

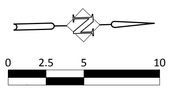
LINWOOD AVENUE IMPROVEMENTS

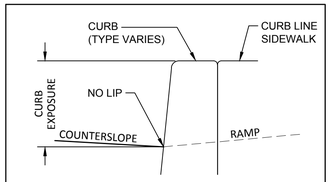
CLACKAMAS COUNTY, OREGON

SHEET NO. 7.7

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg





CURB DETAIL

SCALE: NTS

SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
UNLESS OTHERWISE NOTED.
(SEE DRG. NO. RD902 & RD904)

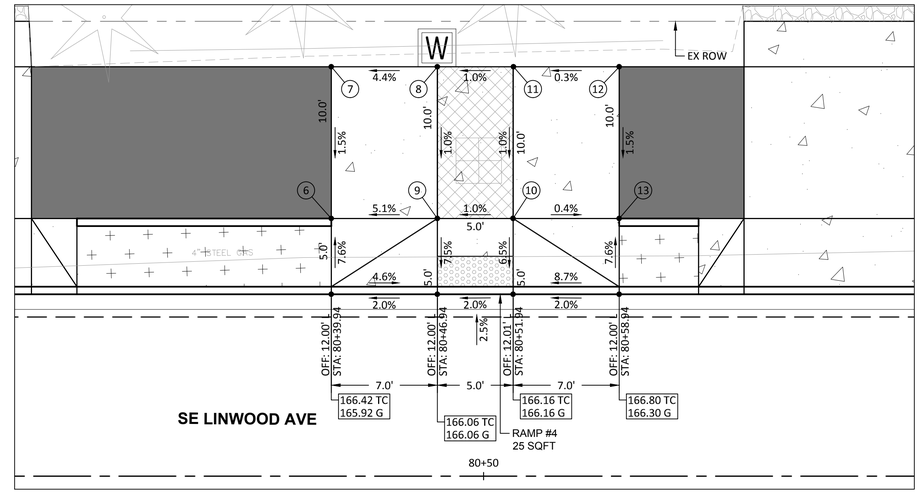
SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

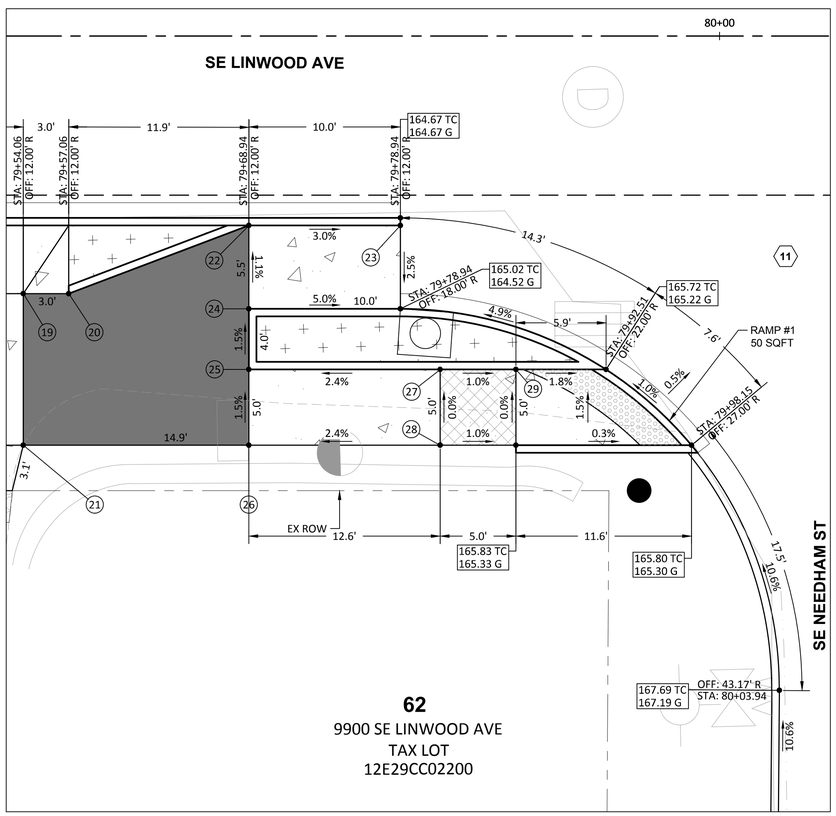
1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.



CURB RETURN NEEDHAM-3

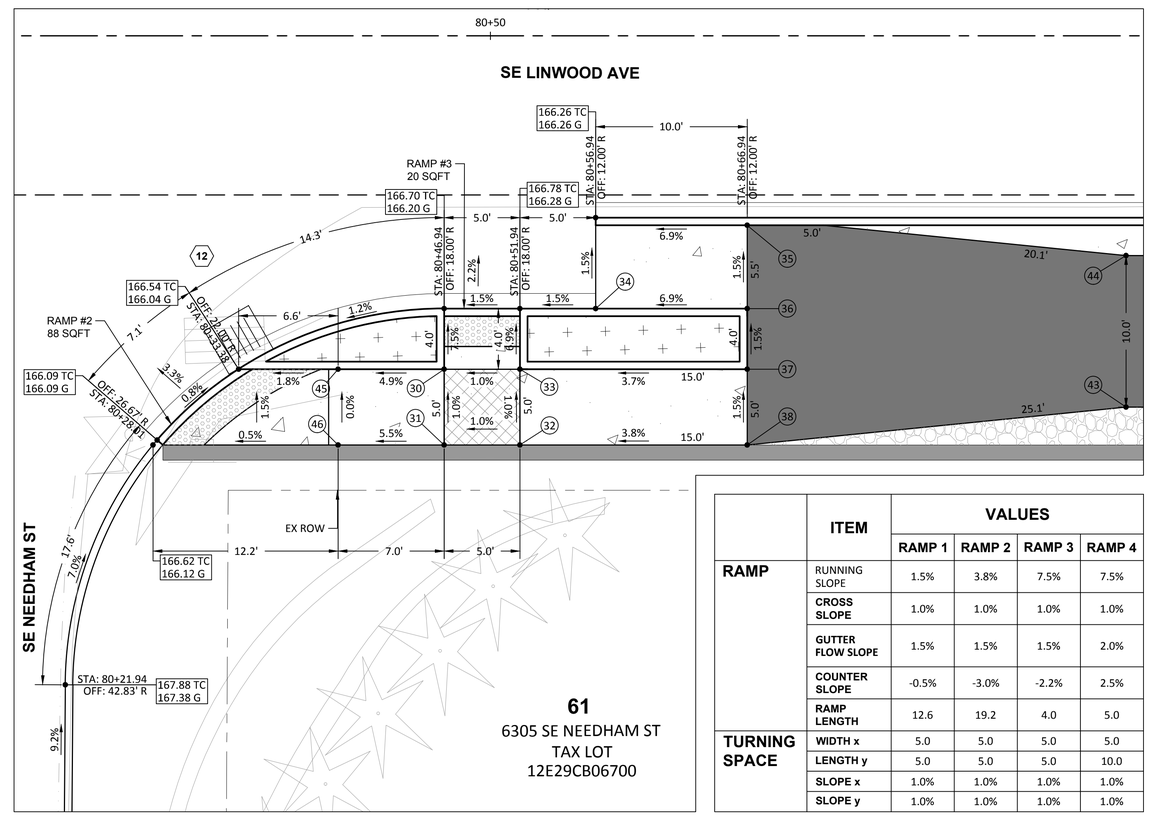
POINT TABLE

#	STATION	OFFSET	ELEVATION
6	80+39.94	17.00 L	166.08 FG
7	80+39.94	27.00 L	166.23 FG
8	80+46.94	27.00 L	166.53 FG
9	80+46.94	17.00 L	166.44 FG
10	80+51.94	17.00 L	166.49 FG
11	80+51.97	27.00 L	166.59 FG
12	80+58.94	27.00 L	166.61 FG
13	80+58.94	17.00 L	166.46 FG
19	79+54.06	17.00 R	164.29 FG
20	79+57.06	17.00 R	164.75 TC 164.35 G
21	79+54.06	27.00 R	164.44 FG
22	79+68.94	12.50 R	164.95 TC 164.95 G
23	79+78.94	12.50 R	165.17 164.67 G
24	79+68.94	18.00 R	165.01 TC 165.01 G
25	79+68.94	22.00 R	165.07 TC 165.07 G
26	79+68.94	27.00 R	165.15 FG
27	79+81.56	22.00 R	165.38 TC 165.38 G
28	79+81.56	27.00 R	165.38 FG
29	79+86.56	22.00 R	165.33 TC 165.33 G
30	80+46.94	22.00 R	166.75 TC 166.50 G
31	80+46.94	27.00 R	166.55 FG
32	80+51.94	27.00 R	166.60 FG
33	80+51.94	22.00 R	166.80 TC 166.55 G
34	80+56.94	18.00 R	166.85 TC 166.35 G
35	80+66.94	12.50 R	166.96 FG
36	80+66.94	18.00 R	167.04 TC 167.04 G
37	80+66.94	22.00 R	167.10 TC 167.10 G
38	80+66.94	27.00 R	167.18 FG
43	80+91.94	24.50 R	167.62 FG
44	80+91.94	14.50 R	167.47 FG
45	80+39.94	22.00 R	166.66 TC 166.16 G
46	80+39.94	27.00 R	166.16 FG



62
9900 SE LINWOOD AVE
TAX LOT
12E29CC02200

CURB RETURN NEEDHAM-1



61
6305 SE NEEDHAM ST
TAX LOT
12E29CB06700

CURB RETURN NEEDHAM-2

	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	1.5%	3.8%	7.5%	7.5%
	CROSS SLOPE	1.0%	1.0%	1.0%	1.0%
	GUTTER FLOW SLOPE	1.5%	1.5%	1.5%	2.0%
	COUNTER SLOPE	-0.5%	-3.0%	-2.2%	2.5%
	RAMP LENGTH	12.6	19.2	4.0	5.0
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	5.0	5.0	5.0	10.0
	SLOPE x	1.0%	1.0%	1.0%	1.0%
	SLOPE y	1.0%	1.0%	1.0%	1.0%

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
11	90°24'00'	25.0'	25.18'	39.44'
12	89°36'00"	25.0'	24.83'	39.10'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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CURB RETURNS

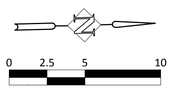
LINWOOD AVENUE IMPROVEMENTS

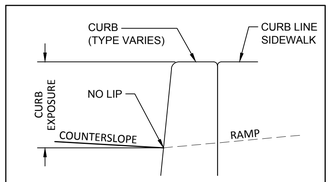
CLACKAMAS COUNTY, OREGON

SHEET NO. 7.8

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg





CURB DETAIL
SCALE: NTS

SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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(SEE DRG. NO. RD902 & RD904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

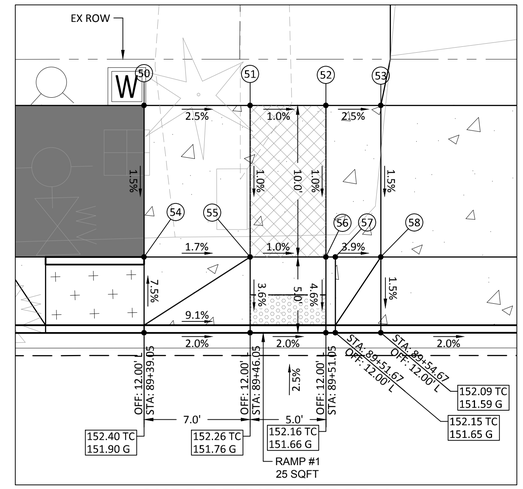
STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

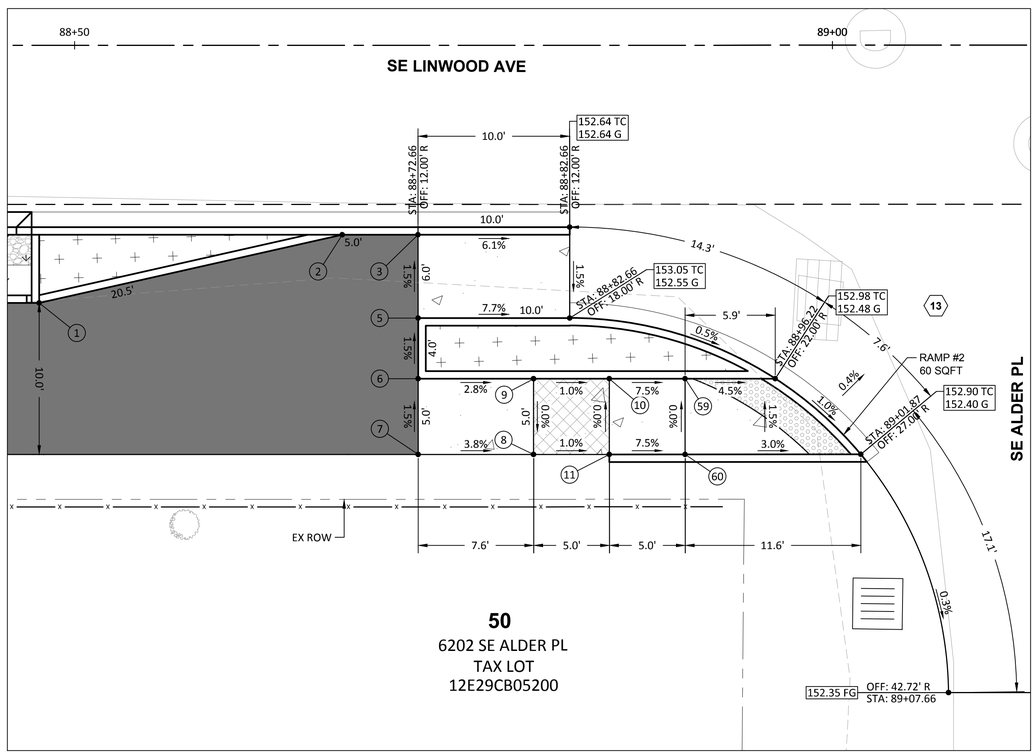
	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	4.6%	4.7%	1.0%	7.5%
	CROSS SLOPE	1.0%	1.0%	1.0%	0.3%
	GUTTER FLOW SLOPE	2.0%	0.5%	1.0%	1.5%
	COUNTER SLOPE	2.5%	-0.6%	1.4%	1.5%
	RAMP LENGTH	5.0	14.6	14.6	4.0
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	10.0	5.0	5.0	5.0
	SLOPE x	1.0%	1.0%	1.5%	0.3%
	SLOPE y	1.0%	1.0%	0.3%	1.5%

CURVE DATA TABLE				
	DELTA	RADIUS	TANGENT	LENGTH
13	89°21'30"	25.0'	24.72'	38.99'
14	88°06'12"	25.0'	24.19'	38.44'

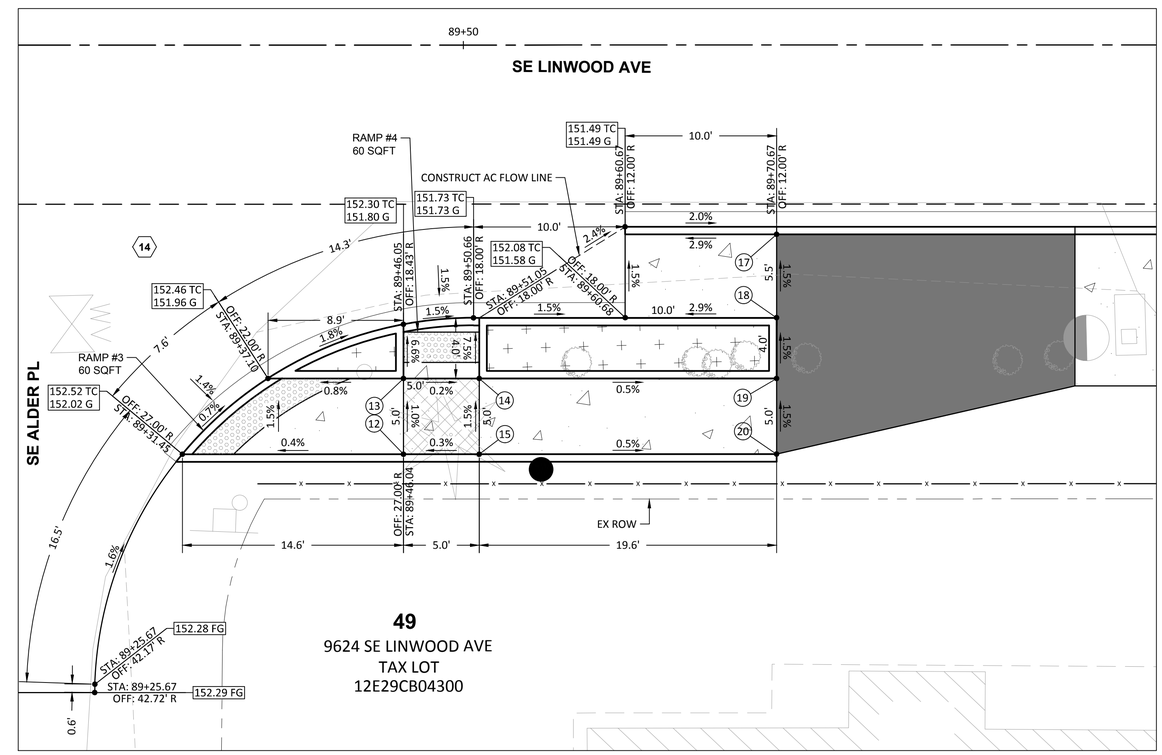


CURB RETURN ALDER-1

POINT TABLE				POINT TABLE			
#	STATION	OFFSET	ELEVATION	#	STATION	OFFSET	ELEVATION
1	88+47.66	17.00 R	153.75 TC 153.35 G	18	89+70.67	18.00 R	151.86 TC 151.86 G
2	88+67.66	12.50 R	153.31 TC 153.31 G	19	89+70.67	22.00 R	151.92 TC 151.92 G
3	88+72.66	12.50 R	153.24 FG	20	89+70.67	27.00 R	152.00 FG
5	88+72.66	18.00 R	153.32 TC 153.32 G	50	89+39.05	27.00 L	152.22 FG
				51	89+46.05	27.00 L	152.04 FG
6	88+72.66	22.00 R	153.38 TC 153.38 G	52	89+51.05	27.00 L	151.99 FG
7	88+72.66	27.00 R	153.46 FG	53	89+54.67	27.00 L	151.90 FG
8	88+80.28	27.00 R	153.17 FG	54	89+39.05	17.00 L	152.07 FG
9	88+80.28	22.00 R	153.17 TC 153.17 G	55	89+46.05	17.00 L	151.94 FG
				56	89+51.05	17.00 L	151.89 FG
10	88+85.28	22.00 R	153.12 TC 153.12 G	57	89+51.67	17.00 L	151.87 FG
				58	89+54.67	17.00 L	151.75 FG
11	88+85.28	27.00 R	153.12 TC 153.12 G	59	88+90.28	22.00 R	153.06 TC 152.75 G
12	89+46.04	27.00 R	152.08 TC 152.08 G	60	88+90.28	27.00 R	153.06 TC 152.75 G
13	89+46.05	22.00 R	152.25 TC 152.03 G				
14	89+51.05	22.00 R	152.25 TC 152.02 G				
15	89+51.04	27.00 R	152.10 FG				
17	89+70.67	12.50 R	151.78 FG				



CURB RETURN ALDER-2



CURB RETURN ALDER-3

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 7.9

JOB NO. CLA-93

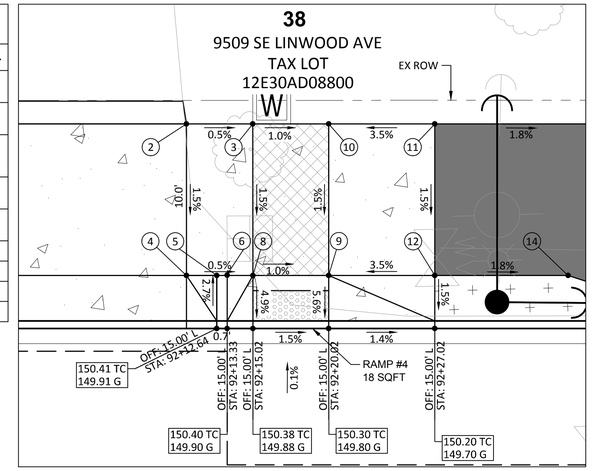
POINT TABLE

#	STATION	OFFSET	ELEVATION
2	92+10.64	28.50 L	150.22 FG
3	92+15.02	28.50 L	150.15 FG
4	92+10.64	18.50 L	150.07 FG
5	92+12.64	18.50 L	150.06 FG
6	92+13.33	18.52 L	150.06 FG
8	92+15.02	18.50 L	150.05 FG
9	92+20.02	18.50 L	150.02 FG
10	92+20.02	28.50 L	150.12 FG
11	92+27.02	28.50 L	150.56 FG
12	92+27.02	18.50 L	150.41 FG
14	92+35.82	18.50 L	150.37 FG
15	92+08.03	17.00 R	150.63 TC 150.13 G
16	92+08.03	27.00 R	150.28 FG
17	92+15.02	17.00 R	149.77 FG
18	92+15.02	27.00 R	149.87 FG
19	92+20.02	27.00 R	149.84 TC 149.84 G
20	92+20.02	17.00 R	149.74 TC 149.74 G
21	92+31.66	17.00 R	149.47 TC 148.97 G
22	92+31.66	27.00 R	149.47 TC 148.97 G
24	92+83.82	19.00 R	148.79 FG
25	92+83.82	29.00 R	148.74 FG
26	92+88.82	29.00 R	148.77 FG
27	92+88.82	19.00 R	148.82 FG
28	92+91.16	19.00 R	148.88 FG
29	92+91.16	28.95 R	148.84 FG
30	92+96.16	19.00 R	149.00 FG
31	92+96.16	29.00 R	149.00 FG

	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	3.8%	7.5%	2.3%	5.6%
	CROSS SLOPE	0.5%	1.0%	1.0%	1.0%
	GUTTER FLOW SLOPE	0.5%	1.5%	1.5%	1.5%
	COUNTER SLOPE	3.2%	4.8%	2.5%	0.1%
	RAMP LENGTH	8.0	11.0	11.5	3.5
TURNING SPACE	WIDTH x	5.0	10.0	10.0	5.0
	LENGTH y	10.0	4.5	5.0	10.0
	SLOPE x	0.5%	1.0%	0.5%	1.0%
	SLOPE y	1.0%	1.0%	0.5%	1.5%

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
15	97°08'21"	25.0'	28.33'	42.39'
16	65°23'12"	25.0'	16.05'	28.53'



SIDEWALK RAMP OVERLAND-3

SIDEWALK

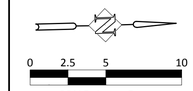
TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

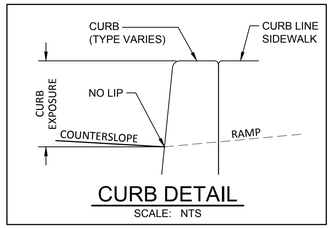
TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
UNLESS OTHERWISE NOTED.
(SEE DRG. NO. RD902 & RD904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

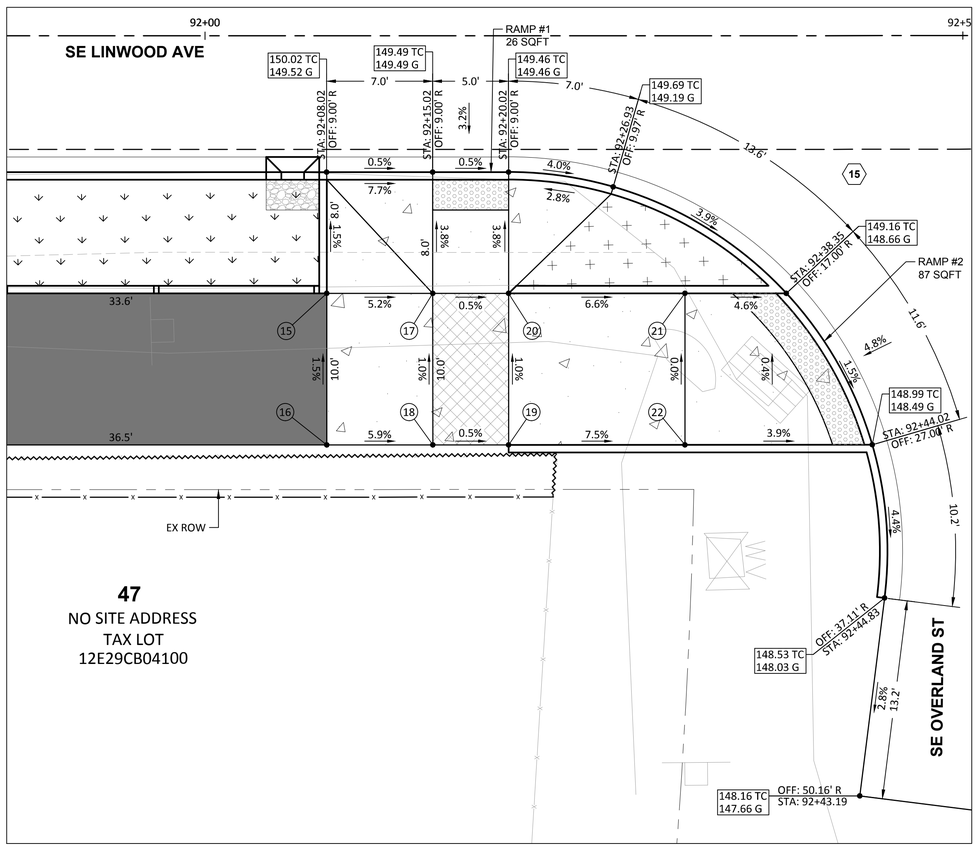
STATION, OFFSET, ELEVATION POINT



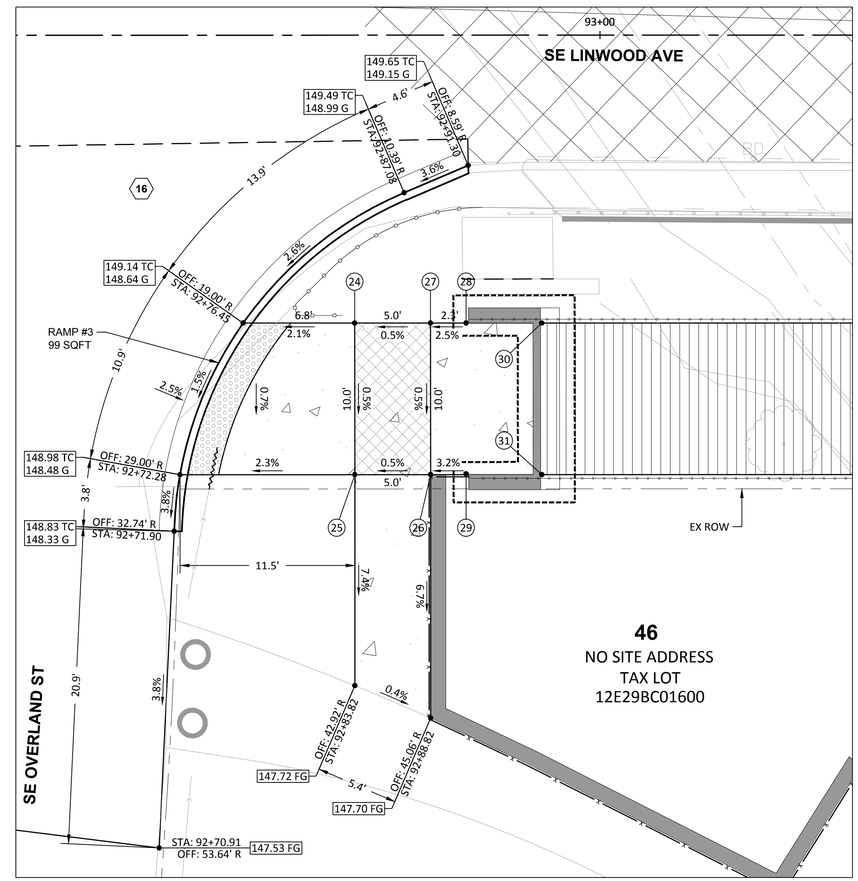


CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.



CURB RETURN OVERLAND-1



CURB RETURN OVERLAND-2

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

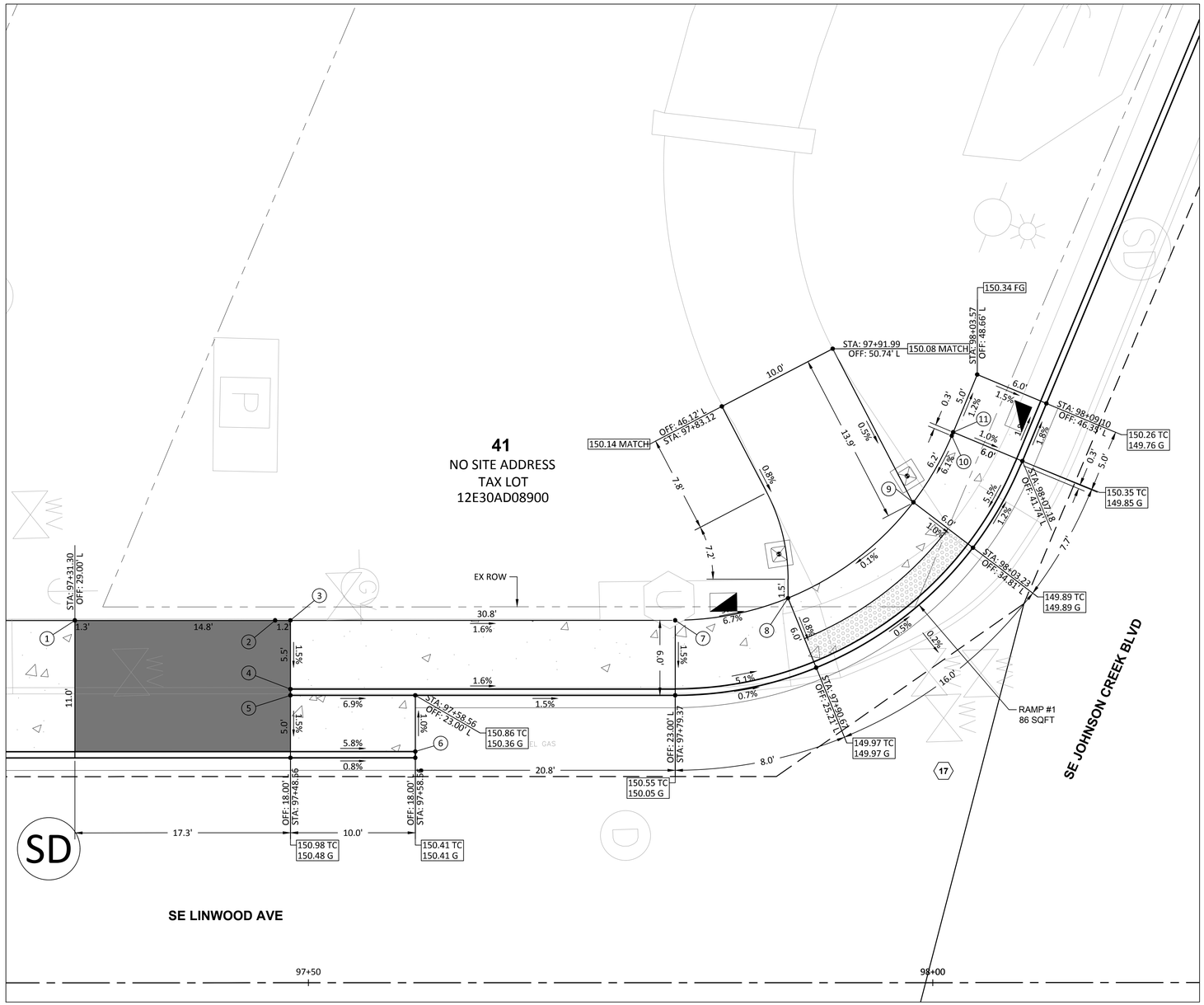
REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

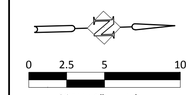
CURB RETURNS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

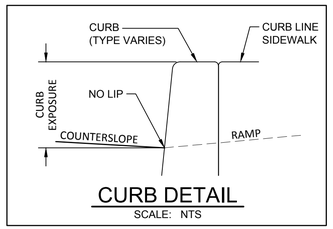
SHEET NO. 7.10
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg



CURB RETURN JOHNSON CREEK-1





SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

TRUNCATED DOME DETECTABLE WARNING SURFACE
2' X 4' MIN (WITH SHORTER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING)
UNLESS OTHERWISE NOTED.
(SEE DRG. NO. RD902 & 904)

SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

1. SLOPES HOLD OVER ELEVATIONS
2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

	ITEM	VALUES
		RAMP 1
RAMP	RUNNING SLOPE	1.0%
	CROSS SLOPE	0.1%
	GUTTER FLOW SLOPE	0.5%
	COUNTER SLOPE	0.2%
	RAMP LENGTH	6.0
TURNING SPACE	WIDTH x	12.8
	LENGTH y	6.0
	SLOPE x	0.5%
	SLOPE y	1.0%

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	97+31.30	29.00 L	151.14 FG
2	97+47.34	29.00 L	151.14 FG
3	97+48.56	29.00 L	151.14 FG
4	97+48.56	23.50 L	151.06 TC 151.06 G
5	97+48.56	23.00 L	151.05 TC 151.05 G
6	97+58.56	18.50 L	150.40 TC 150.40 G
7	97+79.37	29.00 L	150.63 FG
8	97+88.41	30.77 L	150.01 FG
9	97+98.46	38.45 L	150.01 FG
10	98+01.52	43.76 L	150.39 FG
11	98+01.64	44.05 L	150.41 FG

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
17	67°21'30"	30.0'	19.99'	35.27'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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CURB RETURNS

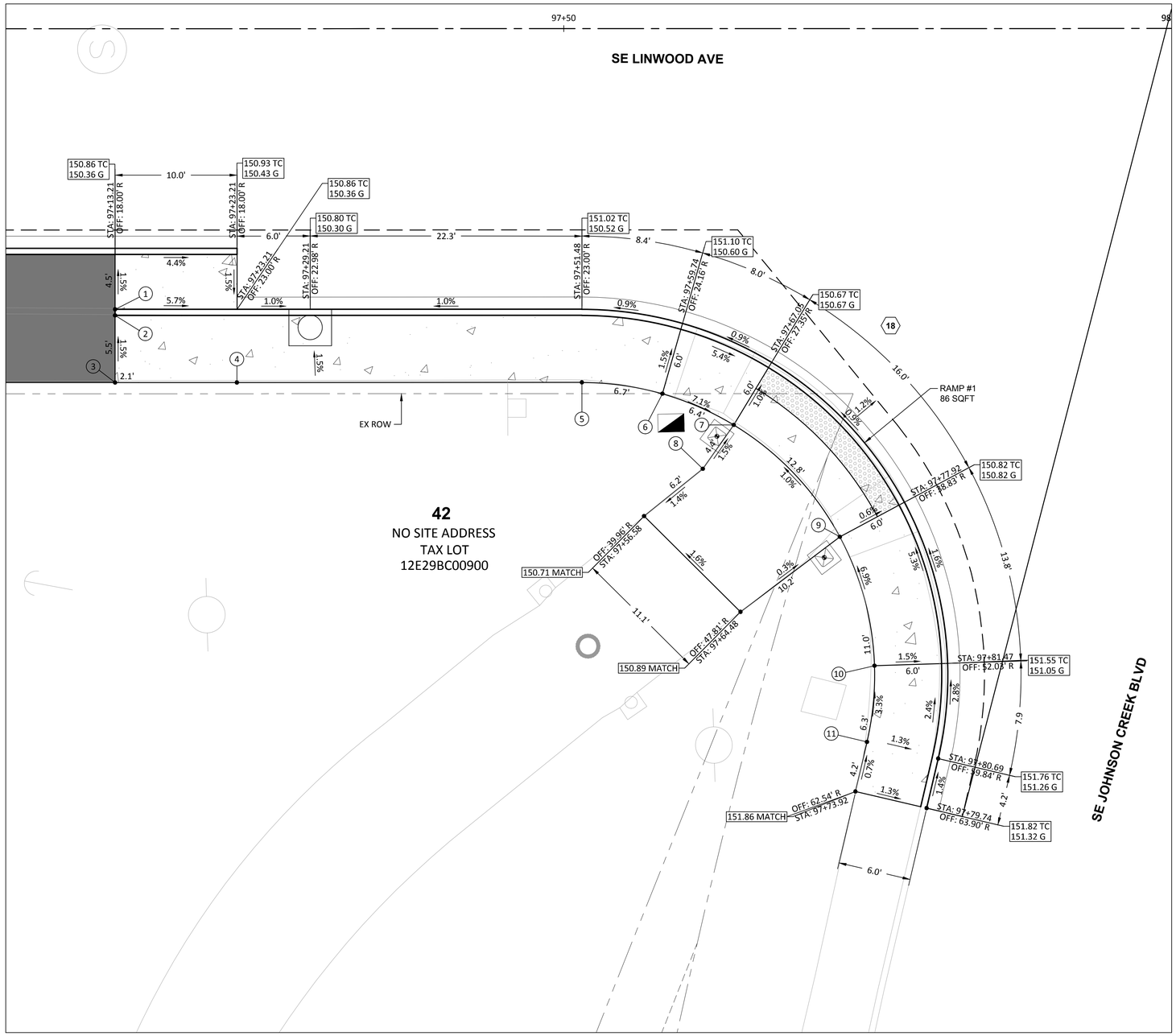
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

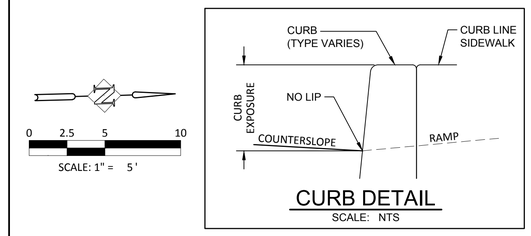
SHEET NO. 7.11

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg



CURB RETURN JOHNSON CREEK-2



SIDEWALK

TURNING SPACE
MIN. LEVEL AREA 4'X4'
4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

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2. MAX. CROSS SLOPE CHANGE ON RAMP 0.5% PER FOOT.
3. SEE STD. DRGS. RD902, RD904, RD905, & RD910 FOR DETAILS NOT SHOWN.

	ITEM	VALUES
		RAMP 1
RAMP	RUNNING SLOPE	1.0%
	CROSS SLOPE	1.0%
	GUTTER FLOW SLOPE	0.9%
	COUNTER SLOPE	-1.2%
	RAMP LENGTH	6.0
TURNING SPACE	WIDTH x	12.8
	LENGTH y	6.0
	SLOPE x	1.0%
	SLOPE y	1.0%

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	97+13.21	23.00 R	150.93 TC 150.93 G
2	97+13.21	23.50 R	150.94 TC 150.94 G
3	97+13.21	29.00 R	151.02 FG
4	97+23.20	29.00 R	150.94 FG
5	97+51.48	29.00 R	151.10 FG
6	97+58.09	29.93 R	151.18 FG
7	97+63.93	32.48 R	150.73 FG
8	97+61.40	36.08 R	150.80 FG
9	97+72.64	41.66 R	150.86 FG
10	97+75.47	52.23 R	151.62 FG
11	97+74.85	58.47 R	151.83 FG

CURVE DATA TABLE

	DELTA	RADIUS	TANGENT	LENGTH
18	103°10'55"	30.0'	37.84'	54.03'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-7.0 CURB RETURNS-2.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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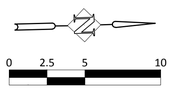
CURB RETURNS

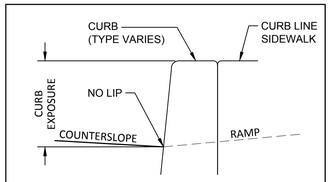
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 7.12

JOB NO. CLA-93





CURB DETAIL

SCALE: NTS

SIDEWALK

TURNING SPACE
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4'X5' WHEN CONSTRAINED (WITH LONGER DIMENSION IN DIRECTION OF PEDESTRIAN STREET CROSSING). FOR THE PURPOSES OF THIS APPLICATION, A MAX. 2.0% FINISHED SURFACE SLOPE (FOR DRAINAGE) IS CONSIDERED LEVEL.

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SLOPE INFORMATIONAL ARROW (FINISHED SURFACE SLOPE)

COUNTER SLOPE

STATION, OFFSET, ELEVATION POINT

CONSTRUCTION NOTES:

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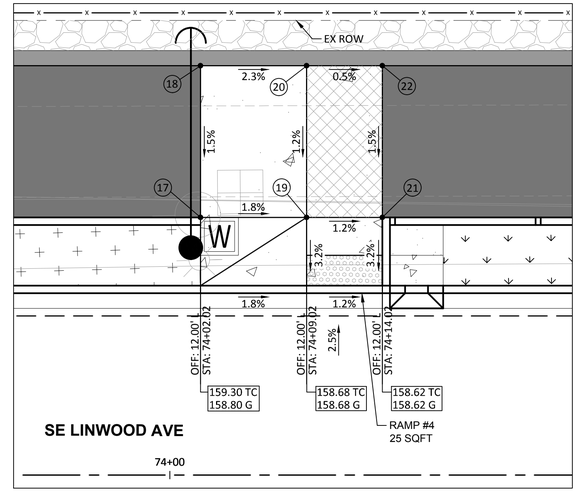


CURB RETURN BEVERLY-3

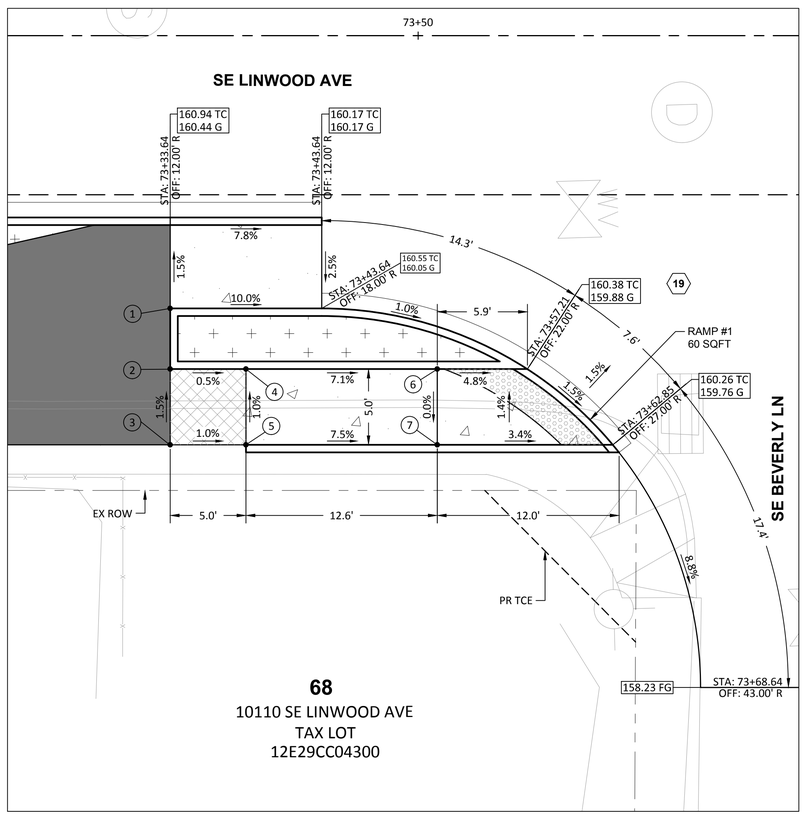
	ITEM	VALUES			
		RAMP 1	RAMP 2	RAMP 3	RAMP 4
RAMP	RUNNING SLOPE	7.5%	1.7%	3.3%	3.2%
	CROSS SLOPE	1.0%	1.0%	1.0%	1.2%
	GUTTER FLOW SLOPE	1.5%	0.5%	0.5%	1.2%
	COUNTER SLOPE	0.7%	4.5%	3.1%	2.5%
	RAMP LENGTH	15.0	15.0	4.0	4.0
TURNING SPACE	WIDTH x	5.0	5.0	5.0	5.0
	LENGTH y	5.0	5.0	5.0	10.0
	SLOPE x	1.0%	1.0%	1.0%	1.2%
	SLOPE y	1.0%	1.0%	1.0%	1.5%

CURVE DATA TABLE

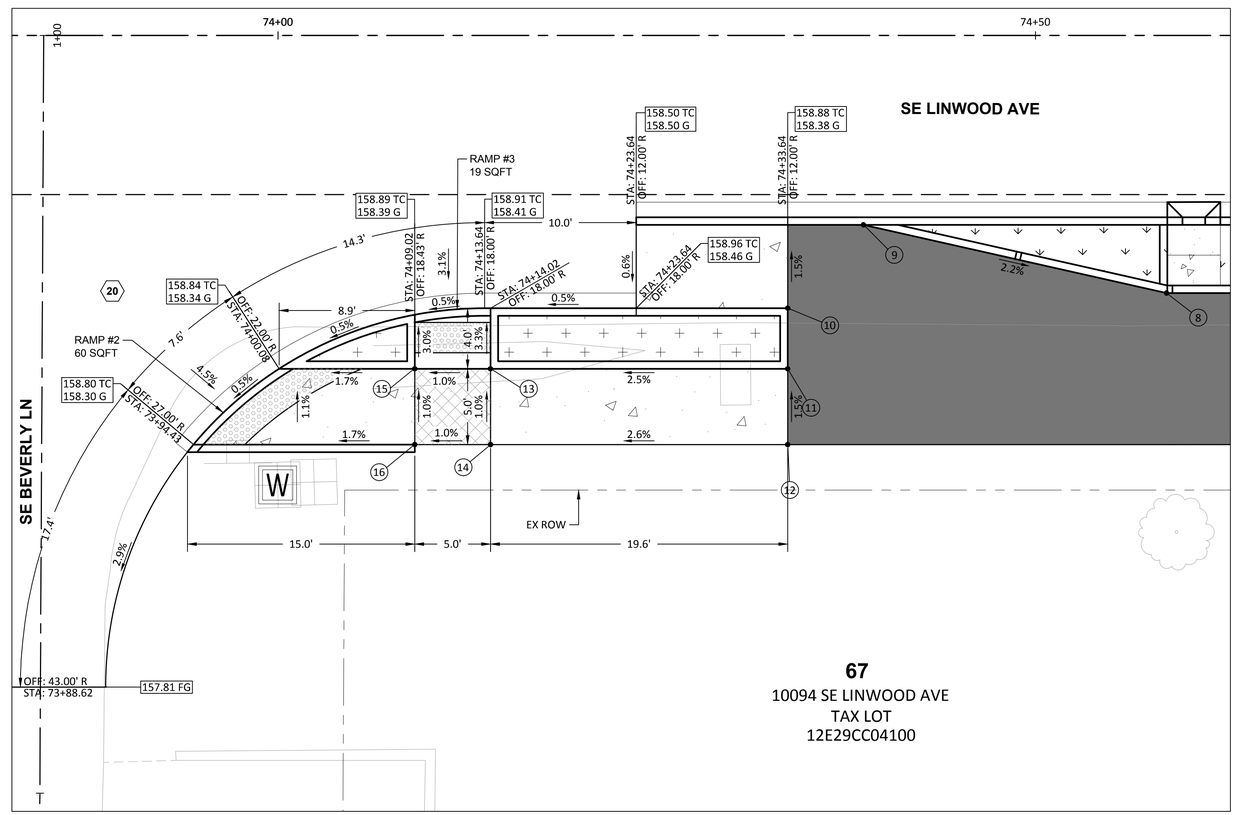
	DELTA	RADIUS	TANGENT	LENGTH
19	90°00'00"	25.0'	25.00'	39.27'
20	90°00'00"	25.0'	25.00'	39.27'

POINT TABLE

#	STATION	OFFSET	ELEVATION
1	73+33.64	18.00 R	161.02 TC 161.02 G
2	73+33.64	22.00 R	161.08 TC 161.08 G
3	73+33.64	27.00 R	161.16 FG
4	73+38.64	22.00 R	161.06 TC 161.06 G
5	73+38.64	27.00 R	161.11 TC 161.11 G
6	73+51.26	22.00 R	160.66 TC 160.16 G
7	73+51.26	27.00 R	160.66 TC 160.16 G
8	74+58.64	17.00 R	158.77 TC 158.37 G
9	74+38.64	12.50 R	158.82 TC 158.82 G
10	74+33.64	18.00 R	158.96 TC 158.96 G
11	74+33.64	22.00 R	159.02 TC 159.05 G
12	74+33.64	27.00 R	159.10 FG
13	74+14.02	22.00 R	158.54 TC 158.54 G
14	74+14.02	27.00 R	158.59 FG
15	74+09.02	22.00 R	158.49 TC 158.49 G
16	74+09.02	27.00 R	158.54 TC 158.54 G
17	74+02.02	17.00 L	158.96 FG
18	74+02.02	27.00 L	159.11 FG
19	74+09.02	17.00 L	158.84 FG
20	74+09.02	27.00 L	158.95 FG
21	74+14.02	17.00 L	158.78 FG
22	74+14.02	27.00 L	158.93 FG



CURB RETURN BEVERLY-1



CURB RETURN BEVERLY-2

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
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CURB RETURNS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 7.13

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-7.0 CURB RETURNS-3.dwg

DRIVEWAY CONSTRUCTION TABLE

LOCATION			CONCRETE DRIVEWAY APPROACH							DRIVEWAY CONNECTION			
PROPERTY NUMBER	STATION "L"	ADDRESS	"A" APPROACH WIDTH	APPROACH AREA (SF)	"B" WING WIDTH	"C" WING WIDTH	"D" APPROACH LENGTH	"E" PATHWAY LENGTH	"F" APPROX. SLOPE	FINISH SURFACE	"G" ESTIMATED LENGTH	ESTIMATED AREA (SF)	"H" APPROX. SLOPE
1	56+73.88, 22.0' LT	10717 SE LINWOOD AVE	18.1	175	3.9	10.0	0	5.5	1.5%	CONCRETE	10.5	189	-0.1%
1	57+43.31, 20.0' LT	10717 SE LINWOOD AVE	12.0	191	10.0	7.5	0	VARIES	1.5%	CONCRETE	12.0	144	-0.4%
2	57+95.38, 12.0' LT	10627 SE LINWOOD AVE	12.3	205	3.0	3.0	4.5	10.0	1.5%	CONCRETE	13.5	188	-6.5%
3	58+71.39, 12.0' LT	10621 SE LINWOOD AVE	13.5	223	3.0	3.0	4.5	10.0	1.5%	CONCRETE	SEE SHEET 8.1	929	SEE SHEET 8.1
3	59+08.35, 12.0' LT	10621 SE LINWOOD AVE	19.4	301	3.0	1.3	4.5	10.0	1.5%	CONCRETE	SEE SHEET 8.1	N/A	SEE SHEET 8.1
4	59+27.20, 12.0' LT	10605 SE LINWOOD AVE	11.0	179	1.3	3.0	4.5	10.0	1.5%	ASPHALT	9.5	86	-6.5%
6	61+57.52, 12.0' LT	10523 SE LINWOOD AVE	26.0	404	3.0	3.0	4.5	10.0	1.5%	ASPHALT	10.1	263	-6.5%
6	63+39.45, 12.0' LT	10523 SE LINWOOD AVE	30.0	462	3.0	3.0	4.5	10.0	1.5%	ASPHALT	4.9	147	-6.5%
9*	64+56.59, 12.0' LT	6100 SE KING RD	25.0	390	3.0	3.0	4.5	10.0	1.5%	ASPHALT	8.6	216	0.5%
9*	66+31.01, 12.0' LT	6100 SE KING RD	30.0	462	3.0	3.0	4.5	10.0	1.5%	ASPHALT	8.7'	260	-1.0%
10**	67+11.95, 18.0' LT	6140 SE KING RD	24.0	240	8.0	8.0	0	6.0	1.5%	CONCRETE	5.5	238	SEE SHEET 7.5
10**	67+81.60, 18.0' LT	6140 SE KING RD	24.0	192	8.0	0	0	6.0	1.5%	ASPHALT	5.5	256	SEE SHEET 7.4
11	69+64.27, 18.0' LT	6135 SE KING RD	15.5	302	10.0	10.0	0	8.5	1.5%	ASPHALT	4.8	73	-6.5%
12	70+51.17, 12.0' LT	10123 SE LINWOOD AVE	15.0	245	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	2.3 (G) 3.0 (C)	38 (G) 47 (C)	-6.5%
13	71+12.59, 12.0' LT	10291 SE LINWOOD AVE	20.0	317	3.0	3.0	4.5	10.0	1.5%	CONCRETE	3.0	60	6.3%
14	71+72.81, 12.0' LT	10263 SE LINWOOD AVE	23.5	368	3.0	3.0	4.5	10.0	1.5%	CONCRETE	3.0	71	8.3%
15	72+33.20, 12.0' LT	10227 SE LINWOOD AVE	21.3	336	3.0	3.0	4.5	10.0	1.5%	CONCRETE	3.0	64	6.5%
16	72+58.30, 12.0' LT	10101 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	3.0 (C)	23 (G) 33 (C)	13.5%
16	73+22.42, 12.0' LT	10101 SE LINWOOD AVE	25.0	390	3.0	3.0	4.5	10.0	9.7%	CONCRETE ASPHALT	6.4	115 (C) 45 (A)	13.5%
17	73+58.19, 12.0' LT	10099 SE LINWOOD AVE	26.5	411	3.0	3.0	4.5	10.0	9.7%	GRAVEL CONCRETE	SEE SHEET 8.2	280 (G) 280 (C)	SEE SHEET 8.2
18	74+76.33, 12.0' LT	10037 SE LINWOOD AVE	17.5	281	3.0	3.0	4.5	10.0	1.5%	ASPHALT	28.5	498	-5.0%
19	75+71.13, 12.0' LT	10035 SE LINWOOD AVE	16.0	259	3.0	3.0	4.5	10.0	1.5%	CONCRETE	21.0	203	SEE SHEET 8.6
20	76+56.48, 12.0' LT	9957 SE LINWOOD AVE	24.0	375	3.0	3.0	4.5	10.0	1.5%	ASPHALT	30.9	1519	SEE SHEET 8.2
21	77+29.42, 12.0' LT	9949 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	CONCRETE	22.9	311	0.5%
22	77+50.42, 12.0' LT	9943 SE LINWOOD AVE	16.0	259	3.0	3.0	4.5	10.0	1.5%	CONCRETE	22.9	490	0.8%
23	78+93.46, 12.0' LT	9939 SE LINWOOD AVE	20.0	317	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	6.0 (G) 3.0 (C)	118 (G) 60 (C)	-6.5%
24	79+75.56, 12.0' LT	9929 SE LINWOOD AVE	26.1	405	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	3.4 (G) 3.0 (C)	89 (G) 78 (C)	-6.5%
25	80+12.91, 12.0' LT	9925 SE LINWOOD AVE	14.5	237	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	1.0 (G) 3.0 (C)	15 (G) 43 (C)	13.5%
25	80+73.74, 12.0' LT	9925 SE LINWOOD AVE	13.0	209	3.0	1.5	4.5	10.0	1.5%	CONCRETE	1.0 (G) 3.0 (C)	13 (G) 39 (C)	-6.5%
26	80+90.46, 12.0' LT	9911 SE LINWOOD AVE	12.5	202	1.5	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	6.4 (G) 3.0 (C)	82 (G) 38 (C)	-6.5%
27	81+10.80, 12.0' LT	NO SITE ADDRESS	12.0	201	3.0	3.0	4.5	10.0	1.5%	N/A	N/A	N/A	N/A
28	82+53.44, 12.0' LT	9835 SE LINWOOD AVE	16.0	259	3.0	3.0	4.5	10.0	1.5%	CONCRETE	17.0	381	SEE SHEET 8.3
29	82+92.70, 12.0' LT	9831 SE LINWOOD AVE	12.5	208	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	17.0 (G) 3.0 (C)	403 (G) 41 (C)	SEE SHEET 8.6
29	83+52.59, 12.0' LT	9831 SE LINWOOD AVE	12.0	193	3.0	1.2	4.5	10.0	1.5%	GRAVEL CONCRETE	9.9 (G) 3.0 (C)	91 (G) 35 (C)	-6.5%
30	83+67.99, 12.0' LT	9815 SE LINWOOD AVE	12.0	193	1.2	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	2.5 (G) 3.0 (C)	25 (G) 32 (C)	-6.5%
30	84+18.80, 12.0' LT	9815 SE LINWOOD AVE	16.5	266	3.0	3.0	4.5	10.0	1.5%	ASPHALT	9.5	155	-6.5%
31	85+21.97, 12.0' LT	9799 SE LINWOOD AVE	13.0	216	3.0	3.0	4.5	10.0	1.5%	ASPHALT	3.0	36	0.4%
32	86+28.76, 12.0' LT	9731 SE LINWOOD AVE	13.0	215	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	17.0 (G) 3.0 (C)	269 (G) 39 (C)	SEE SHEET 8.6
33	86+47.26, 12.0' LT	9785 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	26.2 (G) 3.0 (C)	350 (G) 36 (C)	-6.5%
33	87+19.19, 12.0' LT	9785 SE LINWOOD AVE	16.0	259	3.0	3.0	4.5	10.0	1.5%	CONCRETE	24.5	392	SEE SHEET 8.6
34	87+72.30, 12.0' LT	9721 SE LINWOOD AVE	18.5	295	3.0	3.0	4.5	10.0	1.5%	CONCRETE	30.0	555	SEE SHEET 8.3
35	88+72.87, 12.0' LT	9595 SE LINWOOD AVE	15.0	244	3.0	3.0	4.5	10.0	1.5%	GRAVEL CONCRETE	22.0 (G) 3.0 (C)	329 (G) 46 (C)	-6.5%
35	89+23.55, 12.0' LT	9595 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	CONCRETE	20.0	220	-6.5%
36	89+60.67, 12.0' LT	9555 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	ASPHALT	20.0	225	SEE SHEET 8.6
36	90+00.95, 12.0' LT	9555 SE LINWOOD AVE	12.0	194	3.0	1.4	4.5	10.0	1.5%	GRAVEL CONCRETE	13.0 (G) 3.0 (C)	156 (G) 36 (C)	SEE SHEET 8.6
37	90+20.83, 12.0' LT	9531 SE LINWOOD AVE	20.0	310	1.4	3.0	4.5	10.0	1.5%	ASPHALT	22.1	468	-6.5%
38	90+95.15, 13.3' LT	9509 SE LINWOOD AVE	16.0	230	3.0	3.0	VARIES	10.0	1.5%	CONCRETE	3.0	48	-20.2%
38	92+03.39, 15.0' LT	9509 SE LINWOOD AVE	14.5	203	2.7	2.0	3.0	10.0	1.5%	ASPHALT	1.5	22	8.1%
39	94+35.95, 14.0' LT	9421 SE LINWOOD AVE	16.1	368	10.0	10.0	0	VARIES	1.5%	CONCRETE	28.8	338	SEE SHEET 8.7
N/A	97+12.55, 18.0' LT	NO SITE ADDRESS	17.5	394	10.0	10.0	0	10.5	1.5%	ASPHALT	1.0	18	17.9%
44	96+82.96, 18.0' RT	NO SITE ADDRESS	20.5	322	10.0	10.0	0	10.5	1.5%	GRAVEL CONCRETE	11.4 (G) 3.0 (C)	186 (G) 59 (C)	SEE SHEET 8.7
45	94+76.55, 9.9' RT	9310 SE LINWOOD AVE	12.0	275	3.0	3.0	VARIES	10.0	-8.8%	ASPHALT	4.5	72	11.7%
47	91+44.53, 9.6' RT	NO SITE ADDRESS	16.0	322	3.0	3.0	VARIES	10.0	6.8%	GRAVEL CONCRETE	4.4 (G) 3.0 (C)	70 (G) 48 (C)	13.5%
49	90+12.60, 12.0' RT	9624 SE LINWOOD AVE	32.5	445	6.0	6.0	0.0	10.0	1.5%	ASPHALT	7.0	228	SEE SHEET 8.4
51	87+67.11, 12.0' RT	9710 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	CONCRETE	10.1	120	0.5%
53 52	87+01.41, 12.0' RT	9724 SE LINWOOD AVE 9714 SE LINWOOD AVE	12.0	165	3.0	3.0	2.5	10.0	1.5%	ASPHALT	25.0	275	-6.5%
54	86+76.63, 12.0' RT	9720 SE LINWOOD AVE	20.0	265	3.0	3.0	2.5	10.0	1.5%	EXPOSED AGGREGATE CONCRETE	25.0	690	SEE SHEET 8.4

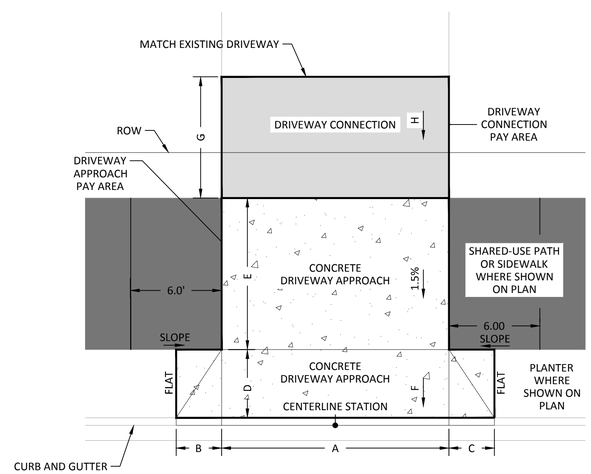
DRIVEWAY CONSTRUCTION TABLE

LOCATION			CONCRETE DRIVEWAY APPROACH							DRIVEWAY CONNECTION			
PROPERTY NUMBER	STATION "L"	ADDRESS	"A" APPROACH WIDTH	APPROACH AREA (SF)	"B" WING WIDTH	"C" WING WIDTH	"D" APPROACH LENGTH	"E" PATHWAY LENGTH	"F" APPROX. SLOPE	FINISH SURFACE	"G" ESTIMATED LENGTH	ESTIMATED AREA (SF)	"H" APPROX. SLOPE
55	85+49.47, 12.0' RT	9730 SE LINWOOD AVE	18.5	295	3.0	3.0	4.5	10.0	9.7%	ASPHALT	10.0	197	13.5%
56	84+49.25, 12.0' RT	9800 SE LINWOOD AVE	14.5	237	3.0	3.0	4.5	10.0	9.7%	ASPHALT	3.0	44	9.5%
57	84+13.11, 12.0' RT	9770 SE LINWOOD AVE	17.0	274	3.0	3.0	4.5	10.0	9.7%	CONCRETE	3.0	51	17.8%
59	82+39.60, 12.0' RT	9866 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	9.7%	ASPHALT	15.4	165	0.5%
60	81+62.56, 12.0' RT	9874 SE LINWOOD AVE	20.0	252	3.0	3.0	2.0	10.0	22.0%	CONCRETE	29.3	583	SEE SHEET 8.5
62	79+47.06, 12.0' RT	9900 SE LINWOOD AVE	14.0	230	3.0	3.0	4.5	10.0	1.5%	CONCRETE	2.1 (G) 3.0 (C)	23 (G) 38 (C)	13.5%
63	78+99.18, 12.0' RT	9916 SE LINWOOD AVE	18.0	288	3.0	3.0	4.5	10.0	1.5%	ASPHALT	3.0	54	3.1%
64	78+07.34, 12.0' RT	9922 SE LINWOOD AVE	17.8	285	3.0	3.0	4.5	10.0	1.5%	CONCRETE	3.0	53	11.9%
65	77+77.33, 12.0' RT	9940 SE LINWOOD AVE	22.5	353	3.0	3.0	4.5	10.0	1.5%	ASPHALT	3.0	67	8.3%
66	75+46.64, 12.0' RT	10032 SE LINWOOD AVE	18.0	288	3.0	3.0	4.5	10.0	1.5%	CONCRETE	20.0	361	-6.5%
69**	70+52.09, 29.0' RT	NO SITE ADDRESS	41.9	497	10.0	10.0	0	8.0	1.5%	ASPHALT	8.9	391	1.2%
72	66+22.34, 29.4' RT	6211 SE QUEEN RD	20.0	320	10.0	10.0	0	8.0	1.5%	CONCRETE	3.0	60	14.1%
72	65+13.4, 23.8' RT	6211 SE QUEEN RD	29.0	392	10.0	10.0	0	8.0	1.5%	CONCRETE	20.8	604	SEE SHEET 7.3
74	62+02.70, 12.0' RT	6209 SE JACK RD	12.0	201	3.0	3.0	4.5	10.0	1.5%	N/A	N/A	N/A	N/A
75	59+16.73, 12.0' RT	10618 SE LINWOOD AVE	12.0	201	3.0	3.0	4.5	10.0	1.5%	ASPHALT	19.5	206	-6.5%

PUBLIC INTERSECTION DRIVEWAY CONSTRUCTION TABLE

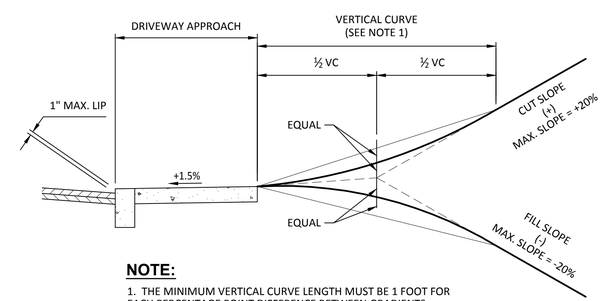
LOCATION		CONCRETE DRIVEWAY APPROACH							DRIVEWAY CONNECTION			
STATION "L"	INTERSECTION	"A" APPROACH WIDTH	APPROACH AREA (SF)	"B" WING WIDTH	"C" WING WIDTH	"D" APPROACH LENGTH	"E" PATHWAY LENGTH	"F" APPROX. SLOPE	FINISH SURFACE	"G" ESTIMATED LENGTH	ESTIMATED AREA (SF)	"H" APPROX. SLOPE
*76+47.25, 12.0' RT	SE STEEN CT	28.0	433	3.0	3.0	4.5	10.0	1.5%	ASPHALT	63.8	1791	SEE SHEET 5.4A
*78+11.48, 12.0' LT	SE TRONA LN	22.0	346	3.0	3.0	4.5	10.0	1.5%	CONCRETE/ GRAVEL	8.0 (C) 10.0 (G)	176 (C) 25 (G)	SEE SHEET 5.4A
*83+54.80, 12.0' RT	SE NEEDHAM CT	24.0	375	3.0	3.0	4.5	10.0	1.5%	ASPHALT	5.8	127	SEE SHEET 5.5A

* DENOTES REINFORCED CONCRETE DRIVEWAY SECTION. SEE SHEET 6.0 FOR SECTION DETAIL.
** DENOTES REINFORCED CONCRETE DRIVEWAY SECTION WITH RAPID SET CONCRETE. SEE SHEET 6.0 FOR SECTION DETAIL.



TYPICAL DRIVEWAY

N.T.S.



NOTE:

1. THE MINIMUM VERTICAL CURVE LENGTH MUST BE 1 FOOT FOR EACH PERCENTAGE POINT DIFFERENCE BETWEEN GRADIENTS.

CUT SLOPE EXAMPLE: +2% - (+20%) = 18' VC
FILL SLOPE EXAMPLE: +2% - (-20%) =22' VC

TYPICAL DRIVEWAY GRADIENT

N.T.S.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

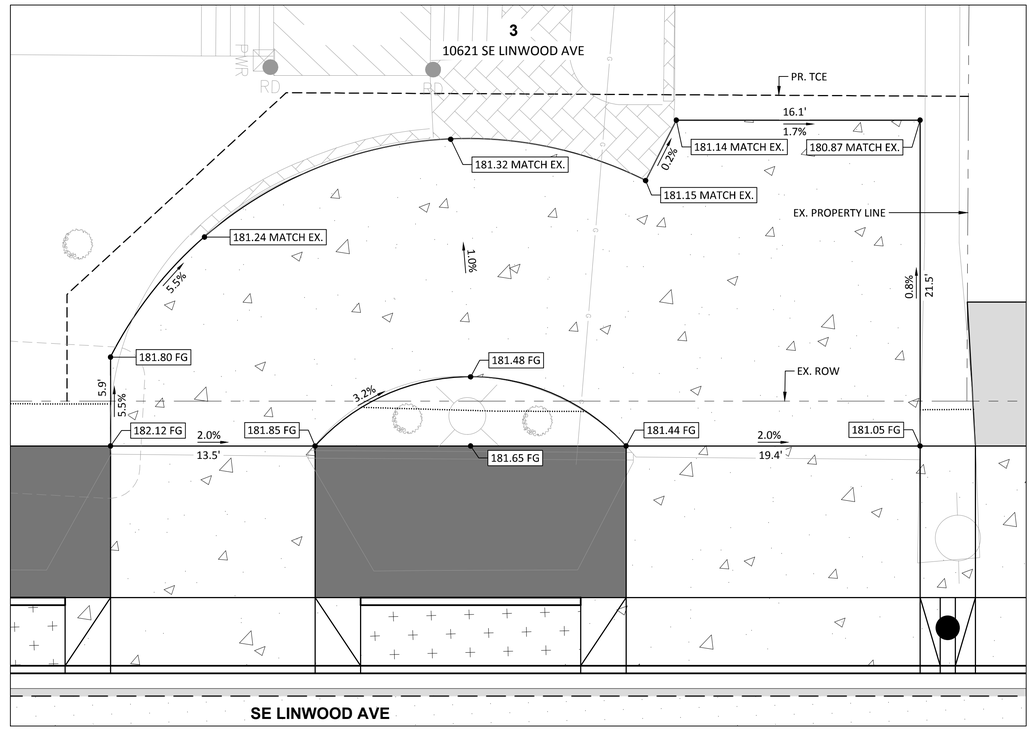
DETAILED DRIVEWAY GRADING

LINWOOD AVENUE IMPROVEMENTS

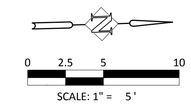
CLACKAMAS COUNTY, OREGON

SHEET NO. 8.0

JOB NO. CLA-93



PROPERTY 3



P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

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150 BEAVERCREEK ROAD
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DETAILED DRIVEWAY GRADING

LINWOOD AVENUE IMPROVEMENTS

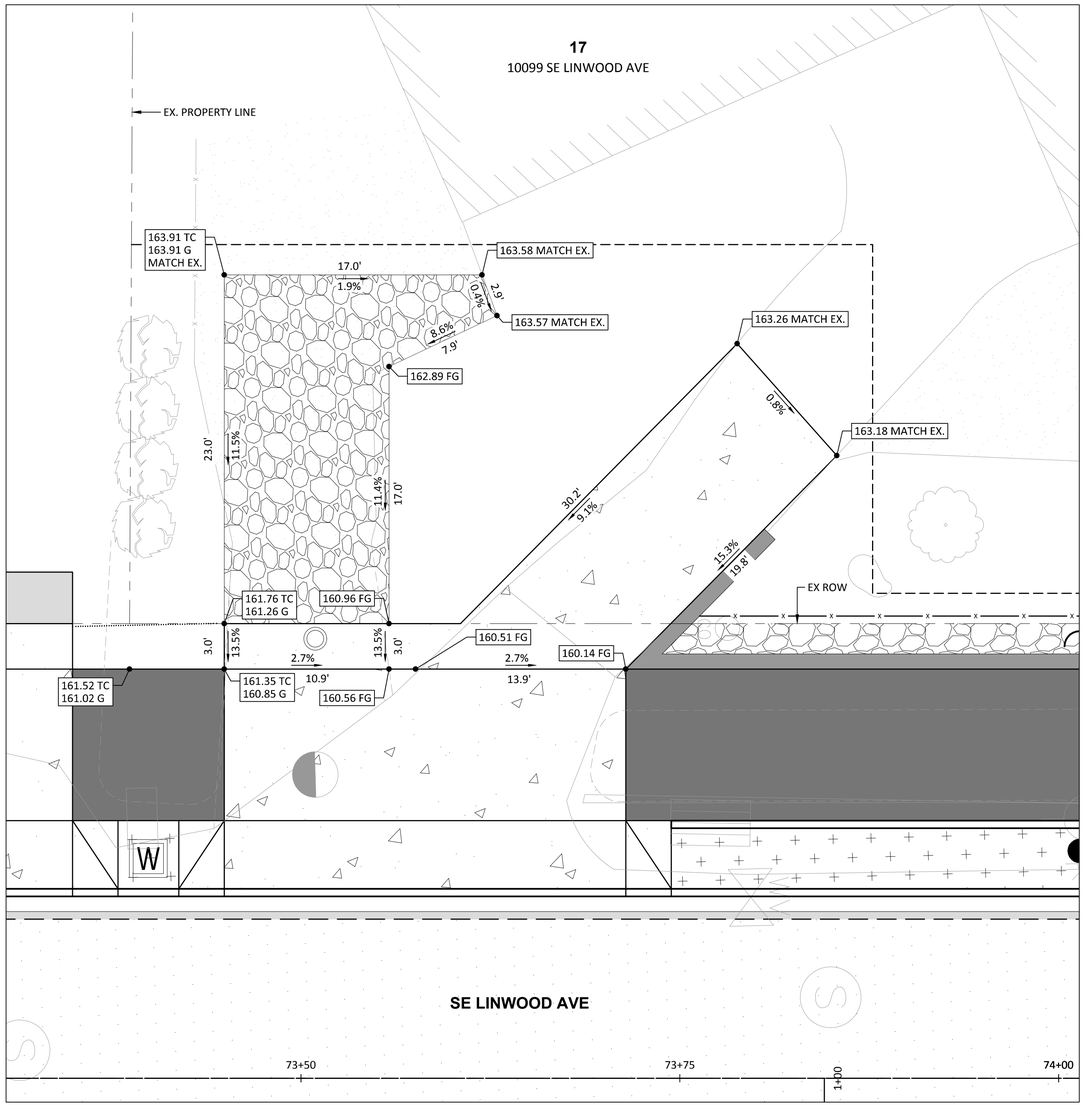
CLACKAMAS COUNTY, OREGON

SHEET NO. 8.1

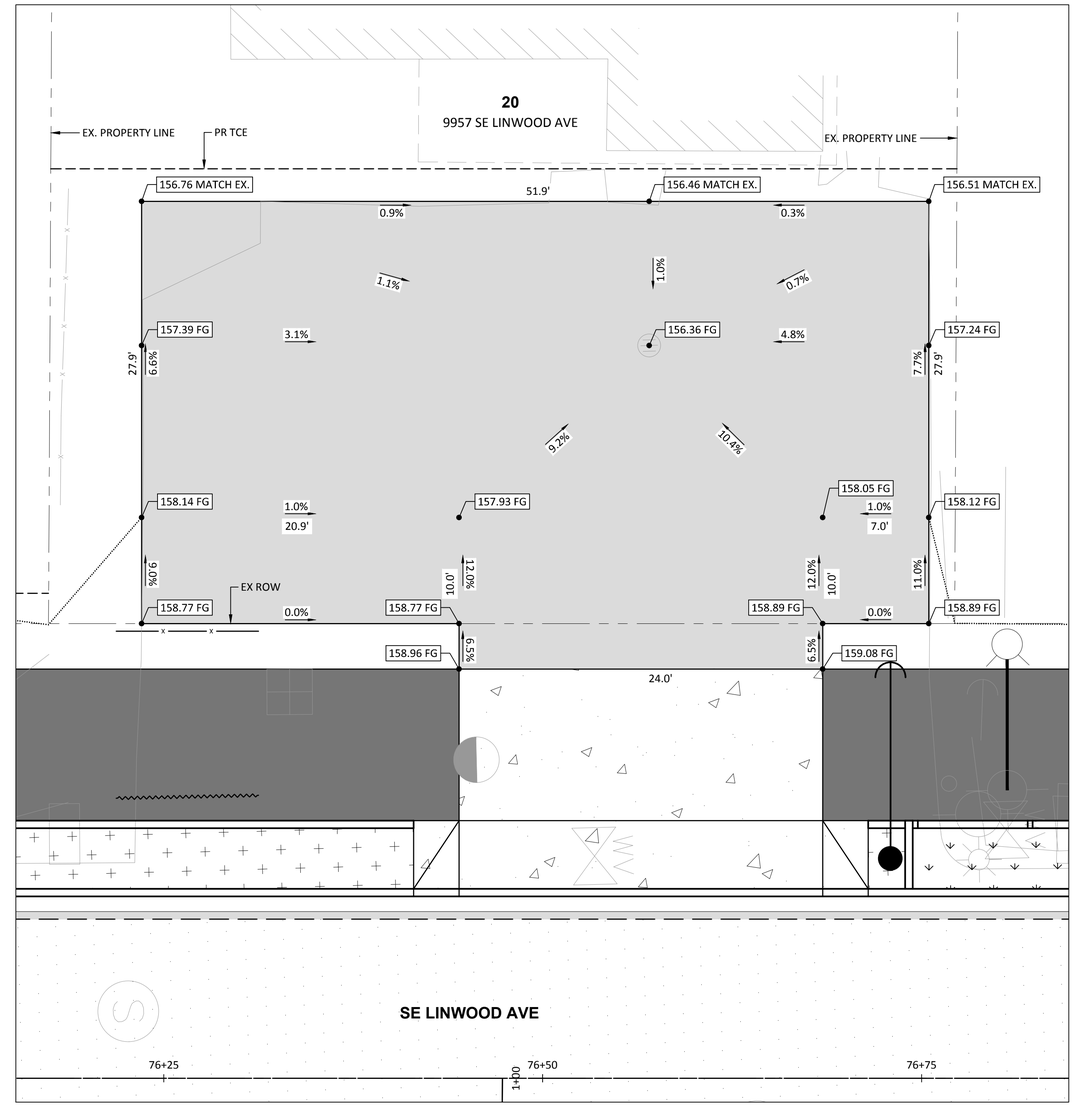
JOB NO. CLA-93

0 2.5 5 10

SCALE: 1" = 5 '



PROPERTY 17



PROPERTY 20

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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DETAILED DRIVEWAY GRADING

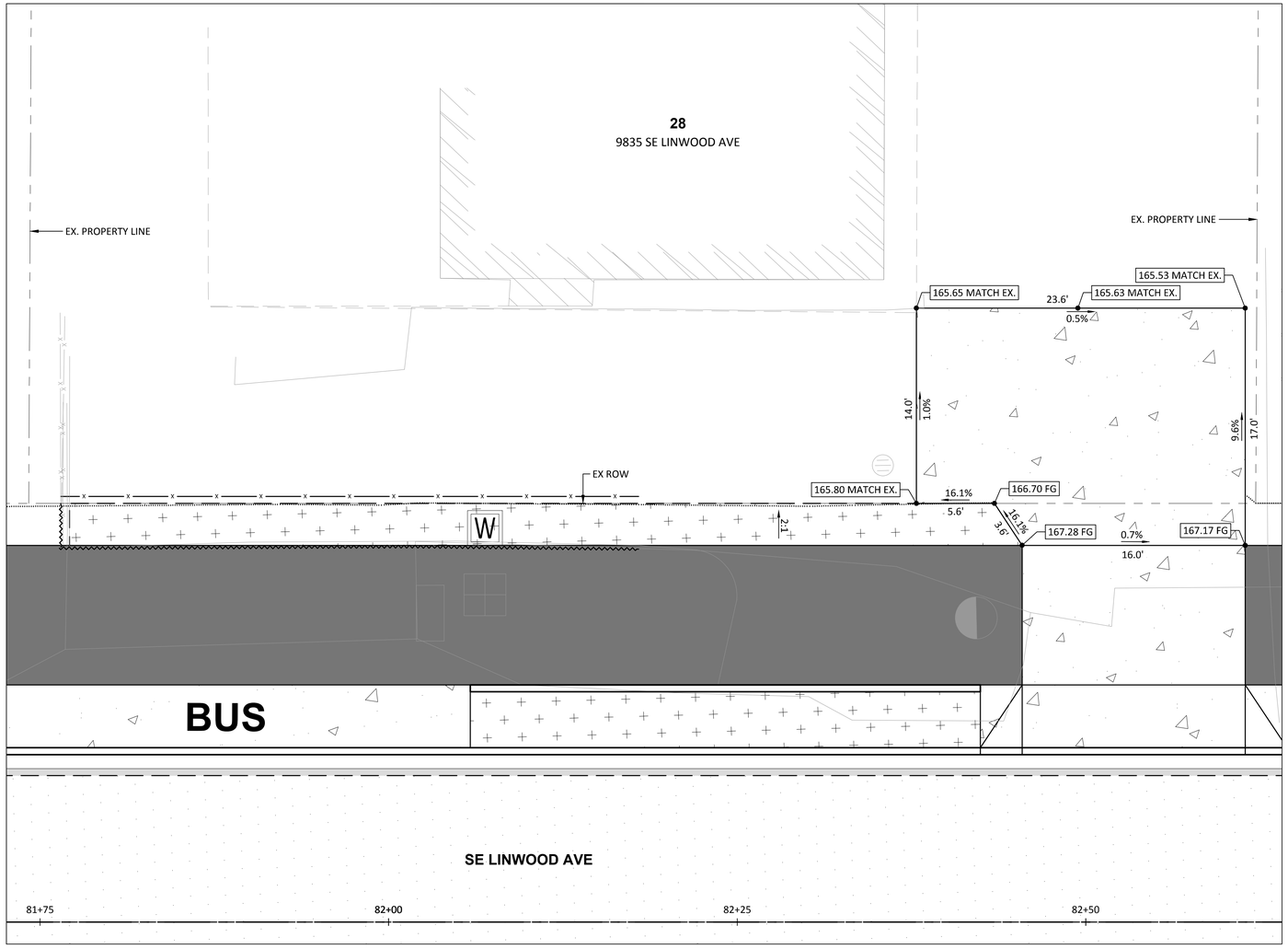
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

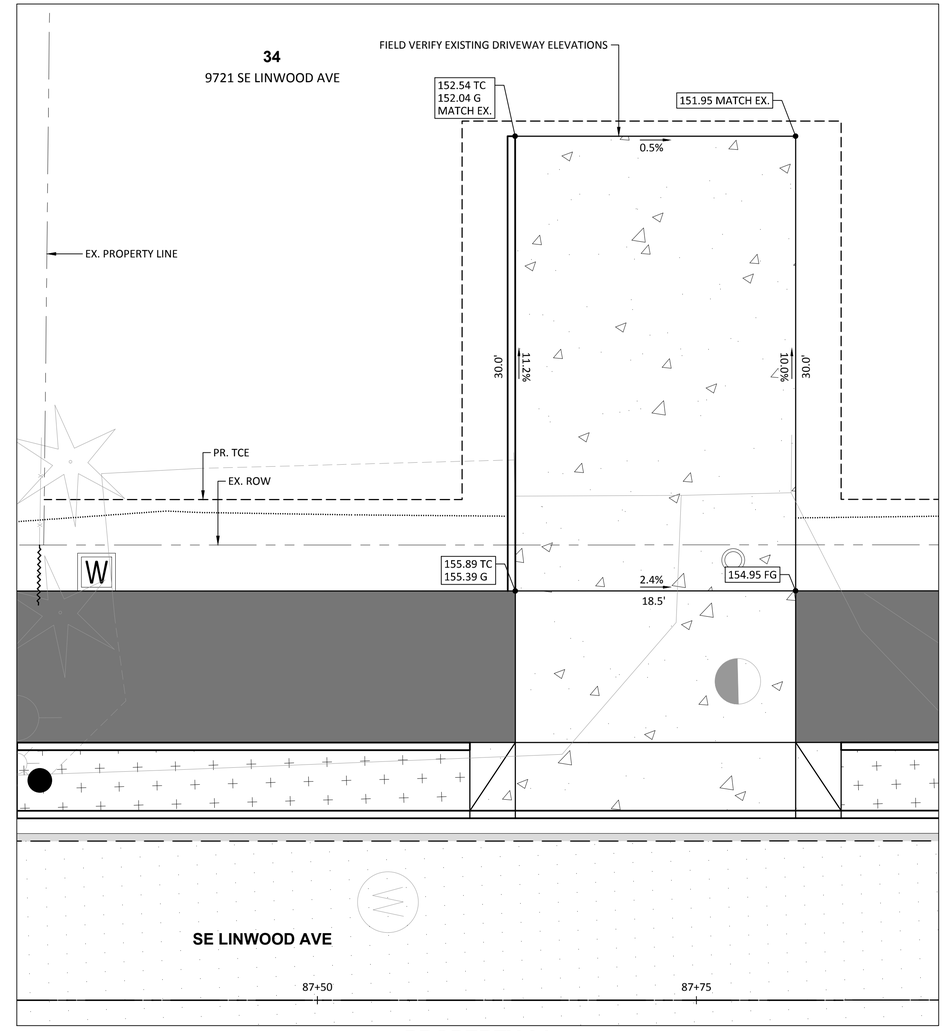
SHEET NO. 8.2

JOB NO. CLA-93

0 2.5 5 10
SCALE: 1" = 5 '



PROPERTY 28



PROPERTY 34

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-8.0 DETAILED GRADING PLANS.dwg

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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DETAILED DRIVEWAY GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.3

JOB NO. CLA-93

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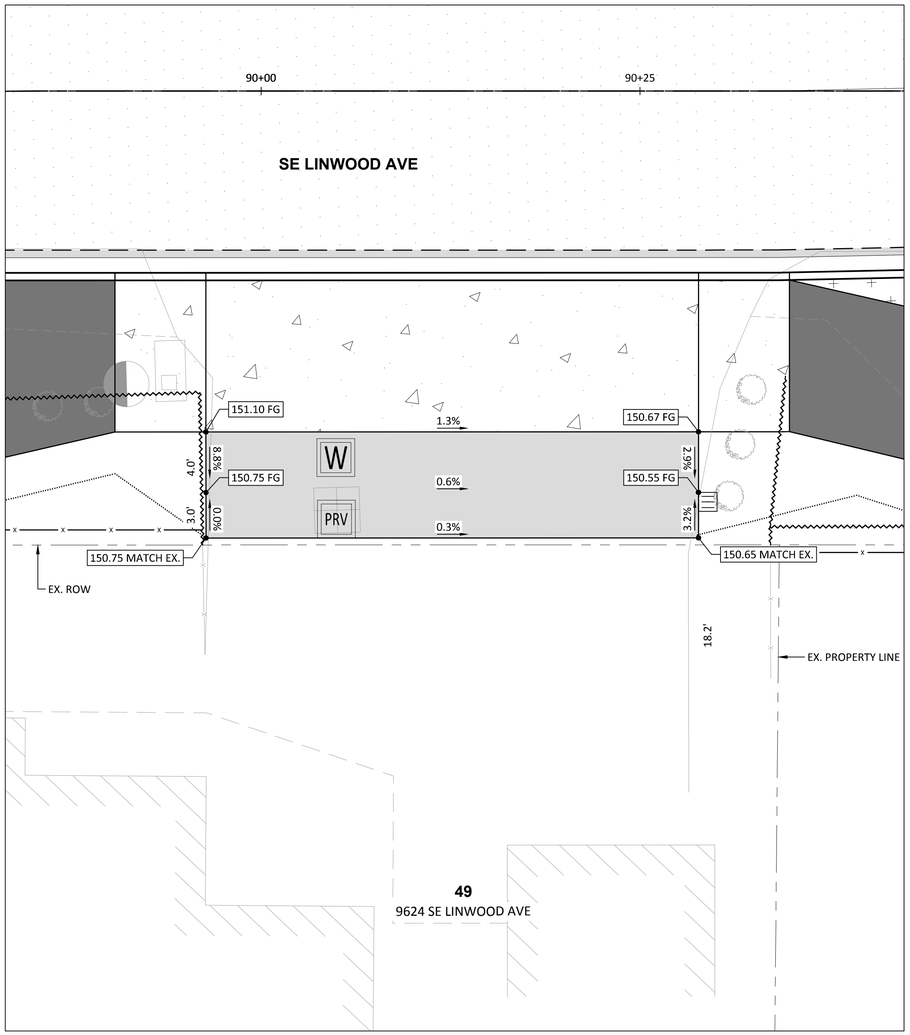
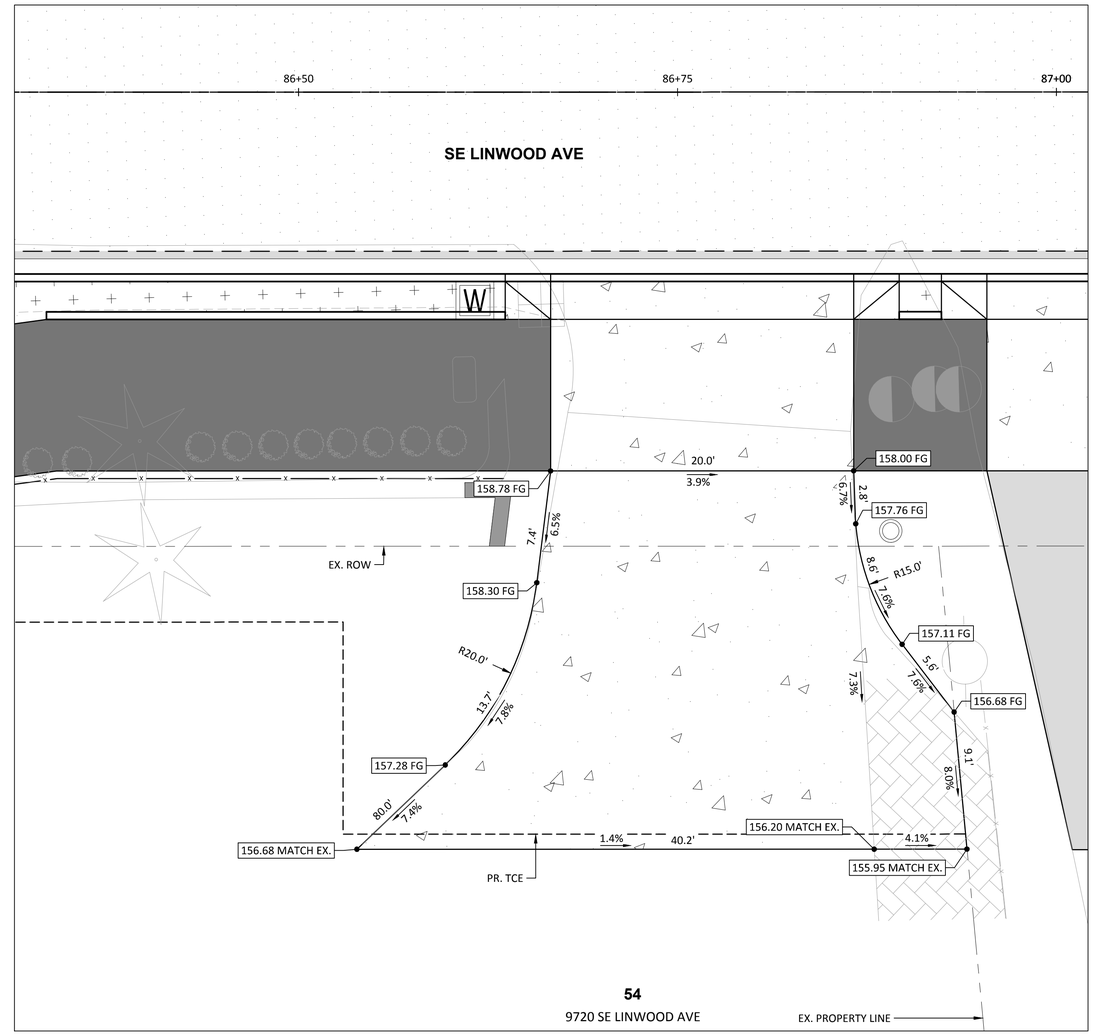


PROPERTY 49



PROPERTY 54

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

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CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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DETAILED DRIVEWAY GRADING

LINWOOD AVENUE IMPROVEMENTS

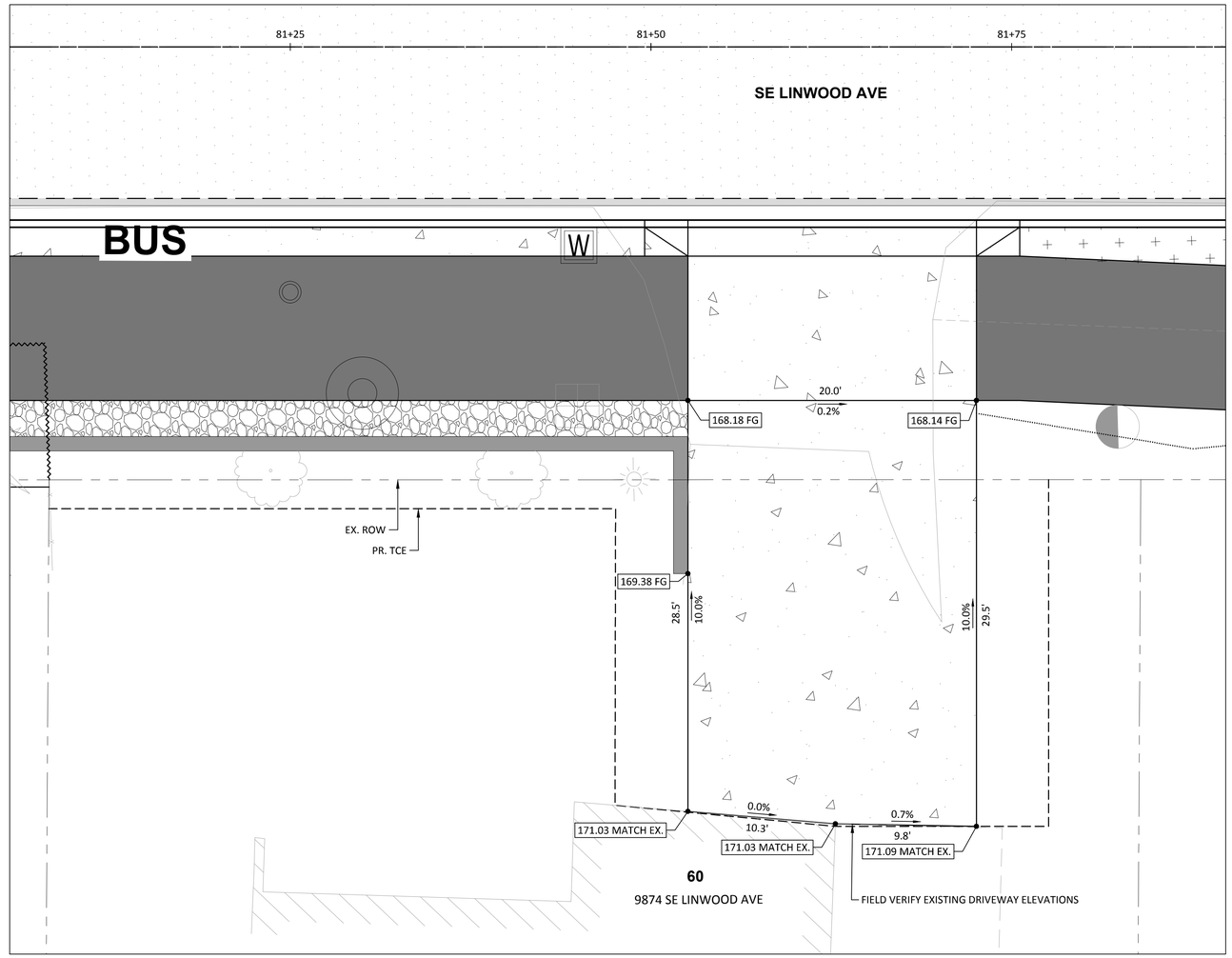
CLACKAMAS COUNTY, OREGON

SHEET NO. 8.4

JOB NO. CLA-93

0 2.5 5 10

SCALE: 1" = 5 '



PROPERTY 60

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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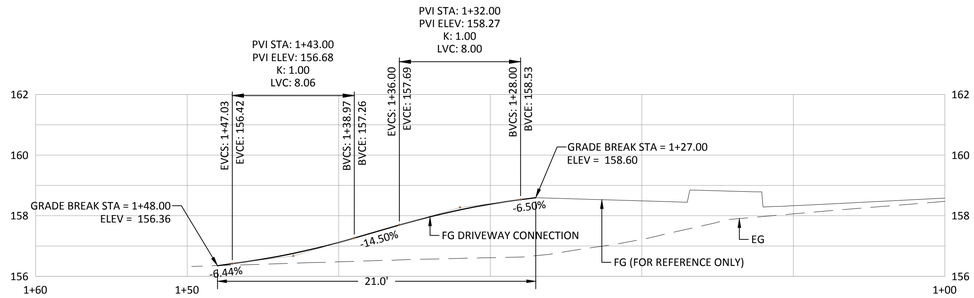
DETAILED DRIVEWAY GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

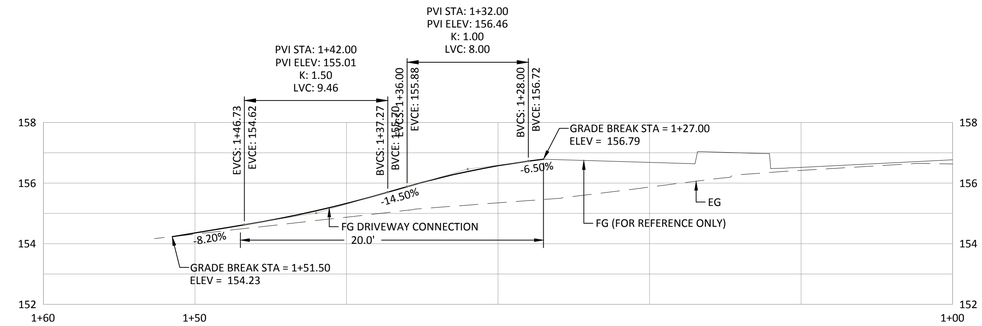
SHEET NO. 8.5

JOB NO. CLA-93



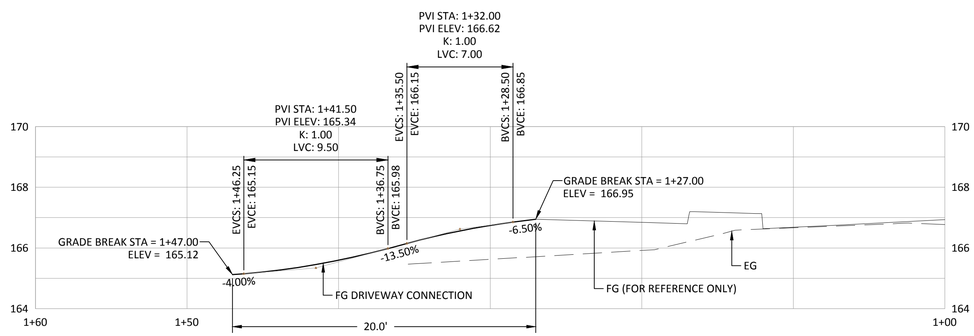
PROPERTY 19 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



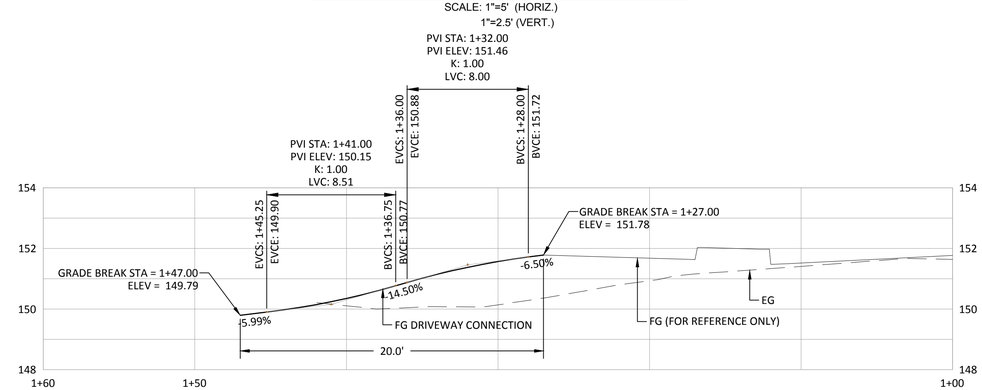
PROPERTY 33 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



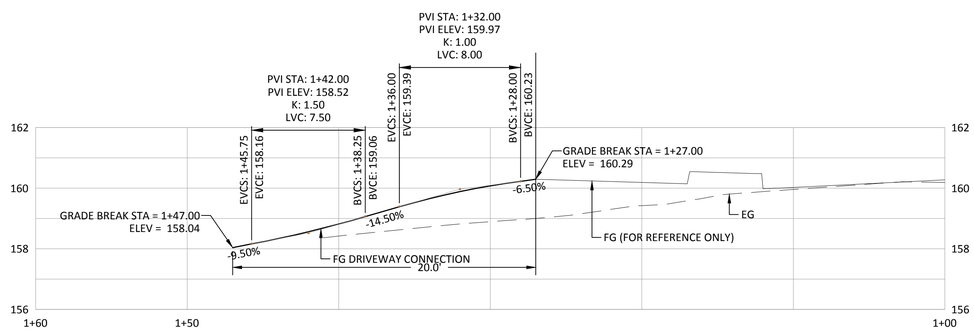
PROPERTY 29 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



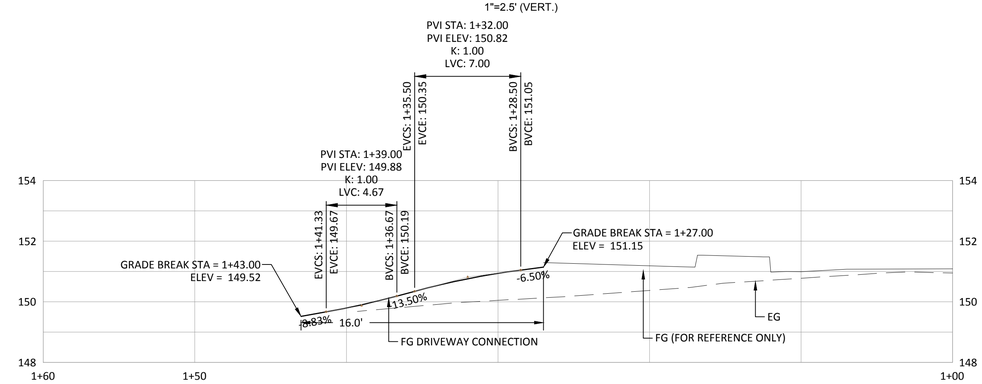
PROPERTY 36 - SOUTH DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



PROPERTY 32 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



PROPERTY 36 - NORTH DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED:	HHPR TEAM
DRAWN:	HHPR TEAM
CHECKED:	DSH/JSH
DATE:	11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

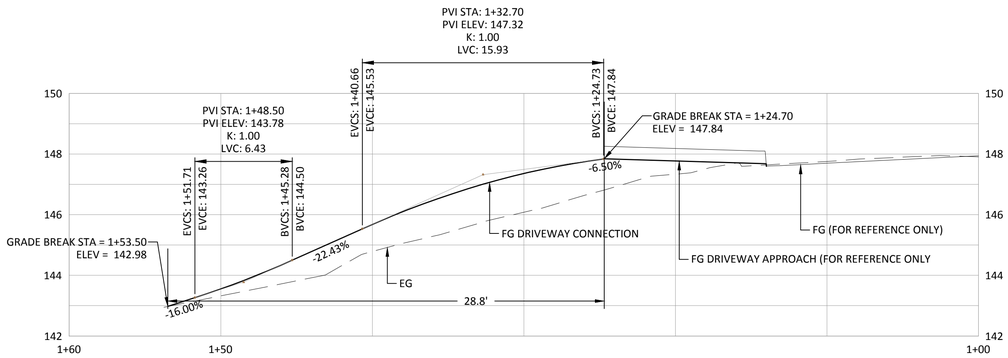
DRIVEWAY CONNECTION PROFILES

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

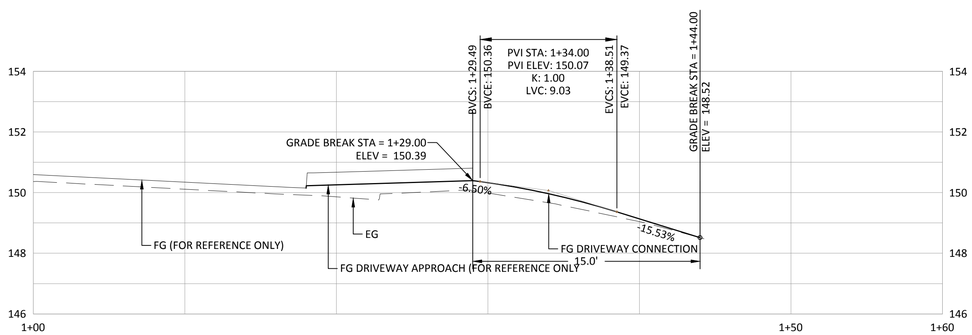
SHEET NO. 8.6

JOB NO. CLA-93



PROPERTY 39 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)



PROPERTY 44 - DRIVEWAY PROFILE

SCALE: 1"=5' (HORIZ.)
1"=2.5' (VERT.)

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED GRADING PLANS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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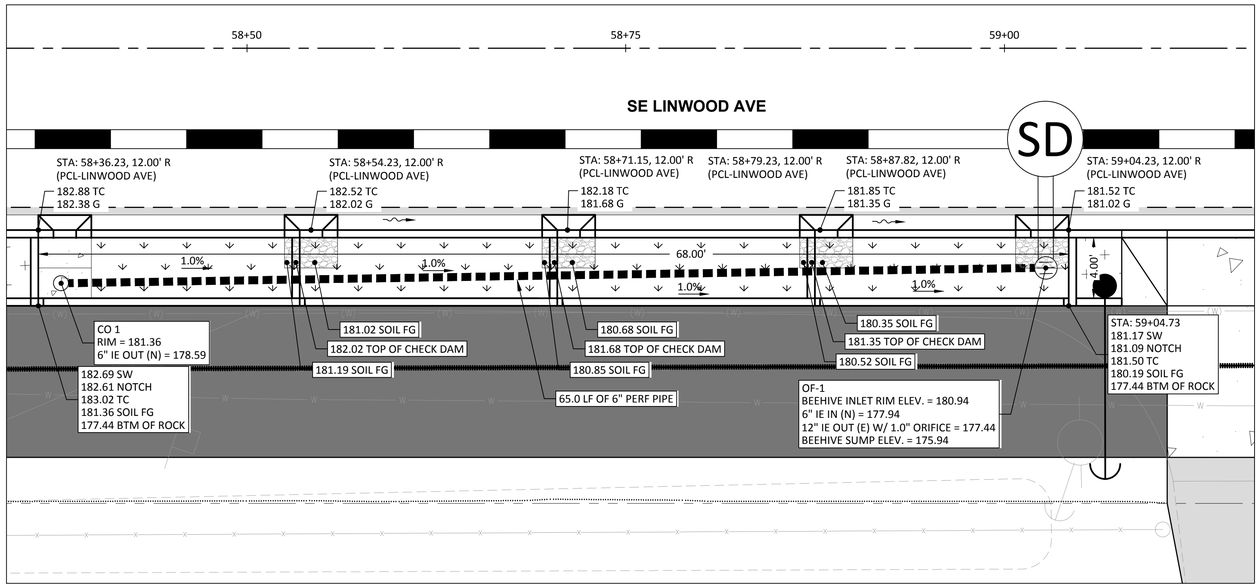
DRIVEWAY CONNECTION PROFILES

LINWOOD AVENUE IMPROVEMENTS

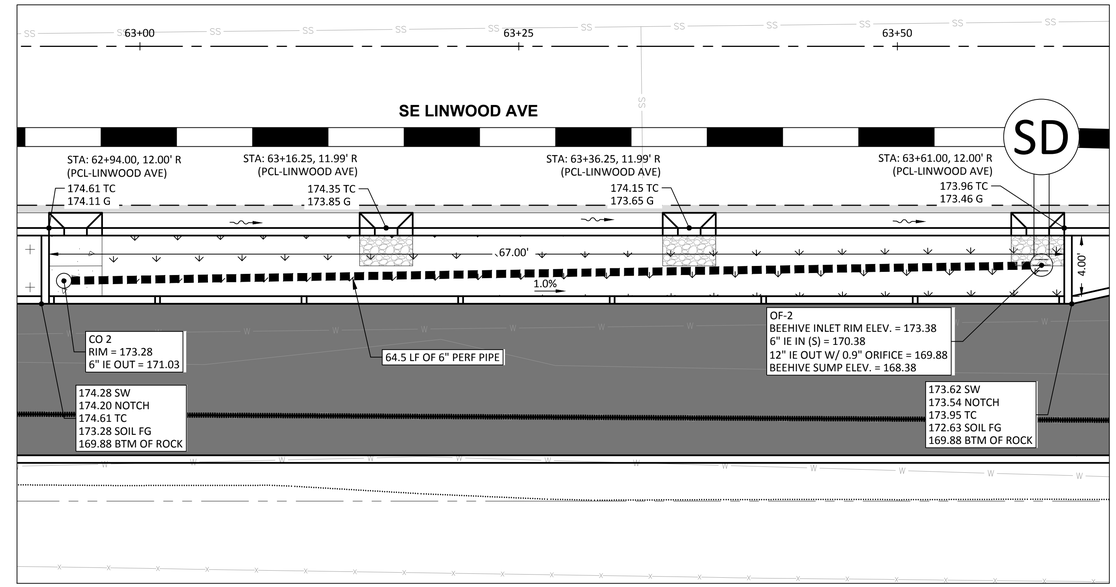
CLACKAMAS COUNTY, OREGON

SHEET NO. 8.7

JOB NO. CLA-93



PLANTER 1



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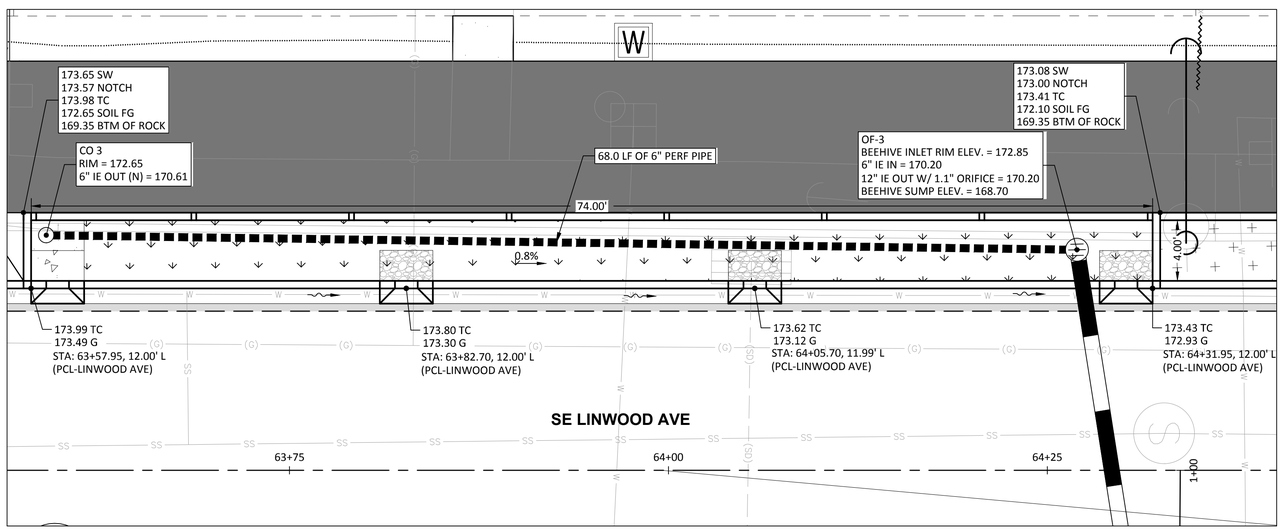

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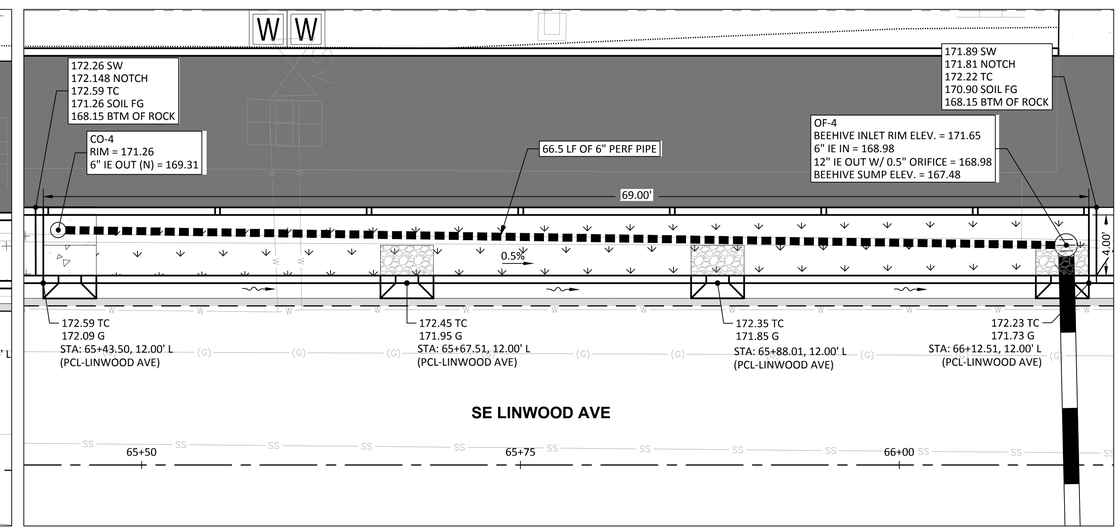

PLANTER 4

0 2.5 5 10

SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg

PREPARED FOR

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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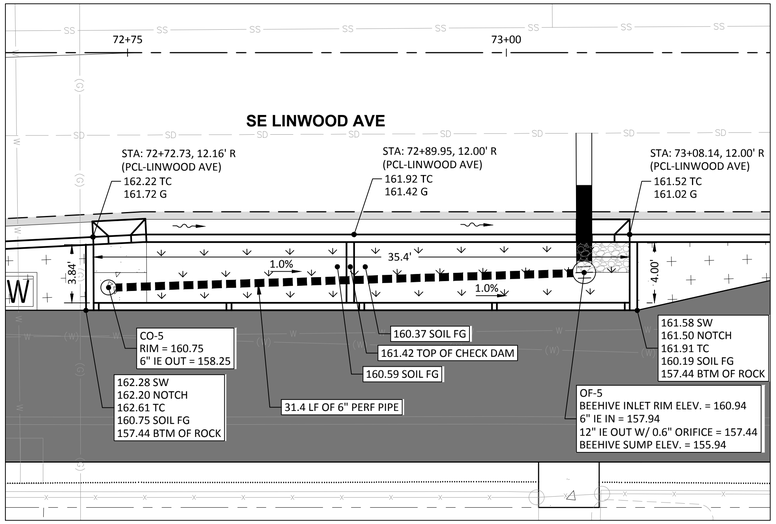
DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.8

JOB NO. CLA-93



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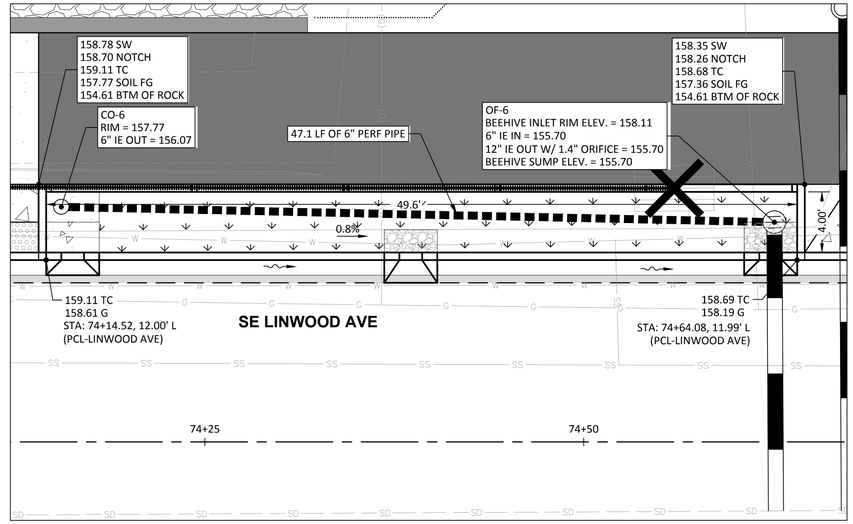

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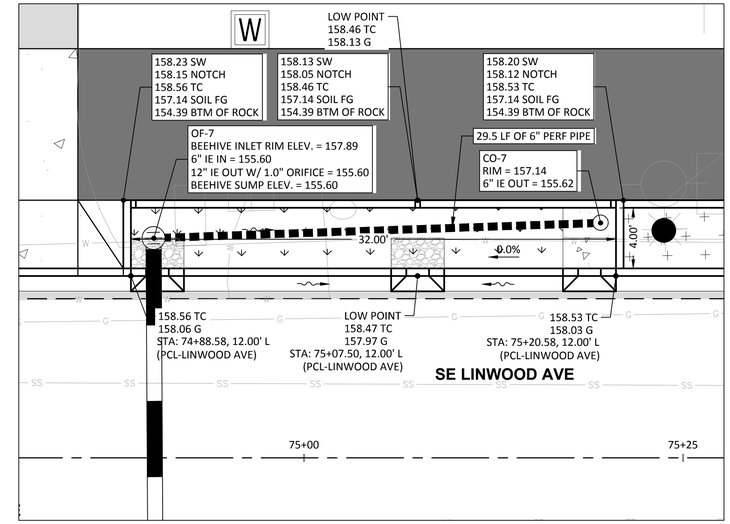

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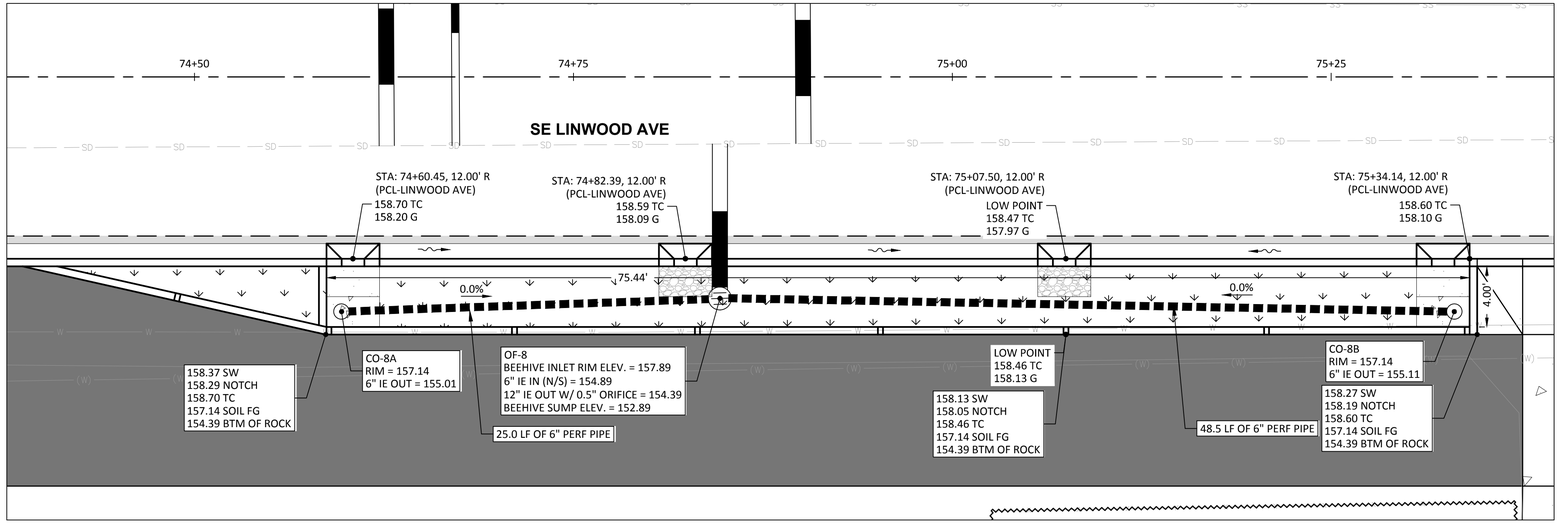
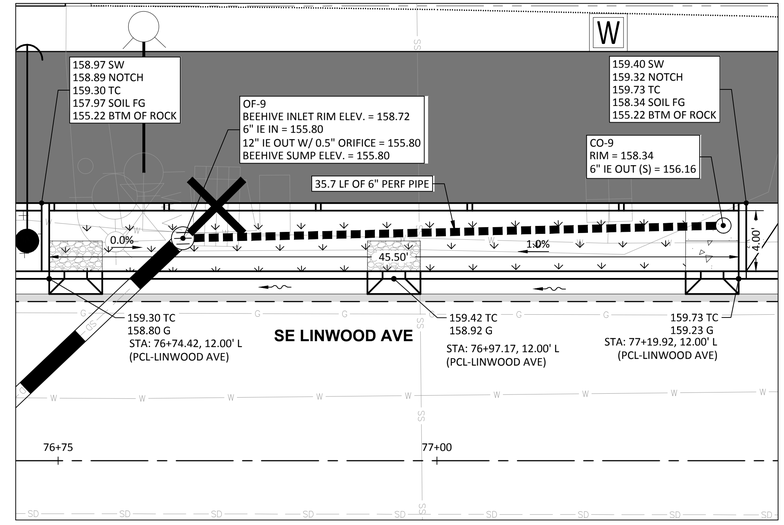


PLANTER 8



PLANTER 9

0 2.5 5 10

SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-8.0 DETAILED PLANTER GRADING.dwg

PREPARED FOR

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DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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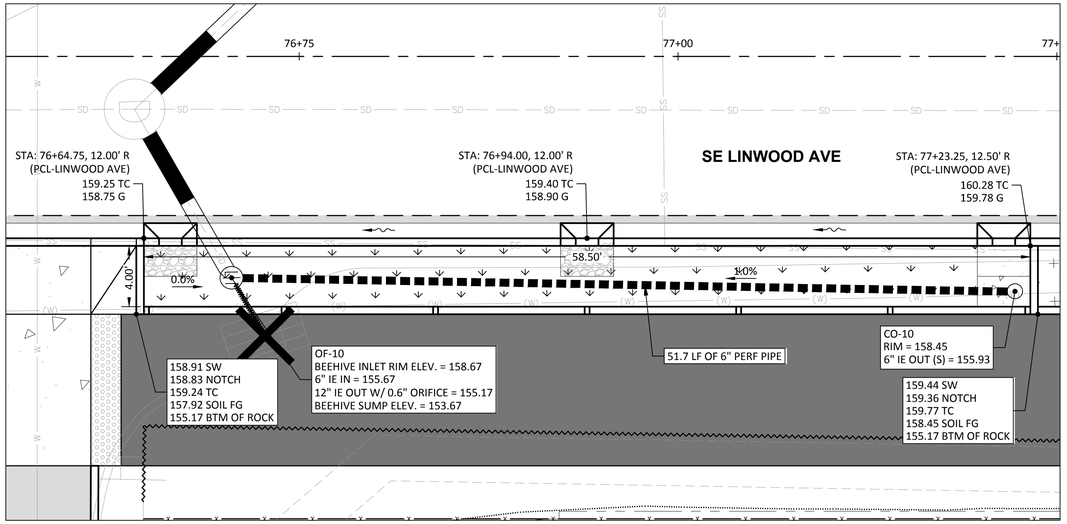
DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

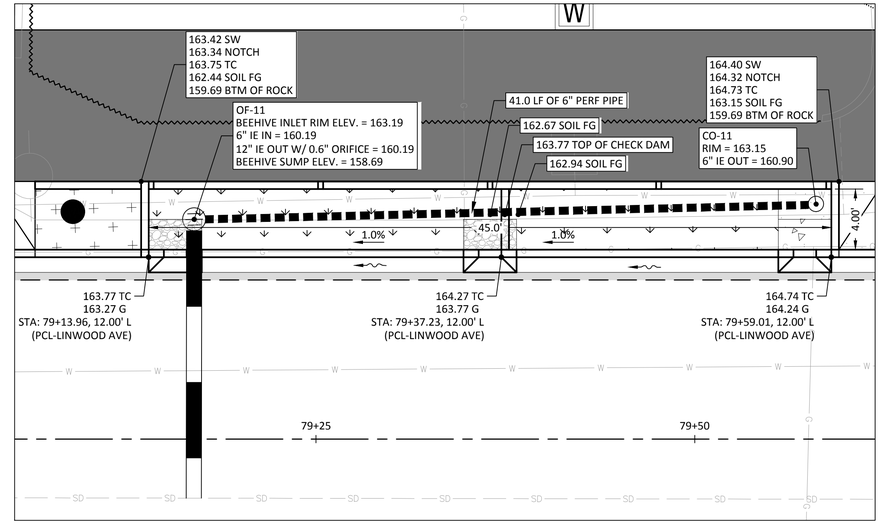
CLACKAMAS COUNTY, OREGON

SHEET NO. 8.9

JOB NO. CLA-93



PLANTER 10



PLANTER 11

0 2.5 5 10

SCALE: 1" = 5 '

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
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150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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DETAILED PLANTER GRADING

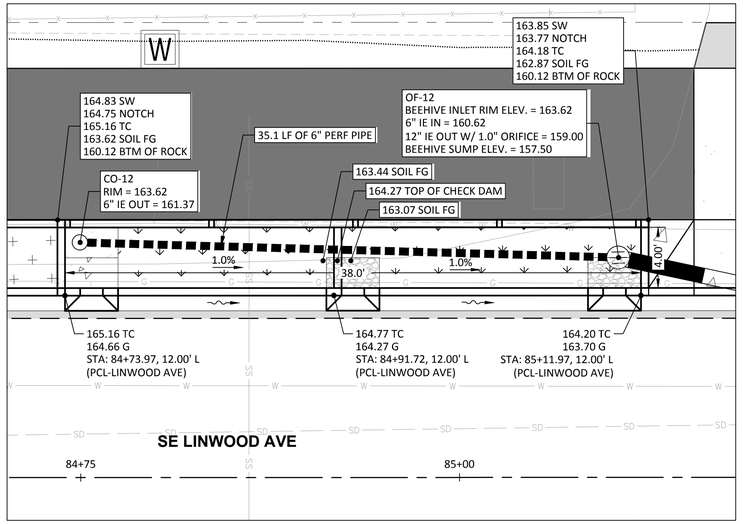
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.10

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg



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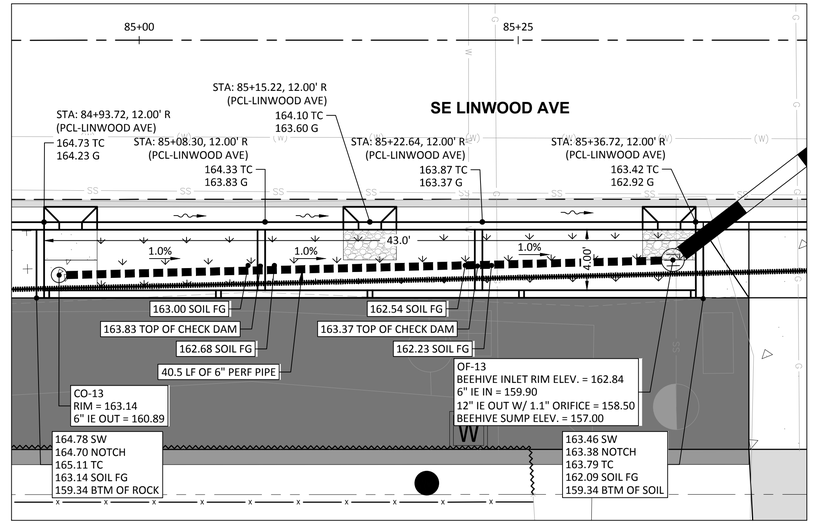

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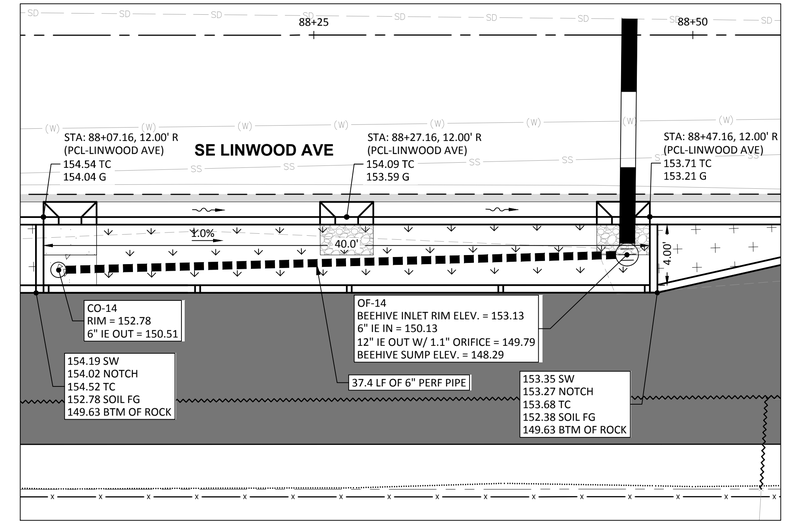

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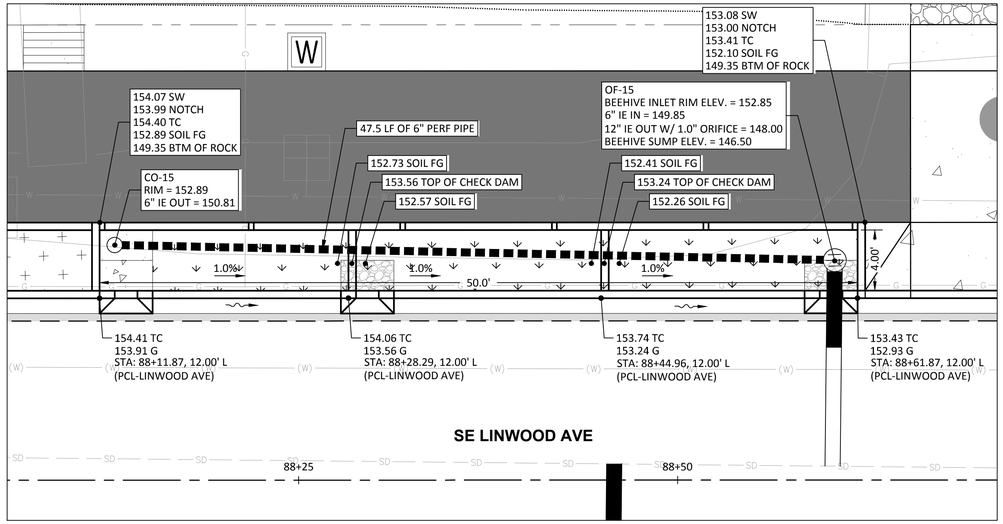

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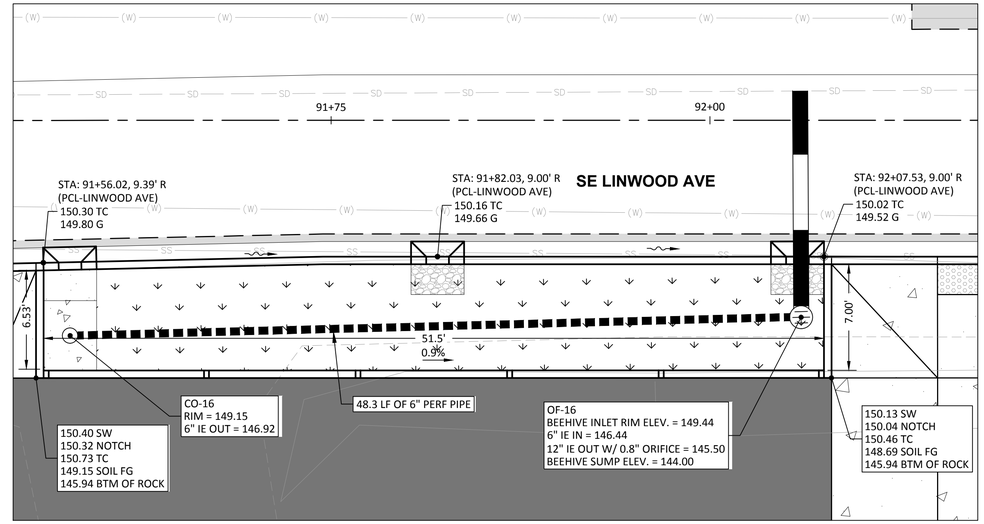

PLANTER 16

0 2.5 5 10

SCALE: 1" = 5 '

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-8.0 DETAILED PLANTER GRADING.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
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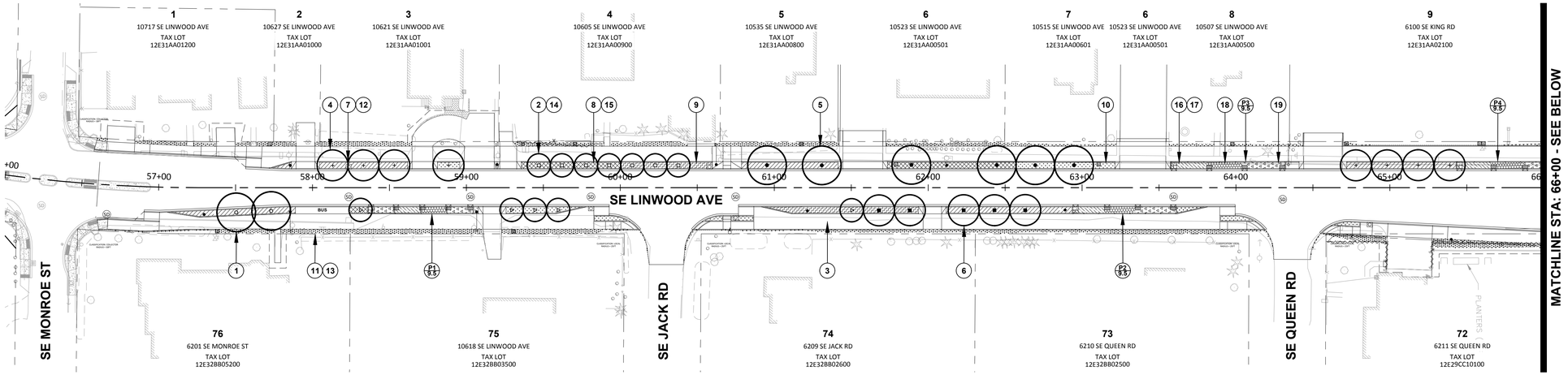
DETAILED PLANTER GRADING

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 8.11

JOB NO. CLA-93

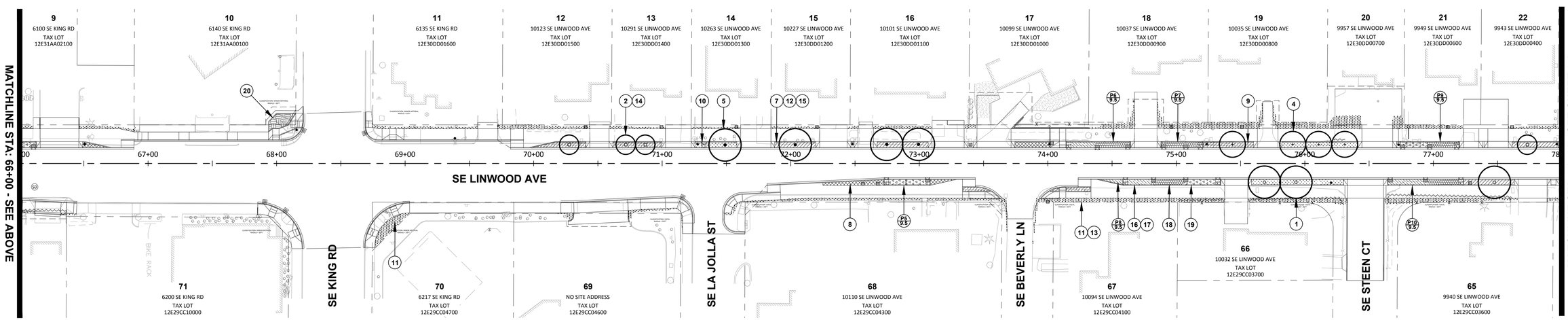


LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

CONSTRUCTION NOTES:

1	INSTALL MAGNOLIA GRANDIFLORA "DD BLANCHARD' AS SHOWN - 1.5" CAL	5 EA
2	INSTALL AMELANCHIER GRANDIFLORA 'AUTUMN BRILLIANCE' AS SHOWN - 1.5" CAL	11 EA
3	INSTALL GINKGO BILOBA 'PRINCETON SENTRY' AS SHOWN - 1.5" CAL	5 EA
4	INSTALL ACER GRISEUM AS SHOWN - 1.5" CAL	12 EA
5	INSTALL CHIONANTHUS RETUSUS AS SHOWN - 1.5" CAL	10 EA
6	INSTALL MAAKIA AMURENSIS AS SHOWN - 1.5" CAL	5 EA
7	INSTALL COTONEASTER DAMMERI 'CORAL BEAUTY' 24" OC - #1 CONTAINER	252 EA
8	INSTALL EUONYMUS FORTUNEI 'COLORATUS' 24" OC - #1 CONTAINER	279 EA
9	INSTALL JUNIPERUS HORIZONTALIS 'WILTONII' 36" OC - #1 CONTAINER	147 EA
10	INSTALL FESTUCA GLAUCA 'ELIJA BLUE' 12" OC - SP#4 CONTAINER	1571 EA
11	INSTALL INSTALL PERMANENT SEEDING AS SHOWN	0.2 AC
12	INSTALL 12" DEEP TOPSOIL IN PLANTERS	201 CY
13	INSTALL 4" TOPSOIL IN SEEDED AREAS	79 CY
14	INSTALL 2' DEEP X 10' LONG ROOT BARRIER PER DETAIL SHEET 9.4	960 LF
15	INSTALL 3" DEEP BARK MULCH IN PLANTERS	151 SY
16	INSTALL 18" DEEP STORM WATER FACILITY GROWING MEDIA IN PLANTERS	128 CY
17	INSTALL ELEOCHARIS OVATA PER TABLE SHEET 9.5 - SP4 CONTAINER	766 EA
18	INSTALL JUNCUS PATENS PER TABLE SHEET 9.5 - SP4	1003 EA
19	INSTALL CAREX DENSA PER TABLE SHEET 9.5 - SP4	871 EA
20	INSTALL 3" BARK MULCH ONLY IN PLANTER	18 SY



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

0 20 40 80

SCALE: 1" = 40'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED LANDSCAPE ARCHITECT 747 JEFFERY P. CREEL OREGON 05/13/11

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

LANDSCAPE PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

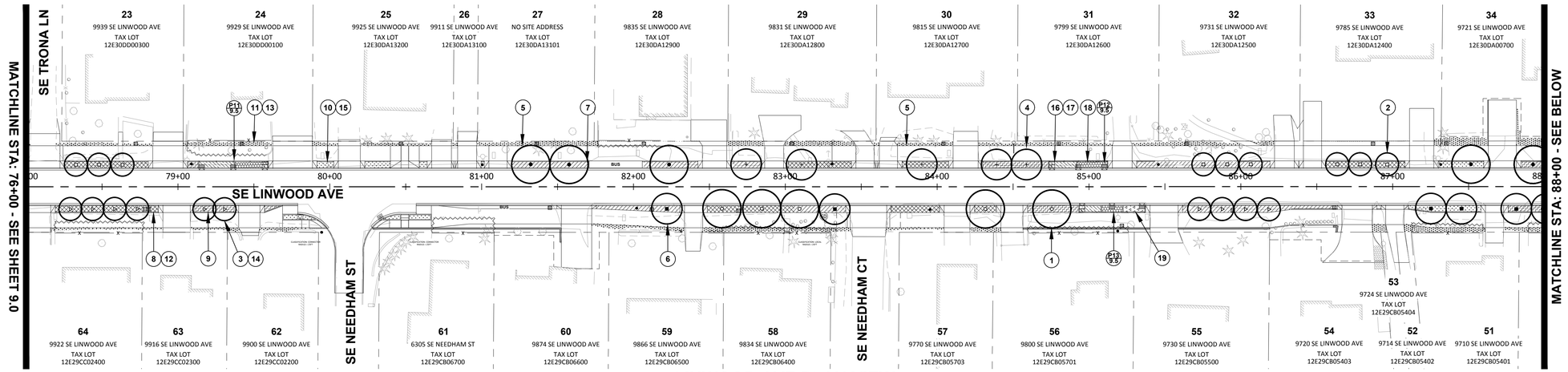
SHEET NO. 9.0

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-9.0 LANDSCAPE PLAN.dwg

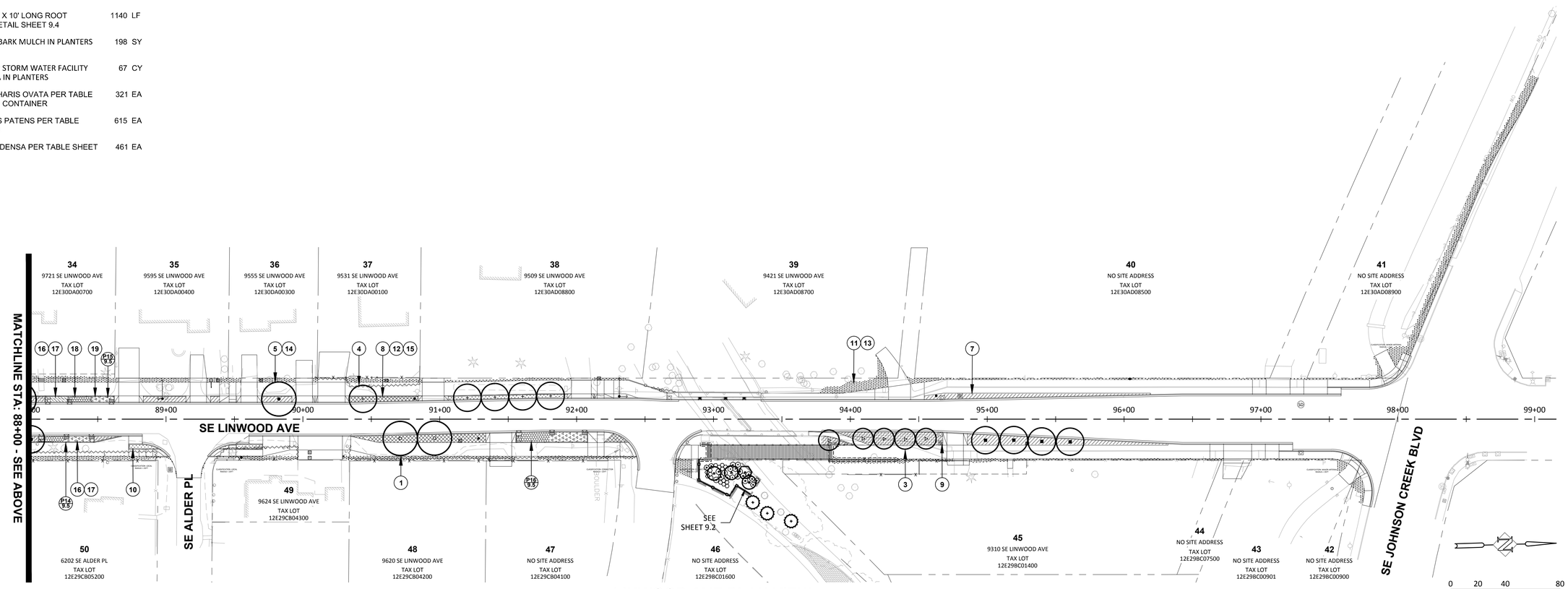
CONSTRUCTION NOTES:

1	INSTALL MAGNOLIA GRANDIFLORA "DD BLANCHARD' AS SHOWN - 1.5" CAL	7 EA
2	INSTALL AMELANCHIER GRANDIFLORA 'AUTUMN BRILLIANCE' AS SHOWN - 1.5" CAL	9 EA
3	INSTALL GINKGO BILOBA 'PRINCETON SENTRY' AS SHOWN - 1.5" CAL	15 EA
4	INSTALL ACER GRISEUM AS SHOWN - 1.5" CAL	10 EA
5	INSTALL CHIONANTHUS RETUSUS AS SHOWN - 1.5" CAL	6 EA
6	INSTALL MAAKIA AMURENSIS AS SHOWN - 1.5" CAL	10 EA
7	INSTALL COTONEASTER DAMMERI 'CORAL BEAUTY' 36" OC - #1 CONTAINER	340 EA
8	INSTALL EUONYMUS FORTUNEI 'COLORATUS' 36" OC - #1 CONTAINER	629 EA
9	INSTALL JUNIPERUS HORIZONTALIS 'WILTONII' 36" OC - #1 CONTAINER	187 EA
10	INSTALL FESTUCA GLAUCA 'ELIJA BLUE' 12" OC - SP#4 CONTAINER	971 EA
11	INSTALL INSTALL PERMANENT SEEDING AS SHOWN	0.2 AC
12	INSTALL 12" DEEP TOPSOIL IN PLANTERS	264 CY
13	INSTALL 4" TOPSOIL IN SEEDED AREAS	104 CY
14	INSTALL 2' DEEP X 10' LONG ROOT BARRIER PER DETAIL SHEET 9.4	1140 LF
15	INSTALL 3" DEEP BARK MULCH IN PLANTERS	198 SY
16	INSTALL 18" DEEP STORM WATER FACILITY GROWING MEDIA IN PLANTERS	67 CY
17	INSTALL ELEOCHARIS OVATA PER TABLE SHEET 9.5 - SP4 CONTAINER	321 EA
18	INSTALL JUNCUS PATENS PER TABLE SHEET 9.5 - SP4	615 EA
19	INSTALL CAREX DENSA PER TABLE SHEET 9.5 - SP4	461 EA



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-9.0 LANDSCAPE PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
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OREGON CITY, OR 97045

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DATE: 11-11-2022

REGISTERED LANDSCAPE ARCHITECT 747 JEFFERY P. CREEL OREGON 05/13/11

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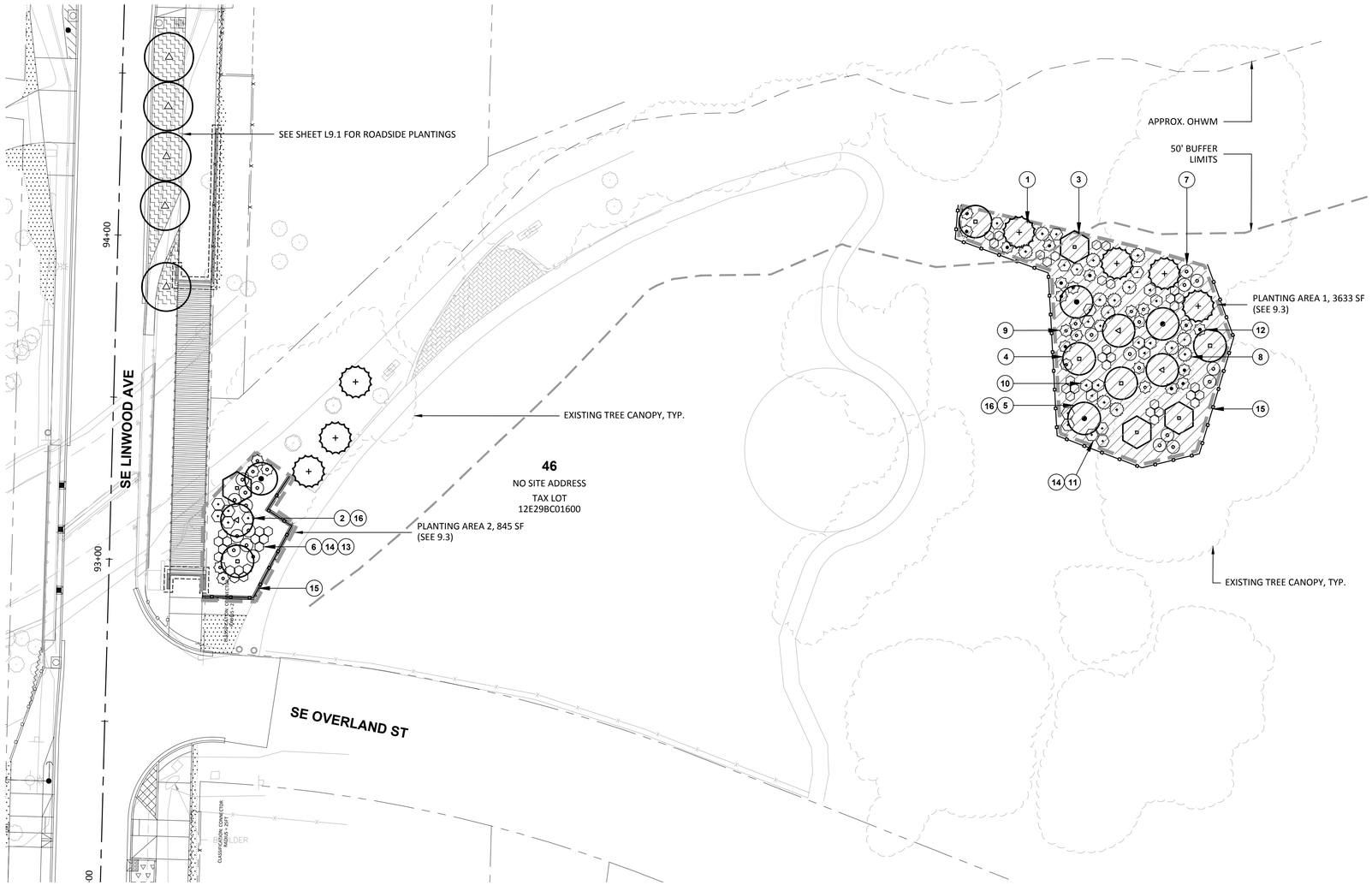
LANDSCAPE PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 9.1

JOB NO. CLA-93



MILL PARK PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

1	INSTALL **CALOCEDRUS DECURRENS** AS SHOWN - .5" CAL.	7 EA
2	INSTALL **PRUNUS EMARGINATA** AS SHOWN - .5" CAL.	3 EA
3	INSTALL **CORNUS NUTALLII** AS SHOWN - .5" CAL.	4 EA
4	INSTALL **RHAMNUS PURSHIANA** AS SHOWN - .5" CAL.	5 EA
5	INSTALL **ACER MACROPHYLLUM** AS SHOWN - .5" CAL.	4 EA
6	INSTALL **SYMPHORICARPOS ALBUS** AS SHOWN - NO.1 CONTAINER	45 EA
7	INSTALL **MAHONIA AQUIFOLIUM** AS SHOWN - NO.1 CONTAINER	20 EA
8	INSTALL **PHILADELPHUS LEWISII** AS SHOWN - NO.1 CONTAINER	13 EA
9	INSTALL **VACCINIUM OVATUM** AS SHOWN - NO.1 CONTAINER	13 EA
10	INSTALL **HOLDISCUS DISCOLOR** AS SHOWN - NO.1 CONTAINER	8 EA
11	INSTALL **RIBES SANGUINEUM** AS SHOWN - NO.1 CONTAINER	18 EA
12	INSTALL **ROSA NUTKANA** AS SHOWN - NO.1 CONTAINER	15 EA
13	PLACE 12" TOP SOIL IN PLANTING AREA	35 CY
14	INSTALL 3" DEEP BARK MULCH IN TREES AND SHRUB PLANTER BEDS	105 SY
15	INSTALL SPLIT RAIL FENCE. SEE DETAIL SHEET 9.4	262 LF
16	INSTALL TEMPORARY IRRIGATION FOR NEW PLANTINGS	1 LS

NOTE: COORDINATE WITH NORTH CLACKAMAS PARKS & RECREATION DISTRICT (NCPRD) FOR POINT OF CONNECTION FOR TEMPORARY IRRIGATION SYSTEM.

N

0 10 20 40

SCALE: 1" = 20'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-9.0 LANDSCAPE PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED LANDSCAPE ARCHITECT 747 JEFFERY P. CREEL OREGON 05/13/11

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
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LANDSCAPE PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 9.2

JOB NO. CLA-93

PLANT SCHEDULE - MILL PARK

PLANT AREA 1				
EVERGREEN TREES, .5" CAL.				
Calocedrus decurrens	Incense Cedar	No. 15 Container	as-shown	4
DECIDUOUS TREES, .5" CAL.				
Prunus emarginata	Bitter Cherry	No. 15 Container	as-shown	2
Cornus nutallii	Pacific Dogwood	No. 15 Container	as-shown	3
Rhamnus purshiana	Cascara	No. 15 Container	as-shown	4
Acer macrophyllum	Bigleaf Maple	No. 15 Container	as-shown	3
			Total Trees	16
SHRUBS, NO. 1 CONTAINER				
Symphoricarpos albus	Common Snowberry	No. 1 Container	as-shown	30
Mahonia aquifolium	Tall Oregon Grape	No. 1 Container	as-shown	10
Philadelphus lewisii	Mock Orange	No. 1 Container	as-shown	13
Vaccinium ovatum	Evergreen Huckleberry	No. 1 Container	as-shown	8
Holdiscus discolor	Oceanspray	No. 1 Container	as-shown	8
Ribes sanguineum	Red-flowering Currant	No. 1 Container	as-shown	13
Rosa nukana	Nootka Rose	No. 1 Container	as-shown	15
			Total	97
PLANT AREA 2				
EVERGREEN TREES, .5" CAL.				
Calocedrus decurrens	Incense Cedar	No. 15 Container	as-shown	3
DECIDUOUS TREES, .5" CAL.				
Prunus emarginata	Bitter Cherry	No. 15 Container	as-shown	1
Cornus nutallii	Pacific Dogwood	No. 15 Container	as-shown	1
Acer macrophyllum	Bigleaf Maple	No. 15 Container	as-shown	1
Rhamnus purshiana	Cascara	No. 15 Container	as-shown	1
			Total Trees	7
SHRUBS, NO. 1 CONTAINER				
Symphoricarpos albus	Common Snowberry	No. 1 Container	as-shown	15
Mahonia aquifolium	Tall Oregon Grape	No. 1 Container	as-shown	10
Vaccinium ovatum	Evergreen Huckleberry	No. 1 Container	as-shown	5
Ribes sanguineum	Red-flowering Currant	No. 1 Container	as-shown	5
			Total	35

BID ITEM LOG

BID ITEM	DECIDUOUS TREES - 2" CAL.						EVERGREEN TREES - .5" CAL.	DECIDUOUS TREES - .5" CAL.					SHRUBS - NO. 1 CONT.									SHRUBS - NO. 5 CONT.			GROUNDCOVER - NO. 1 CONT.			GROUNDCOVER - SP#4	PERMANENT SEEDING	TOP SOIL	ROOT BARRIER	BARK MULCH	STORM WATER FACILITY GROWING MEDIA	WETLAND PLANTS - SP#4			SPLIT RAIL FENCE
DESCRIPTION	MAGNOLIA GRANDIFLORA 'D.D. BLANCHARD' - D.D. BLANCHARD MAGNOLIA	AMELANCHIER ALNIFOLIA - PACIFIC SERVICEBERRY	GINKGO BILOBA 'PRINCETON SENTRY' - PRINCETON SENTRY GINKGO	ACER GRISEUM - PAPERBARK MAPLE	CHIONANTHUS RETUSUS - CHINESE FRINGE TREE	MAAKIA AMURENSIS - AMUR MAAKIA	CALOCEDRUS DECURRENS - INCENSE CEDAR	PRUNUS EMARGINATA - BITTER CHERRY	CORNUS NUTALLI - PACIFIC DOGWOOD	ACER CIRCINATUM - VINE MAPLE	ACER MACROPHYLLUM - BIGLEAF MAPLE	RHAMNUS PURSHIANA - CASCARA	SYMPHORICARPOS ALBUS - COMMON SNOWBERRY	MAHONIA AQUIFOLIUM - OREGON GRAPE	PHILADELPHUS LEWISII - MOCK ORANGE	VACCINIUM OVATUM - EVERGREEN HUCKLEBERRY	HOLDISCUS DISCOLOR - OCEANSPRAY	RIBES SANGUINEUM - RED FLOWERING CURRANT	ROSA NUTKANA - NOOTKA ROSE	CORNUS SERICEA 'KELSEYI' - KELSEY DOGWOOD	SPIREA BETULIFOLIA - BIRCHLEAF SPIRAEA	SALIX PURPUREA NANA - BLUE ARCTIC WILLOW	ROSA NUTKANA - NOOTKA ROSE	SPIREA DOUGLASII - DOUGLAS SPIRAEA	COTONEASTER DAMMERI 'CORAL BEAUTY' - CORAL BEAUTY BEARBERRY	EUONYMUS FORTUNEI 'COLORATUS' - WINTER CREEPER	JUNIPERUS HORIZONTALIS 'WILTONII' - BLUE RUG JUNIPER	FESTUCA GLAUCA 'ELIJA BLUE' - BLUE FESCUE						ELEOCHARIS OVATA	JUNCUS PATENS	CAREX DENSA	
UNTIS	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA.						EA.	EA.	EA.	EA.	AC.	CY.	LF.	SY.	CY.	EA.	EA.	EA.	LF.
PAGE																																					
9.0	5	11	5	12	10	5																			252	279	147	1571	0.2	280	960	169	128	766	1003	871	
9.1	7	9	15	10	6	10																			340	629	187	971	0.2	369	1140	198	67	321	615	461	
9.2							7	3	4	0	4	5	45	20	13	13	8	18	15											35		105					262
9.5														33						54	53	20	41	45													
TOTAL	12	20	20	22	16	15	7	3	4	0	4	5	45	53	13	13	8	18	15	54	53	20	41	45	537	908	341			684		472	195	1087	1618	1332	
	105						7	16					272									106			1786			2514	0.4	684	2100	472	195	4037			262

PLANT SCHEDULE - ROADSIDE DEVELOPMENT

TREES

12	Magnolia grandiflora 'D.D. Blanchard' - D.D. Blanchard Magnolia	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6'	
20	Amelanchier grandiflora 'Autumn Brilliance' - Autumn Brilliance Serviceberry	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6' (OHW APPROVED)	
20	Ginkgo biloba 'Princeton Sentry' - Princeton Sentry Ginkgo	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6'	
22	Acer griseum - Paperbark Maple	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6' (OHW APPROVED)	
16	Chionanthus retusus - Chinese fringe tree	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6' (OHW APPROVED)	
15	Maakia amurensis - Amur Maakia	
2" CAL.	B&B, WELL BRANCHED, LIMBED TO 6' (OHW APPROVED)	

GROUNDCOVER

537	Cotoneaster dammeri 'Coral Beauty' - Bearberry	
1 GAL	CONT., FULL PLANTS, 36" O.C.	
908	Euonymus fortunei 'Coloratus' - Winter Creeper	
1 GAL	CONT., FULL PLANTS, 24" O.C.	
341	Juniperus horizontalis 'Wiltonii' - Blue Rug Juniper	
1 GAL	CONT., FULL PLANTS, 36" O.C.	
2514	Festuca glauca 'Elija Blue' - Blue Fescue	
SP#4	CONT., FULL PLANTS, 18" O.C.	

SEED MIXES

		% PLS	LBS OF PLA/ 1000SF
0.4	PERMANENT SEEDING		
	Festuca rubra 'Gibraltar'	10	0.364
	Festuca rubra 'Silhouette'	10	0.364
	Lolium perenee 'Delaware Dwarf'	40	5.563
	Lolium perenee 'Amazing'	40	2.696
		TOTAL	8.987

STORMWATER PLANTERS GROUNDCOVER

1087	Eleocharis ovata - Ovate spike rush
SP#4	CONT., FULL PLANTS, 12" O.C.
1618	Juncus Patens - Spreading Rush
SP#4	CONT., FULL PLANTS, 12" O.C.
1332	Carex densa - Dense Sedge
SP#4	CONT., FULL PLANTS, 12" O.C.

GENERAL PLANTING NOTES

1. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT CLACKAMAS COUNTY STANDARDS AND OREGON BUILDING AND SPECIALITY CODES.
2. INSTALL EROSION CONTROL SYSTEMS IN ACCORDANCE WITH CLACKAMAS COUNTY STANDARDS PRIOR TO SITE WORK AND LANDSCAPE INSTALLATION.
3. CONTRACTOR SHALL MARK AND PROTECT ALL UTILITIES, SITE FEATURES, AND VEGETATION TO REMAIN IN PLACE.
4. CONTRACTOR SHALL REMOVE ALL WEEDS AND INVASIVE SPECIES PRIOR TO PLANTING OR SEEDING.
5. ALL DISTURBED AREAS SHALL BE SEEDED.
6. PRIOR TO PLANTING, CONTRACTOR SHALL TEST SOILS FOR SOIL FERTILITY BY CERTIFIED TESTING LAB. IF NECESSARY, BACKFILL SOILS FOR TREE PITS, SHRUB AND GROUNDCOVER AREAS SHALL BE AMENDED AS RECOMMENDED BY SOIL ANALYSIS REPORT.
7. ALL SEEDED AREAS SHALL BE STRIPPED OF VEGETATION, SCARIFIED AND RECEIVE 4" OF TOPSOIL PRIOR TO APPLICATION OF SEED.
8. ALL PLANTER BEDS SHALL BE SCARIFIED 12" BELOW FINISHED GRADE AND HAVE 12" OF TOPSOIL ADDED TO BRING BACK TO FINISHED GRADE PRIOR TO PLANTING.
9. CONTRACTOR TO INSTALL 3'' LAYER OF COMPOST MULCH AT ALL TREE, SHRUB AND GROUNDCOVER AREAS.
10. PLANT MATERIAL INSTALLED SHALL CONFORM IN SIZE AND GRADE TO THE ''AMERICAN STANDARD FOR NURSERY STOCK'' CURRENT EDITION.
11. QUANTITIES OF PLANT MATERIALS SHALL BE AS DETERMINED BY CONTRACTOR IN ACCORDANCE WITH SPECIFIED SPACING OR LOCATION ON PLAN. MATERIAL QUANTITIES SHOWN ON PLAN ARE FOR CONTRACTOR CONVENIENCE ONLY AND SHALL BE VERIFIED BY CONTRACTOR PRIOR TO INSTALLATION. SURPLUS OR SHORTAGES OF PLANT QUANTITIES SHALL BE RESPONSIBILITY OF CONTRACTOR.
12. LANDSCAPE CONTRACTOR SHALL WATER PLANTINGS FOR DURATION OF 2-YEAR WARRANTY PERIOD AFTER INSTALLATION AND GUARANTEE ALL PLANTINGS TO BE IN SATISFACTORY HEALTH. LANDSCAPE CONTRACTOR SHALL REPLACE ALL DAMAGED, DEAD, OR DYING PLANTS COVERED BY WARRANTY WITHIN 30 DAYS OF INITIAL IDENTIFICATION OF CONDITION.

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\CLA93-9.0 LANDSCAPE PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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DATE: 11-11-2022

REGISTERED LANDSCAPE ARCHITECT 747 JEFFERY P. CREEL OREGON 05/13/11

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205 SE Spokane Street, Suite 200, Portland, OR 97202
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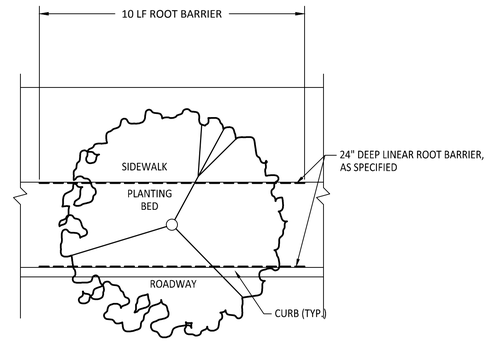
LANDSCAPE LEGEND & NOTES

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 9.3

JOB NO. CLA-93

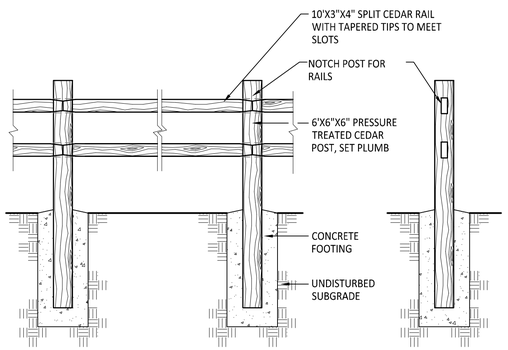


LINEAR ROOT BARRIER LAYOUT

TYPICAL ROOT BARRIER LAYOUT - ALL TREES NEAR PAVING

Plan

NOT TO SCALE



ELEVATION

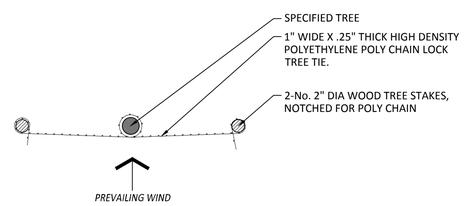
POST SECTION

SPLIT RAIL FENCE

Section

NOT TO SCALE

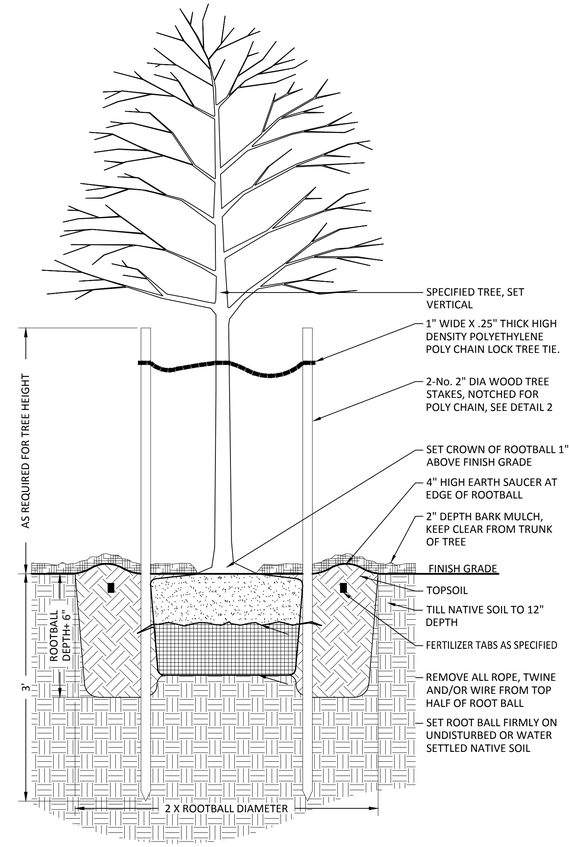
NOTE:
WRAP POLY CHAIN AROUND NOTCHED STAKE AND LOCK TO SECURE. WRAP CENTER OF POLY CHAIN AROUND TREE TRUNK TO MOVE 3" IN ALL DIRECTIONS.



TREE STAKING

Section

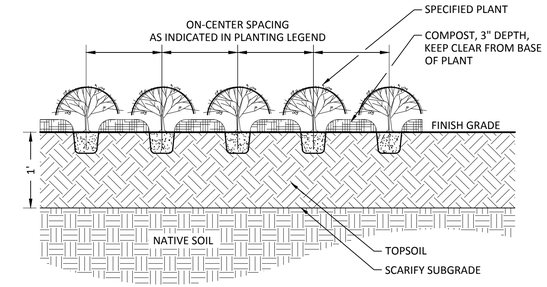
NOT TO SCALE



DECIDUOUS TREE PLANTING

Section

NOT TO SCALE

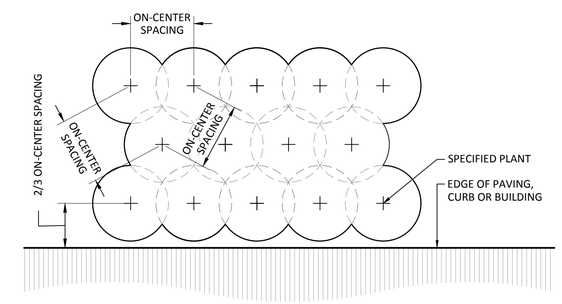


GROUNDCOVER PLANTING

Section

NOT TO SCALE

NOTE:
ON-CENTER SPACING SHALL BE AS INDICATED IN PLANTING SCHEDULE



TRIANGULAR SPACING

Plan

NOT TO SCALE

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-9.0 LANDSCAPE PLAN.dwg

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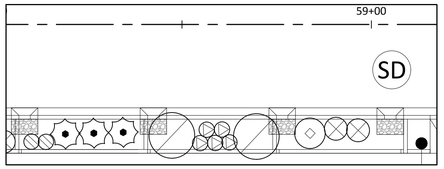
LANDSCAPE DETAILS

LINWOOD AVENUE IMPROVEMENTS

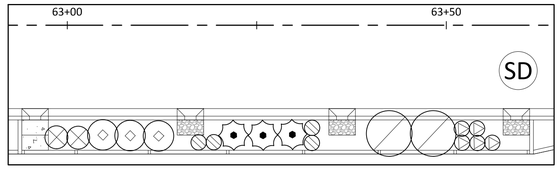
CLACKAMAS COUNTY, OREGON

SHEET NO. 9.4

JOB NO. CLA-93



PLANTER 1
SCALE: 1"=10'



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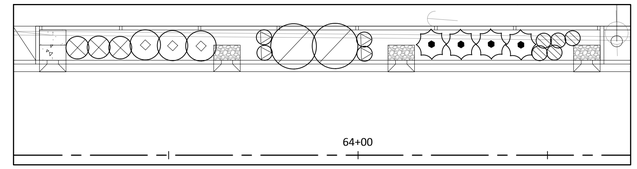

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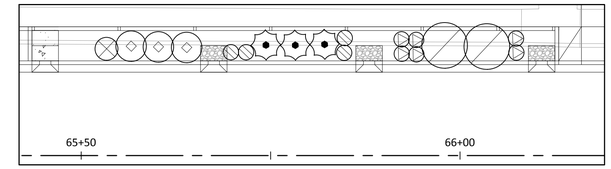

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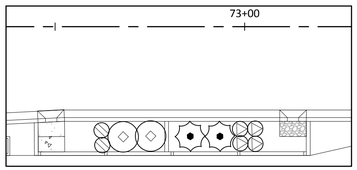

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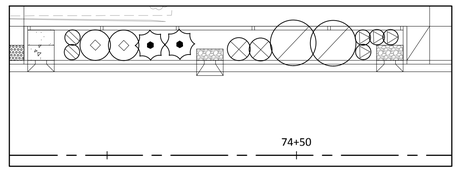

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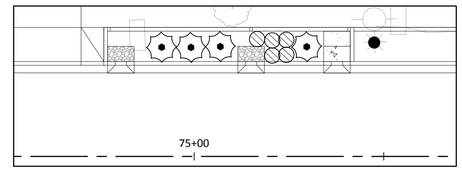

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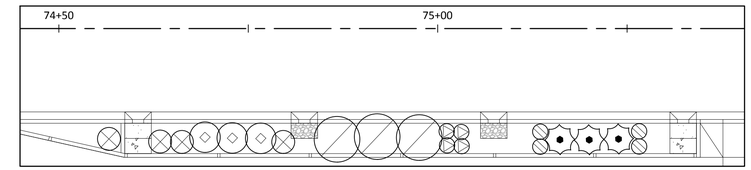

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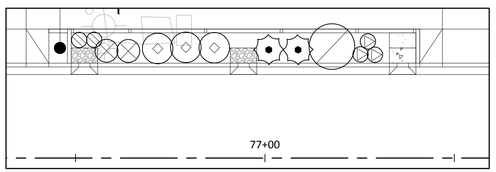

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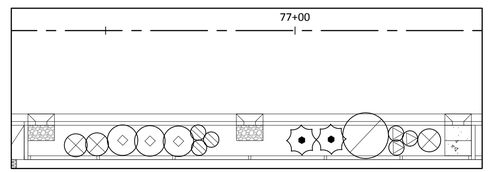

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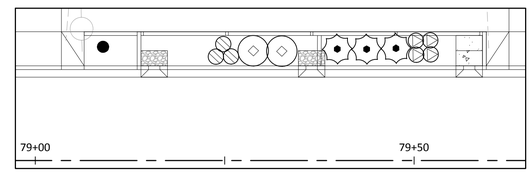

PLANTER 11
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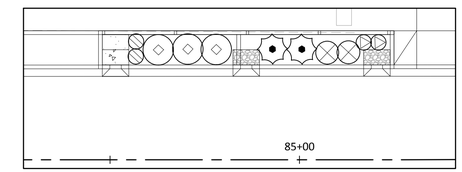

PLANTER 12
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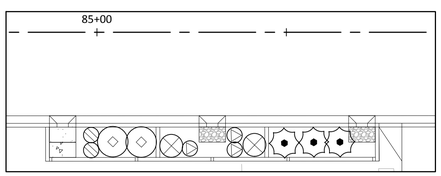

PLANTER 13
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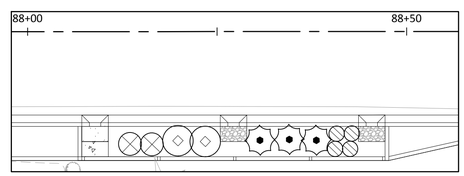

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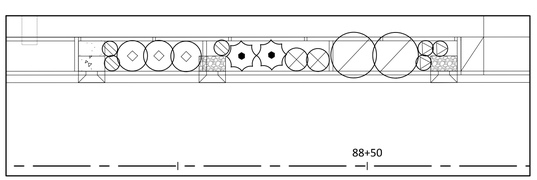
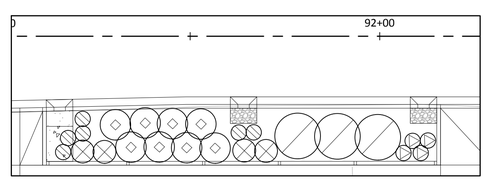


PLANTER 15
SCALE: 1"=10'



PLANTER 16
SCALE: 1"=10'

PLANT SCHEDULE

STORMWATER PLANTER SHRUBS

20	30" HGT 5 GAL	Salix purpurea nana - Blue arctic willow CONT., FULL PLANTS, SPACING AS SHOWN LARGE SHRUB
41	30" HGT 5 GAL	Rosa nutkana - Nootka Rose CONT., FULL PLANTS, SPACING AS SHOWN LARGE SHRUB
45	30" HGT 5 GAL	Spirea douglasii - Douglas spiraea CONT., FULL PLANTS, SPACING AS SHOWN LARGE SHRUB
54	1 GAL	Cornus sericea 'Kelseyi' - Kelsey dogwood CONT., FULL PLANTS, SPACING AS SHOWN SMALL SHRUB
53	1 GAL	Spirea betulifolia - Birchleaf Spiraea CONT., FULL PLANTS, SPACING AS SHOWN SMALL SHRUB
33	1 GAL	Mahonia aquifolium - Oregon grape CONT., FULL PLANTS, SPACING AS SHOWN SMALL SHRUB

WES CALCULATIONS

WES BASIN PLANTING CALCULATIONS

BASIN NO.	BASIN ZONE A SIZE (SF)	LARGE SHRUBS PROVIDED	SMALL SHRUBS PROVIDED	HERBACEOUS GROUNDCOVER PROVIDED
1	272	8	11	313
2	268	8	11	308
3	296	9	12	340
4	276	8	11	317
5	140	4	6	161
6	198	6	8	228
7	128	4	5	147
8	302	9	12	347
9	182	6	7	209
10	234	7	9	270
TOTAL 9.0 & 9.5	2296	69	92	2640
11	180	5	7	207
12	152	5	6	175
13	172	5	7	198
14	160	5	6	184
15	200	6	8	230
16	350	11	14	403
TOTAL 9.1 & 9.5	1214	37	48	1397
TOTAL	3510	106	140	4037

SEE SHEET 9.0 & 9.1 FOR STORMWATER PLANTER GROUNDCOVERS

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-9.5 SW LANDSCAPE PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED LANDSCAPE ARCHITECT 747 JEFFERY P. CREEL OREGON 05/13/11

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

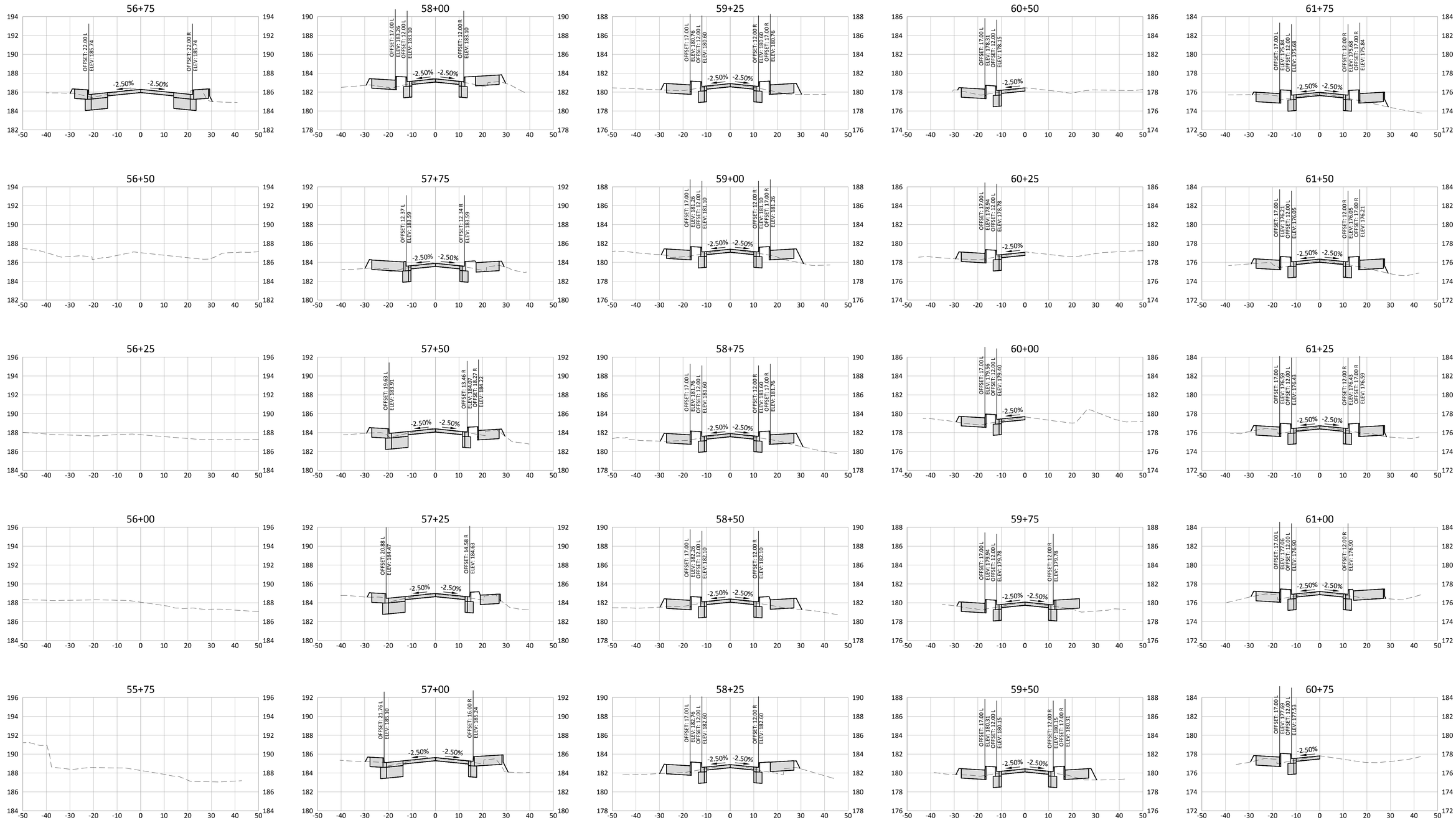
SW LANDSCAPE PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 9.5

JOB NO. CLA-93



LINWOOD AVE - CROSS SECTIONS

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

CROSS SECTIONS - LINWOOD AVE

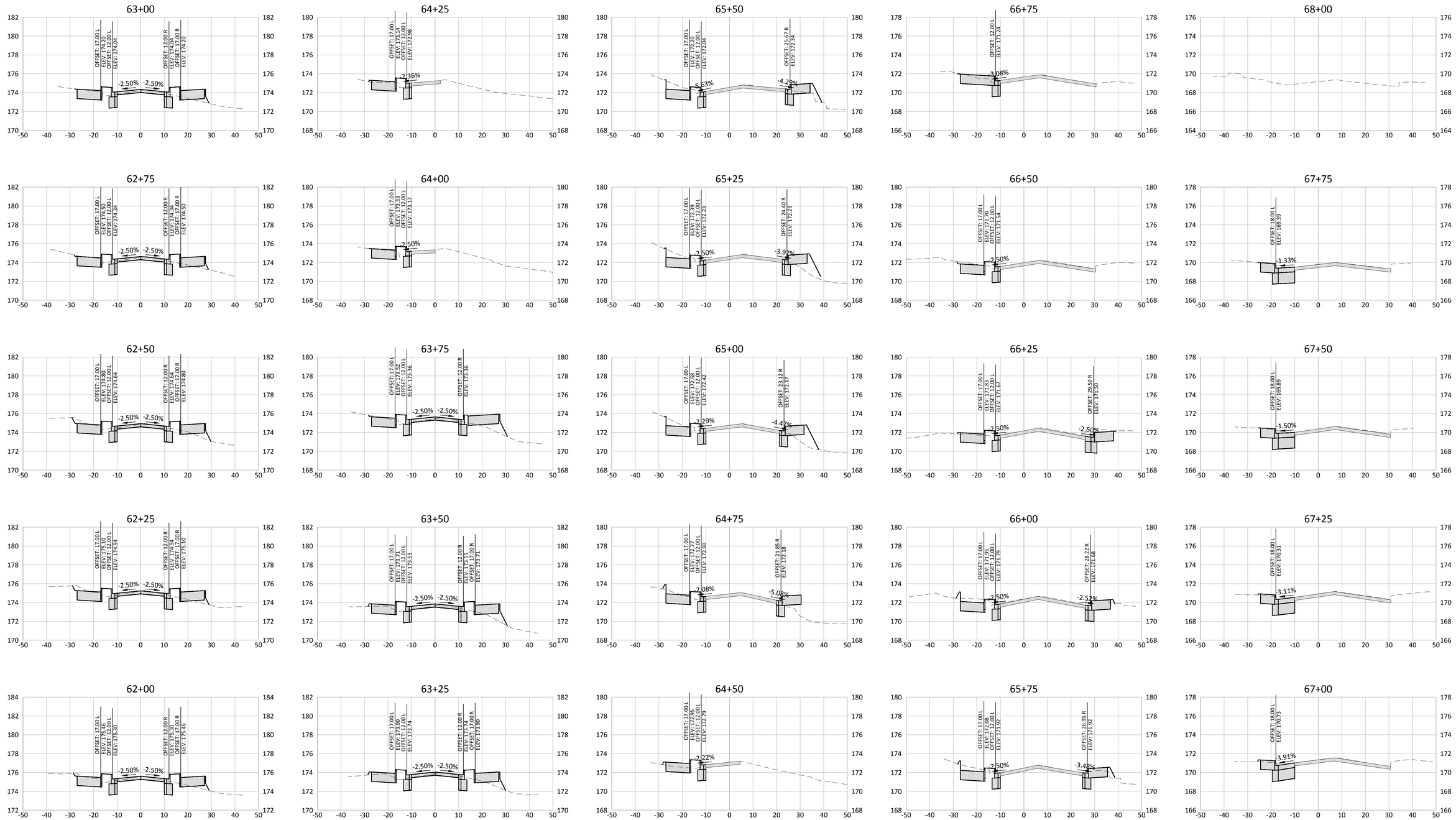
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.0

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg



LINWOOD AVE - CROSS SECTIONS

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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EXPIRES: 6/30/23

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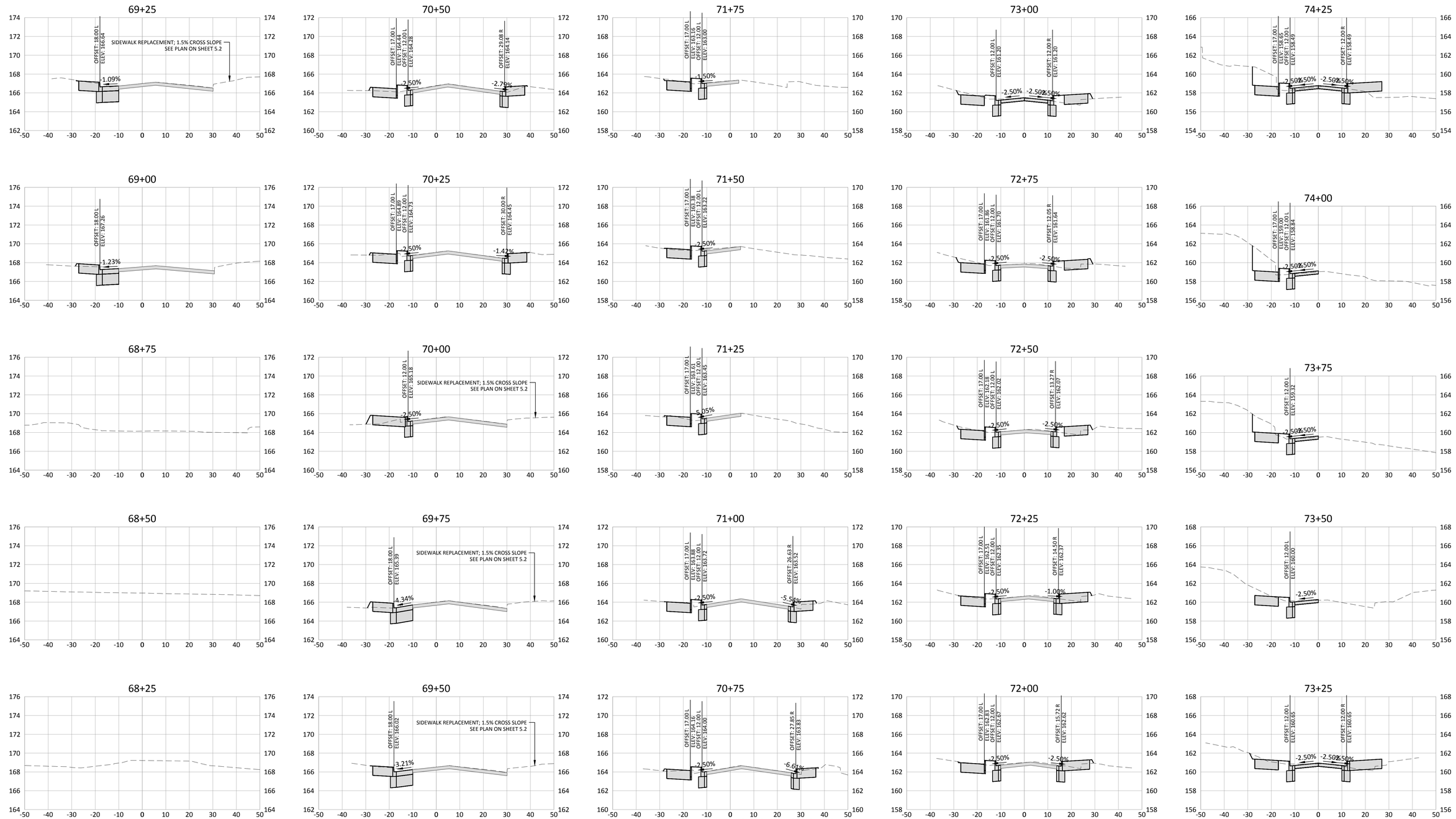
CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.1

JOB NO. CLA-93



LINWOOD AVE - CROSS SECTIONS

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VERT. SCALE: 1" = 5'

P\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

PREPARED FOR

CLACKAMAS COUNTY
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OREGON CITY, OR 97045

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EXPIRES: 6/30/23

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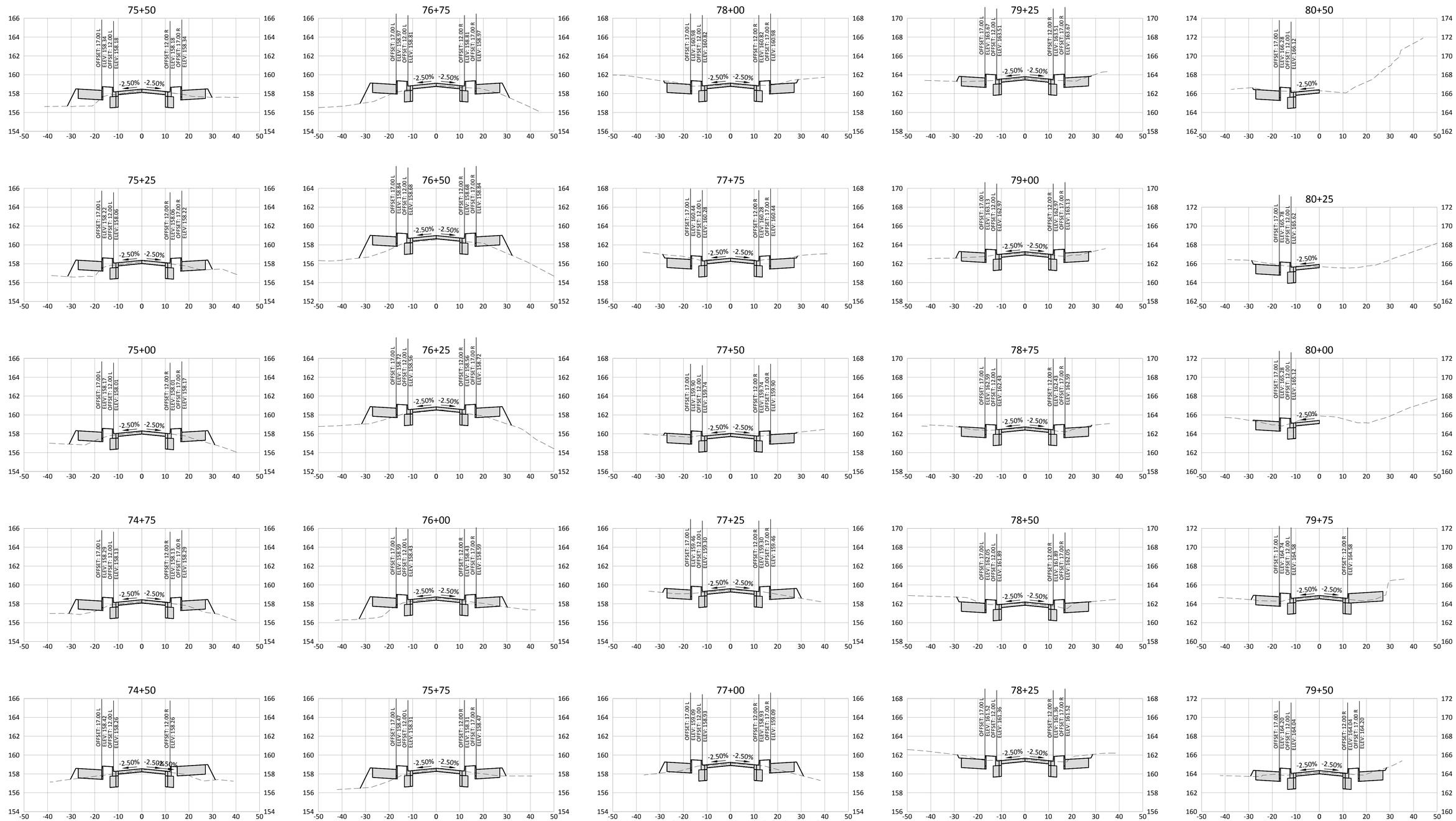
CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.2

JOB NO. CLA-93



LINWOOD AVE - CROSS SECTIONS

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PREPARED FOR

CLACKAMAS COUNTY
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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.3

JOB NO. CLA-93

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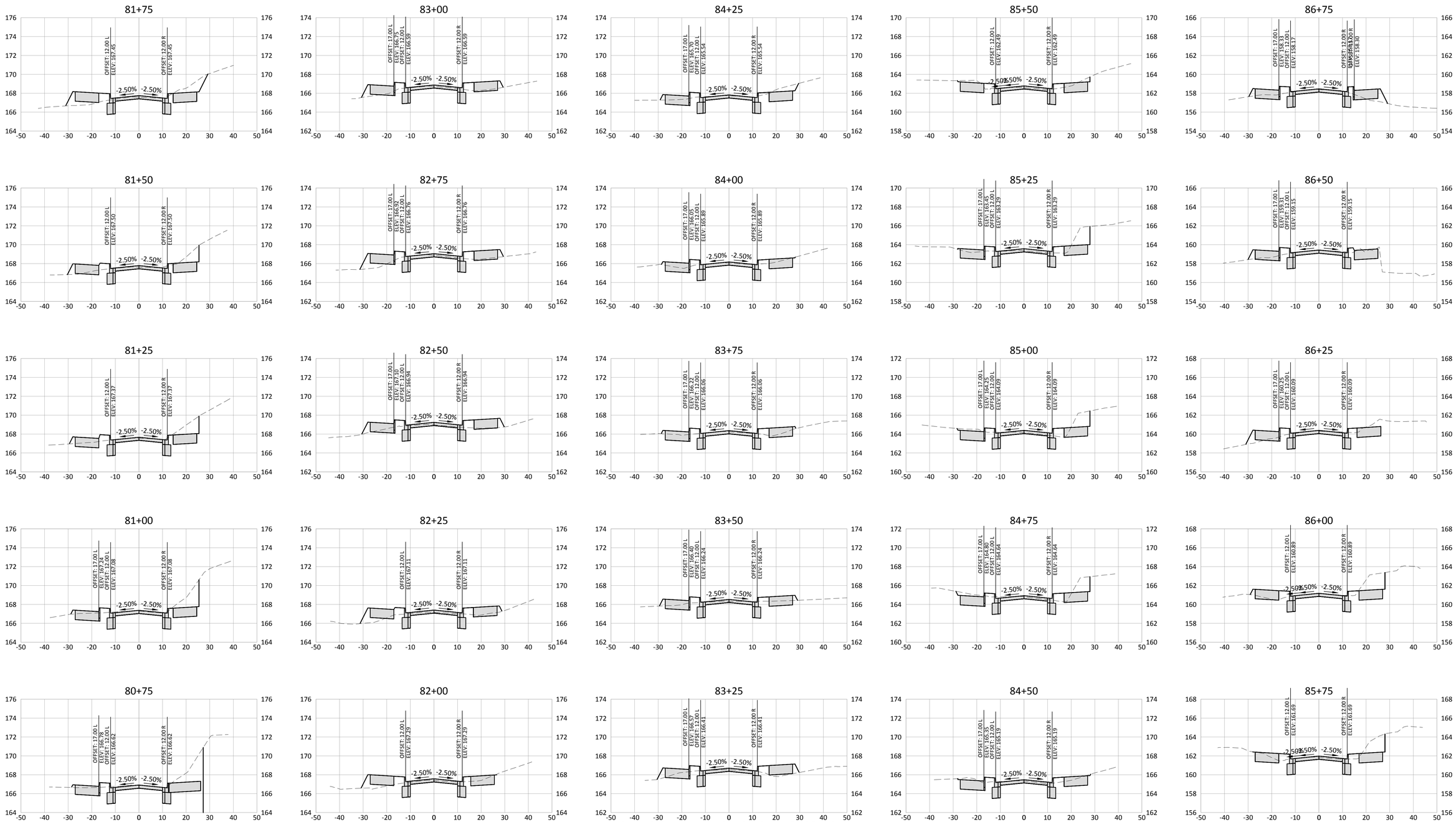

LINWOOD AVE - CROSS SECTIONS

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

P\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

PREPARED FOR

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OREGON CITY, OR 97045

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EXPIRES: 6/30/23

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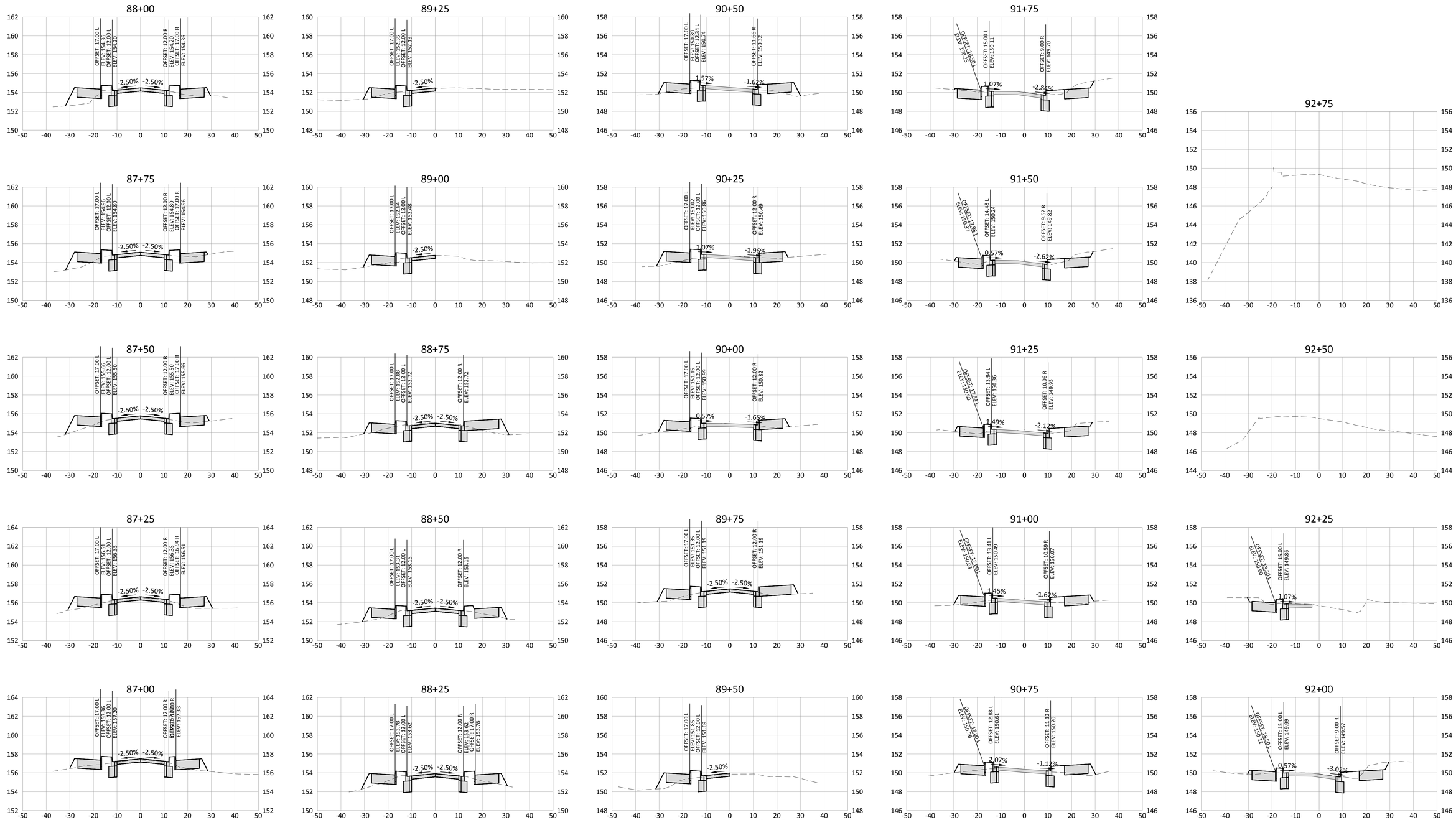
CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.4

JOB NO. CLA-93



LINWOOD AVE - CROSS SECTIONS

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

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150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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EXPIRES: 6/30/23

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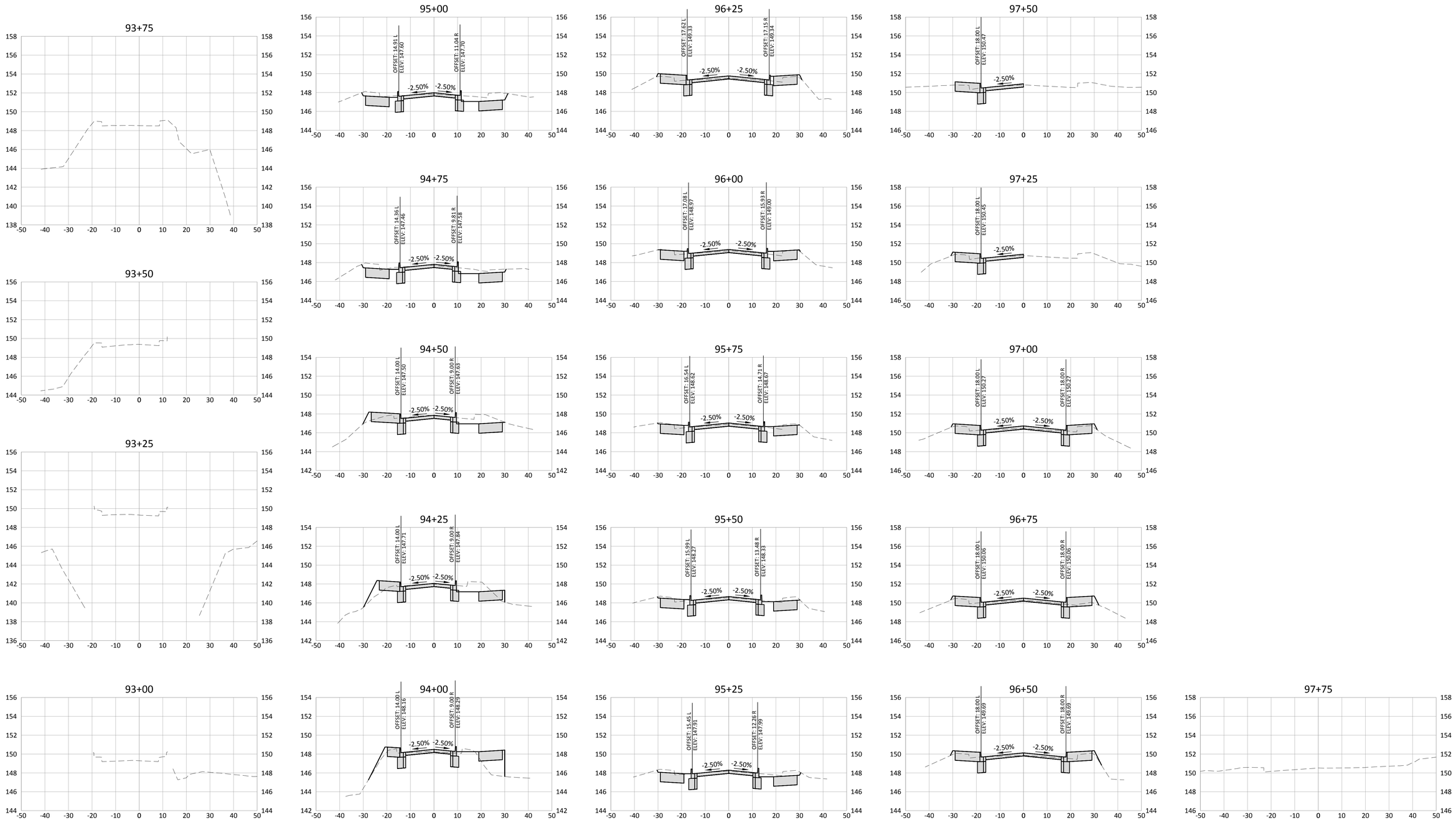
CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.5

JOB NO. CLA-93



LINWOOD AVE - CROSS SECTIONS

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VERT. SCALE: 1" = 5'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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LANDSCAPE ARCHITECTS • SURVEYORS
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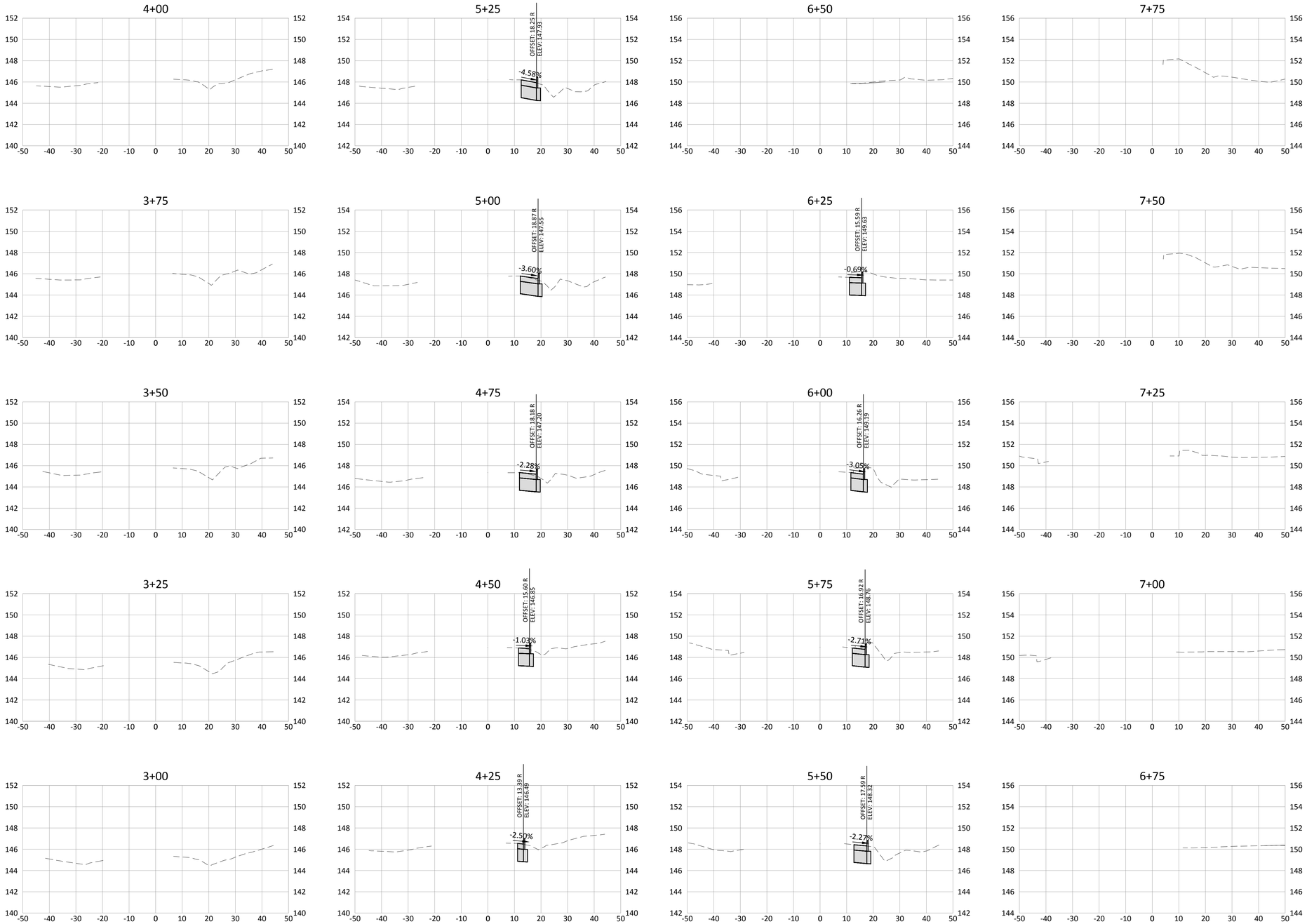
CROSS SECTIONS - LINWOOD AVE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.6

JOB NO. CLA-93



JOHNSON CREEK BLVD - CROSS SECTIONS

HORIZ. SCALE: 1" = 20'
VERT. SCALE: 1" = 5'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

R E V I S I O N S

DESIGNED: HHPR TEAM
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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

Harper Houf Peterson Righellis Inc.
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LANDSCAPE ARCHITECTS • SURVEYORS
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phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

CROSS SECTIONS - JOHNSON CREEK BLVD

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 10.7

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-10.0 CROSS SECTIONS.dwg

SIGNING LEGEND

N / M	INSTALL NEW SIGN (N) ON NEW (M) SIGN SUPPORT.
N	INSTALL NEW SIGN (N).
EXN	MAINTAIN AND PROTECT EXISTING SIGN (N) AND SUPPORT.
RRN / M	REMOVE AND RELOCATE EXISTING AND REMOVE (M) SIGN SUPPORT.
RIN / M	REINSTALL EXISTING SIGN (N) ON NEW (M) SIGN SUPPORT.
RXN / M	REMOVE EXISTING SIGN (N) AND (M) SIGN SUPPORT.
RXN	REMOVE EXISTING SIGN (N).

N = SIGN NUMBER
M = MATERIAL
MATERIAL OPTIONS:
ST = PERFORATED STEEL SQUARE TUBE SIGN SUPPORT
W = WOOD POST
CCB = CROSSWALK CLOSED BARRICADE

STRIPING LEGEND

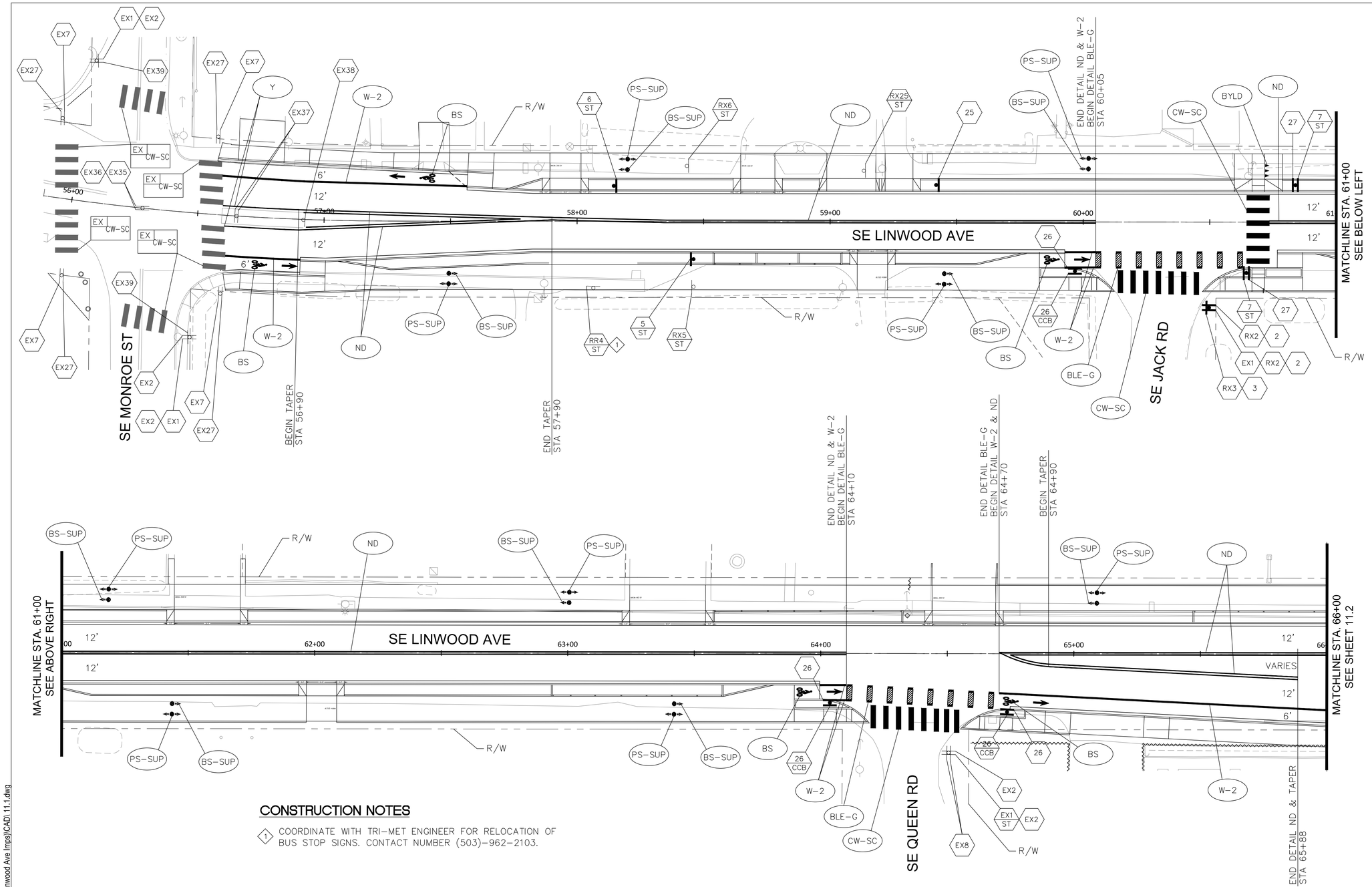
W-2	INSTALL 8" WHITE LINE.
D	INSTALL DOUBLE YELLOW NO-PASS.
ND	INSTALL NARROW DOUBLE YELLOW NO-PASS.
Y	INSTALL 4" YELLOW LINE.
BYLD	INSTALL BICYCLE YIELD LANE (WHITE).
E-LA	INSTALL ELONGATED LEFT TURN ARROW (WHITE).
E-RA	INSTALL ELONGATED RIGHT TURN ARROW (WHITE).
CW-SC	INSTALL STAGGERED CONTINENTAL CROSSWALK.
BS	INSTALL BIKE MARKING (WHITE).
BLE-G	INSTALL GREEN SUPPLEMENTAL BICYCLE LANE DOTTED LINE EXTENSION.
GRN	INSTALL GREEN SUPPLEMENTAL BICYCLE LANE SOLID LINE (GREEN).
PS-SUP	INSTALL SHARED USE PATH PEDESTRIAN MARKING (WHITE).
BS-SUP	INSTALL SHARED USE PATH BICYCLE MARKING (WHITE).
BLE-G / CW-SC	INSTALL GREEN SUPPLEMENTAL BICYCLE LANE DOTTED LINE EXTENSION WITH STAGGERED CONTINENTAL CROSSWALK.
EX CW-SC	RETAIN AND PROTECT EXISTING STAGGERED CONTINENTAL CROSSWALK.
EX W	RETAIN AND PROTECT EXISTING 4" WHITE LINE.
EX TWL	RETAIN AND PROTECT EXISTING TWO-WAY LEFT TURN 4" YELLOW LINES.
RX W-2	REMOVE EXISTING 8" WHITE LINE.
RX E-LA	REMOVE EXISTING ELONGATED LEFT TURN ARROW.
RX D	REMOVE EXISTING DOUBLE YELLOW NO-PASS.

GENERAL NOTES

1. LOCATE STOP LINE 4 FT (MIN.) TO 30 FT (MAX.) IN ADVANCE OF THE NEAREST MARKED CROSSWALK LINE. IN THE ABSENCE OF A MARKED CROSSWALK, LOCATE STOPLINE 4 FT (MIN.) TO 30 FT (MAX.) FROM THE NEAREST EDGE OF THE INTERSECTING TRAVELED WAY. VERIFY SIGHT DISTANCE AND TRUCK TURNING MOVEMENTS.
2. ALIGN CROSSWALKS WITH SIDEWALK RAMP LOCATIONS OR 5 FT. BACK OF EXTENDED EDGE LINE, EDGE OF PAVEMENT, OR CURB FACE.
3. REMOVAL OF EXISTING PAVEMENT MARKINGS IS TO BE DETERMINED IN THE FIELD. PAVEMENT MARKINGS AND STRIPING SHALL BE REMOVED PER THE OREGON STANDARD SPECIFICATIONS AND PROJECT SPECIAL PROVISIONS.
4. ALL PAVEMENT MARKING MATERIALS SHALL BE INSTALLED AS PER OREGON STANDARD SPECIFICATIONS.
5. ALL PAINT AND PAVEMENT MARKINGS SHALL BE FROM THE ODOT QUALIFIED PRODUCTS LISTING.
6. FOR DETAILS NOT SHOWN ON SHEET 11.6 SEE REMAINING TM500 SERIES OF THE OREGON STANDARD DRAWINGS.
7. ALL PERMANENT LONGITUDINAL STRIPING IS METHOD "A" THERMOPLASTIC, EXTRUDED SURFACE, PROFILED EXCEPT AS NOTED ON THE PLANS. SEE SECTION 00865 IN THE SPECIAL PROVISIONS.
8. ALL LEGENDS AND BARS ARE METHOD "B-HS", PREFORMED, FUSED THERMOPLASTIC HIGH SKID FILM. SEE SECTION 00867 IN THE SPECIAL PROVISIONS.
9. MATCH POINTS TO EXISTING PAVEMENT MARKINGS AND STATION CALL-OUTS ARE APPROXIMATE AND SHALL BE FIELD VERIFIED.
10. REMOVE ALL PAVEMENT MARKINGS THAT CONFLICT WITH THESE PLANS. REMOVAL OF EXISTING PAVEMENT MARKINGS IS TO BE DETERMINED IN THE FIELD. STRIPING SHALL BE REMOVED AS DIRECTED BY THE ENGINEER.

STANDARD DRAWINGS

- TM500 PAVEMENT MARKING STANDARD DETAIL BLOCKS
- TM501 PAVEMENT MARKING STANDARD DETAIL BLOCKS
- TM502 PAVEMENT MARKING STANDARD DETAIL BLOCKS
- TM503 PAVEMENT MARKING STANDARD DETAIL BLOCKS
- TM520 DURABLE PAVEMENT MARKINGS METHOD "A" & "D" SURFACE INSTALLED PROFILED
- TM530 INTERSECTION PAVEMENT MARKINGS (CROSSWALK, STOP BAR, BIKE LANE STENCIL)
- TM531 TURN ARROW MARKING DETAILS
- TM539 MEDIAN AND LEFT TURN CHANNELIZATION DETAILS
- TM560 ALIGNMENT LAYOUT: GENERAL
- TM561 ALIGNMENT LAYOUT: LEFT TURN LANE, CENTERLINE & MEDIANS
- T100 STREET NAME SIGNS AND DETAILS CLACKAMAS COUNTY STANDARD
- T130 STREET NAME SIGNS AND DETAILS (CONTINUED) CLACKAMAS COUNTY STANDARD



CONSTRUCTION NOTES

1. COORDINATE WITH TRI-MET ENGINEER FOR RELOCATION OF BUS STOP SIGNS. CONTACT NUMBER (503)-962-2103.

NOTE:
SEE SHEET 11.0 FOR SIGNING AND STRIPING LEGEND.

NOTE:
SEE SHEETS 11.6 THRU 11.12 FOR SIGNING AND STRIPING DETAILS.

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.09.28 15:58:49-07'00'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING/STRIPING PLAN

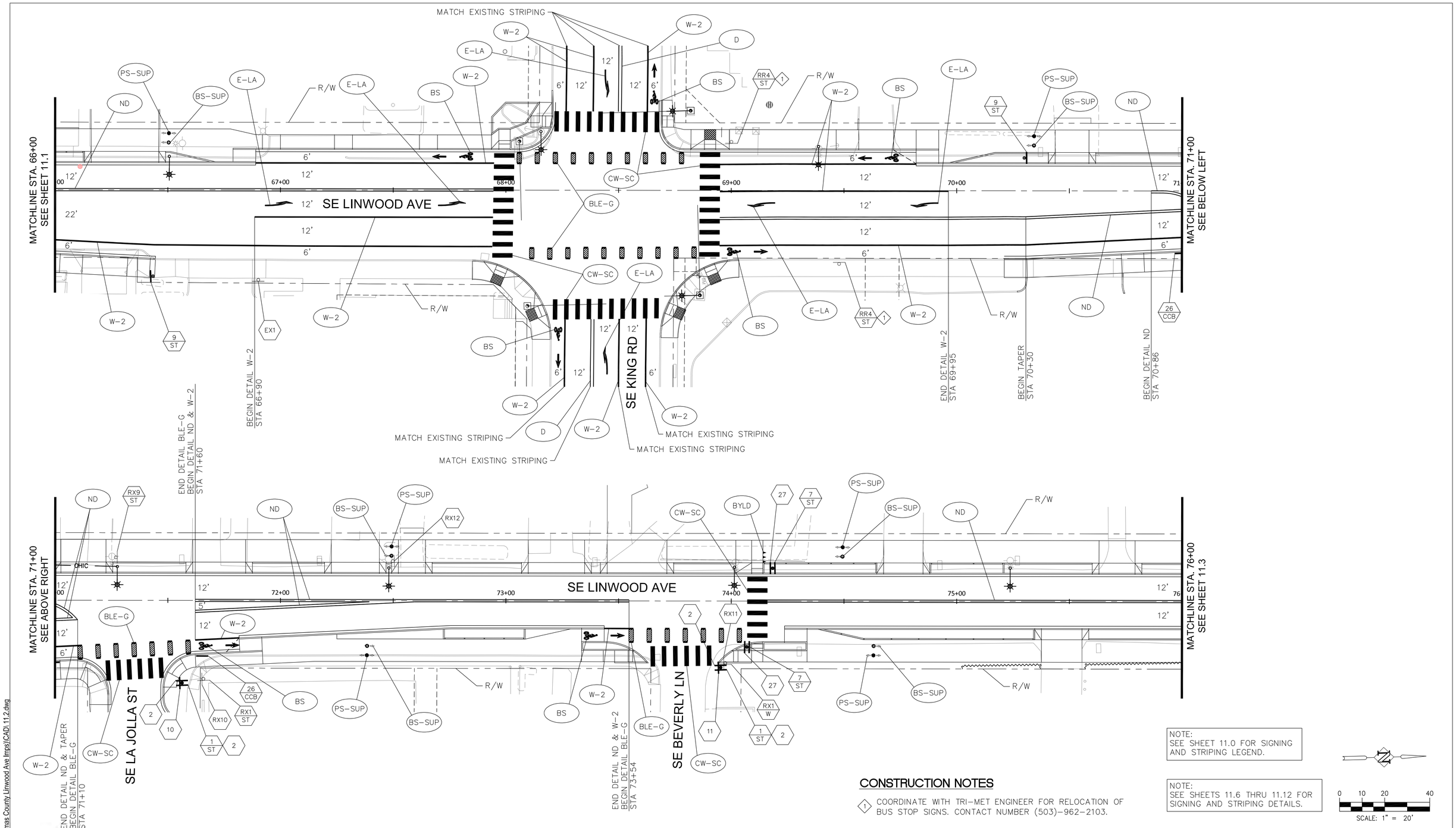
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 11.1

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.1.dwg



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0 10 20 40
SCALE: 1" = 20'

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PREPARED FOR

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150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348
Digitally Signed 2022.11.08 15:47:52-08'00'
OREGON
JUNE 12, 2013
STEVEN J. BOICE
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING/STRIPING PLAN

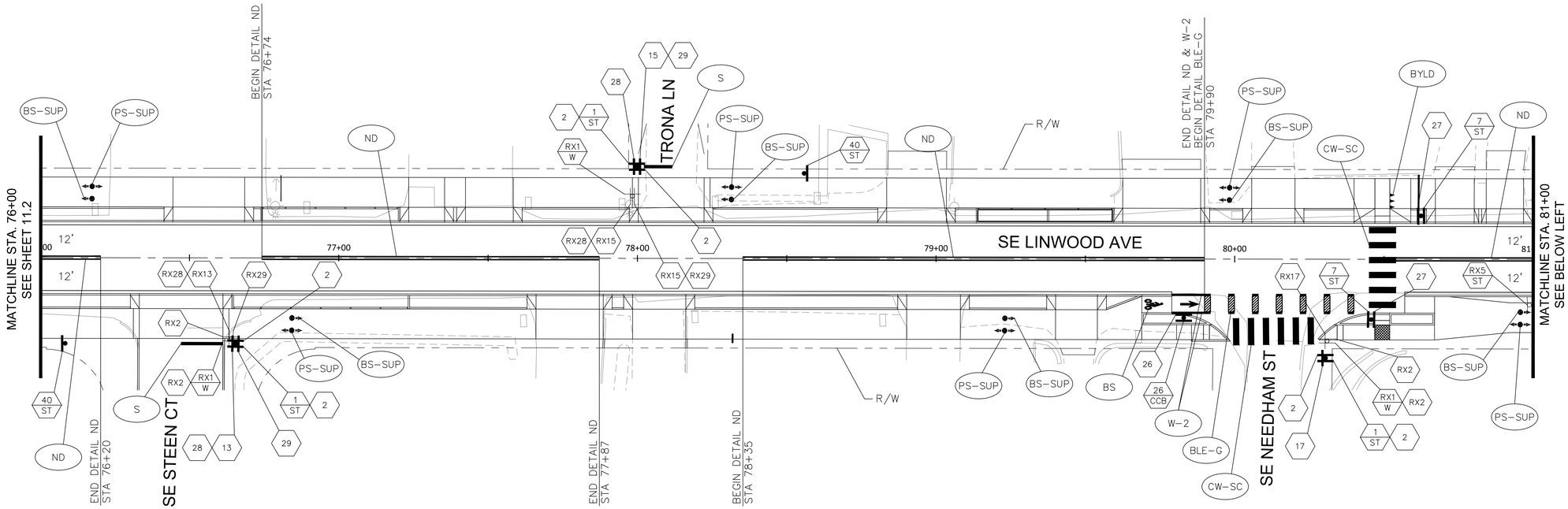
LINWOOD AVENUE IMPROVEMENTS

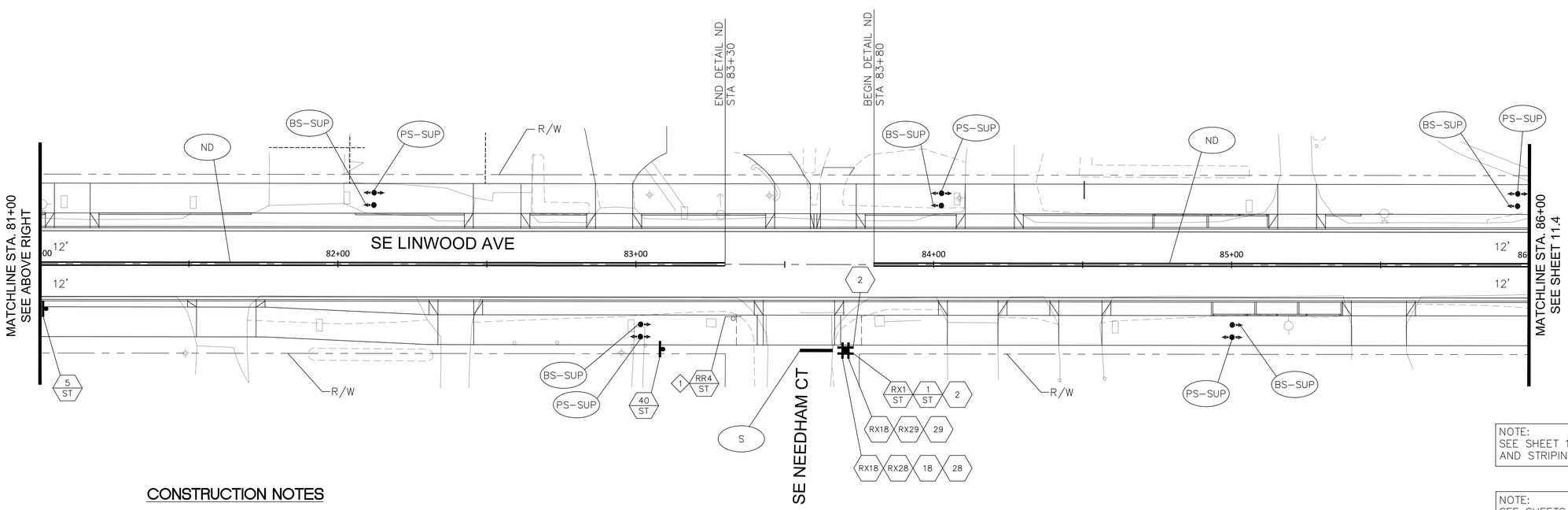
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.2

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\11.2.dwg





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NOTE:
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SCALE: 1" = 20'

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REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.11.08 15:48:31-08'00'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING/STRIPING PLAN

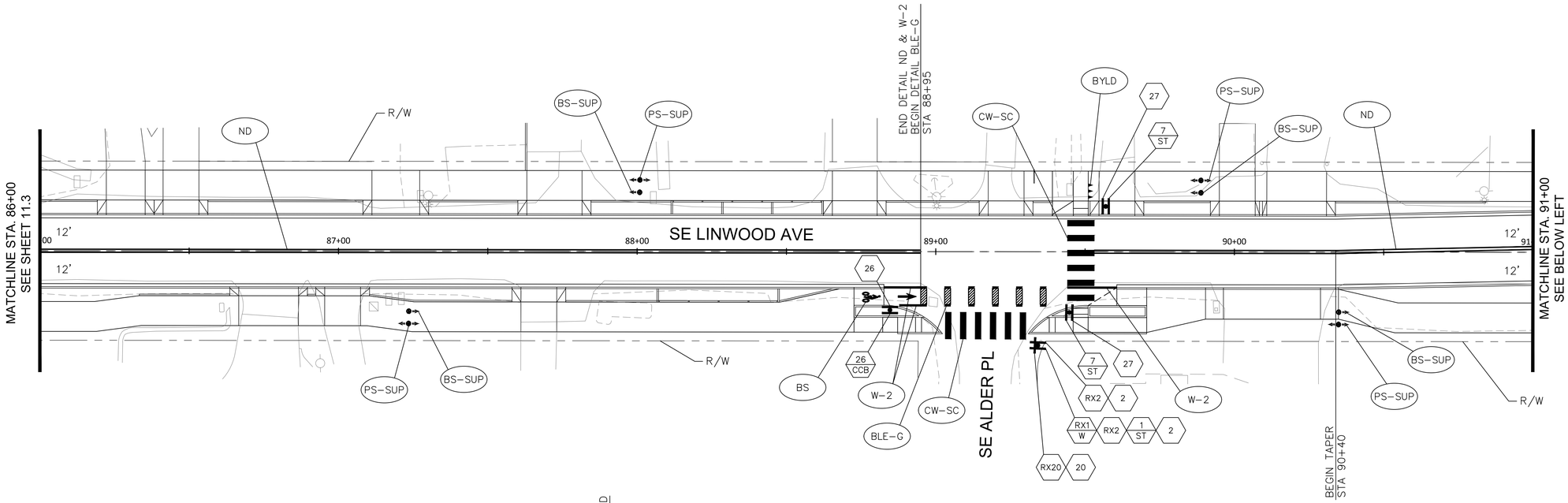
LINWOOD AVENUE IMPROVEMENTS

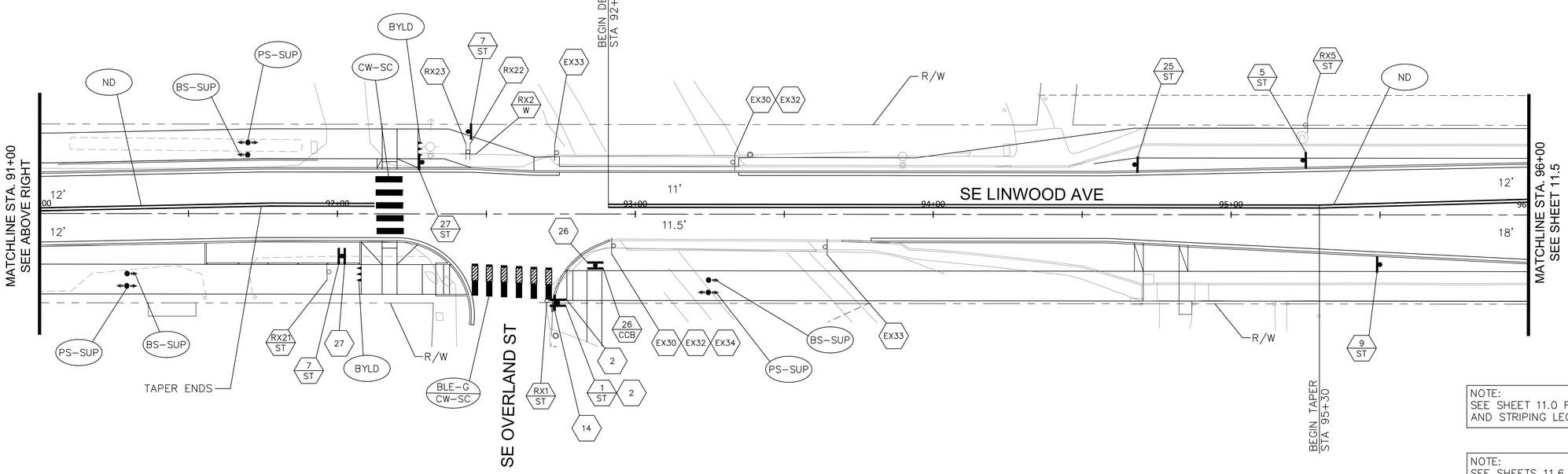
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.3

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.3.dwg





NOTE:
SEE SHEET 11.0 FOR SIGNING AND STRIPING LEGEND.

NOTE:
SEE SHEETS 11.6 THRU 11.12 FOR SIGNING AND STRIPING DETAILS.

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348
Digitally Signed 2022.11.08 15:49:01-08'00'
OREGON
JUNE 12, 2013
STEVEN J. BOICE
EXPIRES: DEC. 31, 2023

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SIGNING/STRIPING PLAN

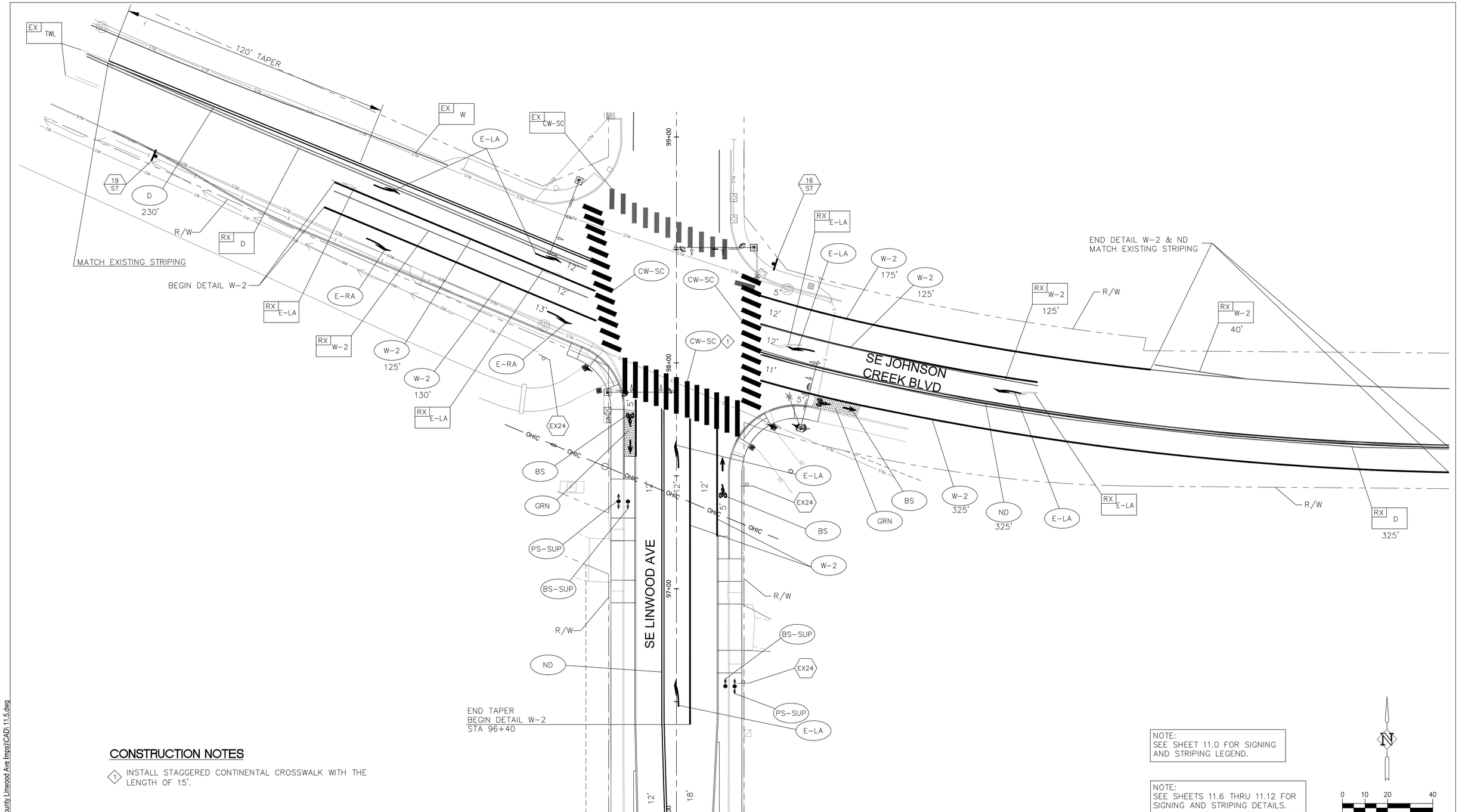
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 11.4

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.4.dwg



CONSTRUCTION NOTES

1. INSTALL STAGGERED CONTINENTAL CROSSWALK WITH THE LENGTH OF 15'.

NOTE:
SEE SHEET 11.0 FOR SIGNING AND STRIPING LEGEND.

NOTE:
SEE SHEETS 11.6 THRU 11.12 FOR SIGNING AND STRIPING DETAILS.

N

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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SIGNING/STRIPING PLAN

LINWOOD AVENUE IMPROVEMENTS

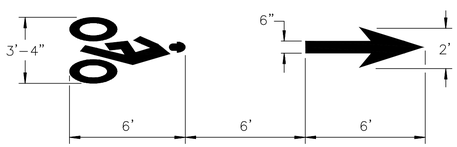
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.5

JOB NO. CLA-93

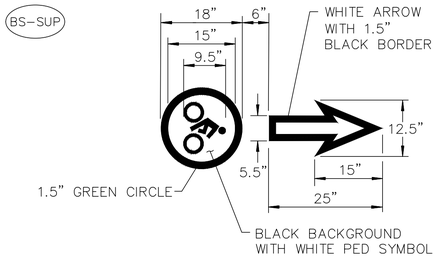
X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.5.dwg

BS



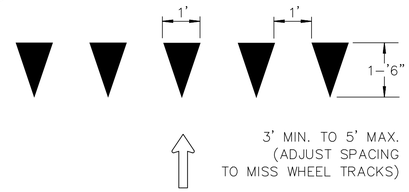
BIKE LANE STANDARD STENCIL (WHITE)
CENTER MARKING WITHIN LANE WIDTH
FOR PROPORTION DETAILS, SEE CURRENT VERSION OF STANDARD HIGHWAY SIGNS.

BS-SUP



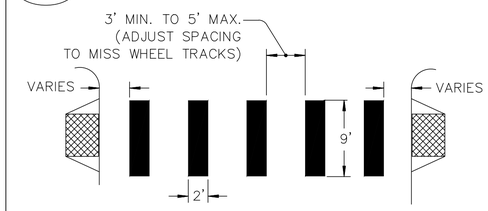
SHARED USE PATH BICYCLE SYMBOL
COLOR AS NOTED ABOVE

BYLD



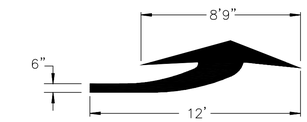
BICYCLE YIELD LANE (WHITE)

CW-SC



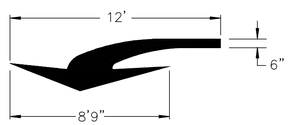
STAGGERED CONTINENTAL CROSSWALK
2' WHITE BARS
INSTALL PER OREGON STANDARD DRAWING TM530

E-LA



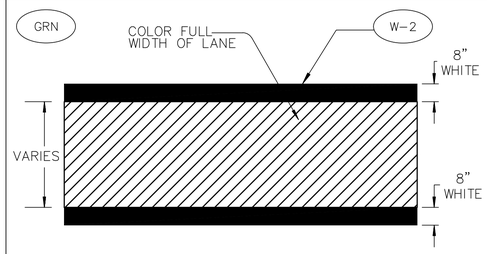
ELONGATED LEFT TURN ARROW (WHITE)
FOR ARROW PROPORTION DETAILS, SEE CURRENT VERSION OF STANDARD HIGHWAY SIGNS

E-RA



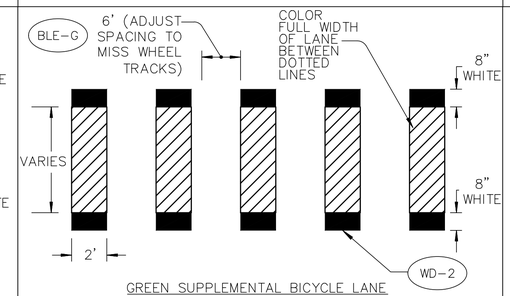
ELONGATED RIGHT TURN ARROW (WHITE)
FOR ARROW PROPORTION DETAILS, SEE CURRENT VERSION OF STANDARD HIGHWAY SIGNS

GRN



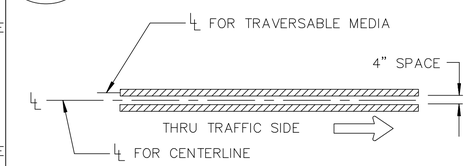
GREEN SUPPLEMENTAL BICYCLE LANE
SOLID LINE (GREEN)

BLE-G



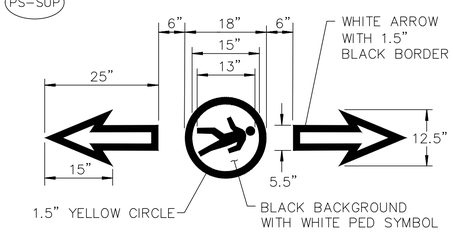
GREEN SUPPLEMENTAL BICYCLE LANE
DOTTED LINE EXTENSION (GREEN)

ND



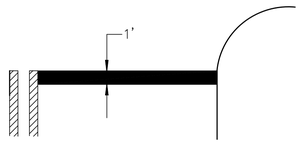
NARROW DOUBLE NO-PASS
TWO 4" YELLOW LINES

PS-SUP



SHARED USE PATH PEDESTRIAN SYMBOL
COLOR AS NOTED ABOVE

S



STOP BAR
1' WHITE BAR
INSTALL PER OREGON STANDARD DRAWING TM530

W

4" WHITE LINE

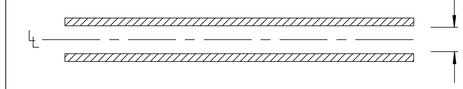
W-2

6' (ADJUST SPACING TO MISS WHEEL TRACKS)

8" WHITE LINE

D

1' SPACE

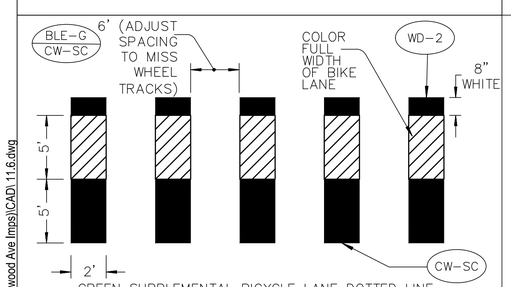


DOUBLE NO-PASS
TWO 4" YELLOW LINES

Y

4" YELLOW LINE

BLE-G
CW-SC



GREEN SUPPLEMENTAL BICYCLE LANE DOTTED LINE EXTENSION (GREEN)
WITH STAGGERED CONTINENTAL CROSSWALK 2' WHITE BARS

℄ - LANE LINE DIMENSIONS ARE SHOWN ON THE STRIPING PLANS.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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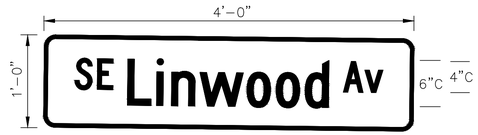
STRIPING DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

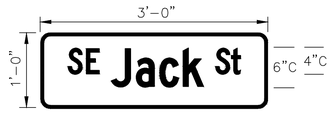
SHEET NO. **11.6**
JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.6.dwg

SIGN NO. 1
R1–1
30"X30"



SIGN NO. 2



SIGN NO. 3

SIGN NO. 4

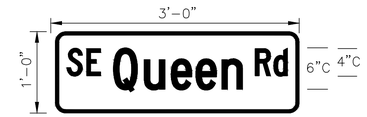
SIGN NO. 5
R2–1
30"X36"

SIGN NO. 6a
W16–8P
24"X8"

SIGN NO. 6
W2–2R
36"X36"

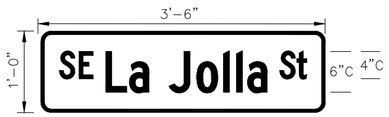
SIGN NO. 7a
W16–7PL
24"X12"

SIGN NO. 7
W11–2
36"X36"

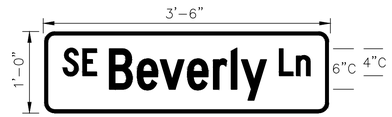


SIGN NO. 8

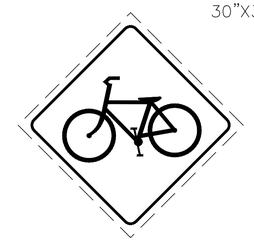
SIGN NO. 9
R3–8
30"X30"



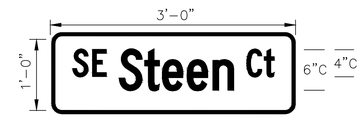
SIGN NO. 10



SIGN NO. 11



SIGN NO. 12
W11–1



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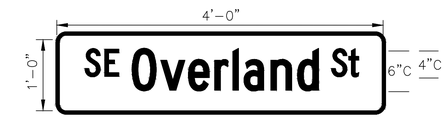

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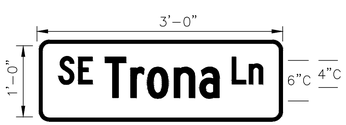
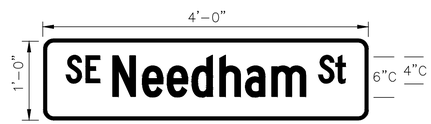


SIGN NO. 15

SIGN NO. 16a
OW11–1a
24"X18"

SIGN NO. 16
OBW1–9
36"X36"



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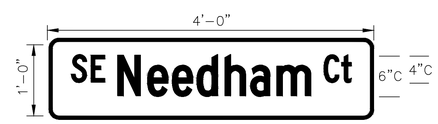

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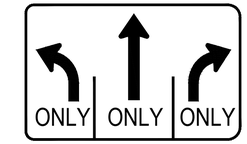
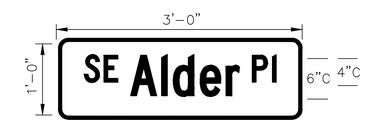


SIGN NO. 19
R3–8b
42"X30"



SIGN NO. 20

SIGN NO. 21a
W16–8P
36"X8"

SIGN NO. 21
W3–3
36"X36"

SIGN NO. 22

SIGN NO. 23

SIGN NO. 24
W11–15

SIGN NO. 25a
W16–9P
24"X12"

SIGN NO. 25
W11–2
36"X36"

NOTE:
SIGNS WITH DASHED BORDER
ARE EXISTING SIGNS.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

CLACKAMAS COUNTY

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SIGNING DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

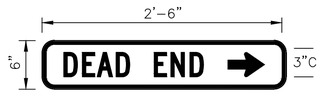
SHEET NO. 11.7

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.7.dwg

SIGN NO. 26
OR22-7
18"X24"

SIGN NO. 27
W11-2
36"X36"



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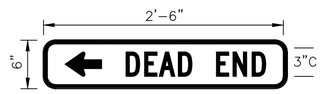

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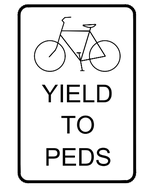
SIGN NO. 30

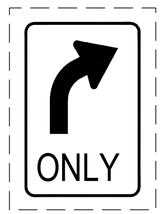


SIGN NO. 31
R9-6

SIGN NO. 32
OM3-R

SIGN NO. 33
OM3-L

SIGN NO. 34



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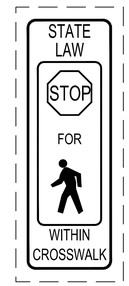
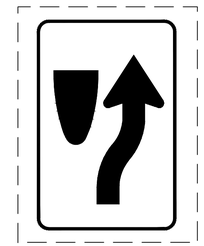
SIGN NO. 36

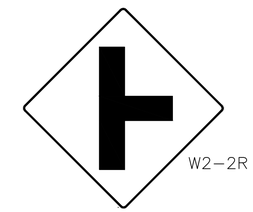


SIGN NO. 37
R1-6



SIGN NO. 38
R4-7

SIGN NO. 39



SIGN NO. 40

NOTE:
SIGNS WITH DASHED BORDER
ARE EXISTING SIGNS.

PREPARED FOR

CLACKAMAS COUNTY
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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
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SIGNING DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 11.8

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.8.dwg

SIGN NO.	STREET NAME	SIGN LOCATION 4/	SIGN DIMENSIONS		SUB-STRATE				COLOR 1/ BACK-GROUND		COLOR 1/ LEGEND			LEGEND TYPE		SIGN NO. 2/	TYPE OF SUPPORT																	POST		FOOTING		REMARKS
																													SECONDARY SIGN (TM676 & TM678)					SIZE	LENGTH	LOCATION 3/	MIN. DEPTH	
			WIDTH	HEIGHT	PLYWOOD	SHEET ALUMINUM	EXTRUDED ALUMINUM (ODOT TM675)	DOUBLE-SIDED	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	NON-REFLECTIVE	PERMANENT	DEMOUNTABLE		WOOD POST (ODOT TM670-671, TM676)	PERF. STEEL SQUARE TUBE (ODOT TM671, TM676, TM681, TM687-669)	TRIANGULAR BASE BREAKAWAY (ODOT TM602)	MULTI-POST BREAKAWAY (ODOT TM220, TM600-601)	STAINLESS STEEL CLAMP (SSC) (TM677)	SIGNAL POLE MOUNT (ODOT TM880)	BRIDGE RAIL MOUNT	STRUCTURE MOUNT	CANTILEVER	CROSSWALK CLOSURE BARRICADE (ODOT TM240)	VERTICAL SIGN MOUNT ON EXISTING STRUCTURE	ADJUSTABLE SIGN MOUNT	MAST ARM SNS MOUNT	C 4 X 5.4	C 4 X 7.25	ROUTE MARKER FRAME (ODOT TM676 & TM678)	LENGTH (FT.)	(BASED ON ESTIMATED LENGTH)	(MUST BE FIELD VERIFIED)			
1	Linwood Ave	60+50 R	30	30		✓			R		SW			✓		1		✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	34'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	71+56 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	37'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	73+95 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	30'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	76+65 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	31'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	78+00 L	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	34'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	80+30 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	33'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	83+70 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	29'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	89+34 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	31'	3'	3/ STATIONING CENTERLINE
	Linwood Ave	92+75 R	30	30		✓			R		SW			✓				✓																2-1/2" x 2-1/2" - 12 ga	13'-9"	30'	3'	3/ STATIONING CENTERLINE
2	Linwood Ave	60+50 R	48	12		✓			G		SW			✓		2																						3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	60+50 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	71+56 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	71+56 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	73+95 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	73+95 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	76+65 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	76+65 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	78+00 L	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	78+00 L	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	80+30 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	80+30 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	83+70 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	83+70 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	89+34 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	89+34 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	92+75 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
	Linwood Ave	92+75 R	48	12		✓			G		SW			✓																								3/ MOUNT ABOVE SIGN NO. 1
3	Linwood Ave	60+50 R	36	12		✓		✓	G		SW			✓		3																						3/ MOUNT ABOVE SIGN NO. 2
5	Linwood Ave	58+45 R	24	30		✓			SW				BK	✓		5		✓																2" x 2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
	Linwood Ave	81+02 R	24	30		✓			SW				BK	✓				✓																2" x 2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
	Linwood Ave	95+25 L	24	30		✓			SW				BK	✓				✓																2" x 2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
6	Linwood Ave	58+15 L	36	36		✓			Y				BK	✓		6		✓																2-1/2" x 2-1/2" - 12 ga	14'-9"	3'	3'	3/ FACE OF CURB
6a	Linwood Ave	58+15 L	24	8		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 6

1/
BK=BLACK
BL=BLUE
BR=BROWN
FY=FLUORESCENT YELLOW
G=GREEN
O=ORANGE
P=PURPLE
R=RED
RB=RED-BLUE
SW=SILVER-WHITE
W=WHITE
Y=YELLOW
YG=FLOURESCENT YELLOW-GREEN

2/
NOTE: L,C,R ARE LOCATIONS OF POSTS FACING THE SIGN.
L = LEFT POST
C = CENTER POST
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3/
DISTANCE FROM EDGE OF TRAVEL LANE, FACE OF CURB, CENTER LINE, GUARDRAIL, OR BARRIER TO THE CENTERLINE OF FOOTING. FOR ADDITIONAL INFORMATION SEE STANDARD DRAWINGS TM600, TM602, AND TM635.

4/
NOTE: THE LOCATIONS SHOWN ARE APPROXIMATE EXCEPT FOR SPEED ZONES, SCHOOL ZONES, OBJECT MARKERS NAD MILEPOST MARKERS. EXACT LOCATIONS ARE TO BE DETERMINED BY THE ENGINEER.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.09.28 16:03:31-0700'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.9
JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.9.dwg

SIGN NO.	STREET NAME	SIGN LOCATION 4/	SIGN DIMENSIONS		SUB-STRATE				COLOR 1/					LEGEND TYPE		SIGN NO. 2/	TYPE OF SUPPORT																	POST		FOOTING		REMARKS
									BACK-GROUND		LEGEND																			SECONDARY SIGN (TM676 & TM678)					SIZE	LENGTH	LOCATION 3/	MIN. DEPTH	
			WIDTH	HEIGHT	PLYWOOD	SHEET ALUMINUM	EXTRUDED ALUMINUM (ODOT TM675)	DOUBLE-SIDED (CLACKAMAS COUNTY T150)	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	NON-REFLECTIVE	PERMANENT	DEMOUNTABLE		WOOD POST (ODOT TM670-671, TM676)	PERF. STEEL SQUARE TUBE (ODOT TM671, TM676, TM681, TM687-689)	TRIANGULAR BASE BREAKAWAY (ODOT TM602)	MULTI-POST BREAKAWAY (ODOT TM220, TM600-601)	STAINLESS STEEL CLAMP (SSC) (TM677)	SIGNAL POLE MOUNT (ODOT TM680)	BRIDGE RAIL MOUNT	STRUCTURE MOUNT	CANTILEVER	CROSSWALK CLOSURE BARRICADE (ODOT TM240)	VERTICAL SIGN MOUNT ON EXISTING STRUCTURE	ADJUSTABLE SIGN MOUNT	MAST ARM SNS MOUNT	C 4 X 5.4	C 4 X 7.25	ROUTE MARKER FRAME (ODOT TM676 & TM678)	LENGTH (FT.)	(BASED ON ESTIMATED LENGTH)	(MUST BE FIELD VERIFIED)			
7	Linwood Ave	60+64 R	36	36		✓			Y				BK	✓		7		✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	60+64 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	60+84 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	60+84 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	80+45 R	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	80+45 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	80+64 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	80+64 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	89+44 R	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	89+44 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	89+55 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
7a	Linwood Ave	89+55 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	92+05 R	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB AND BACK SIDE OF SIGN NO. 27
7a	Linwood Ave	92+05 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
7	Linwood Ave	92+35 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB AND BACK SIDE OF SIGN NO. 27
7a	Linwood Ave	92+35 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 7
9	Linwood Ave	66+38 R	30	30		✓			SW				BK	✓		9		✓																2" x 2" - 12 ga	12'-0"	2'	3'	3/ OFF BACK OF SIDEWALK
	Linwood Ave	70+30 L	30	30		✓			SW				BK	✓				✓																2" x 2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
	Linwood Ave	9+50 R	30	30		✓			SW				BK	✓				✓																2" x 2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
10	Linwood Ave	71+56 R	42	12		✓		✓	G		SW			✓		10																						3/ MOUNT ABOVE SIGN NO. 2
11	Linwood Ave	73+95 R	42	12		✓		✓	G		SW			✓		11																						3/ MOUNT ABOVE SIGN NO. 2
13	Linwood Ave	76+65 R	36	12		✓		✓	G		SW			✓		13																						3/ MOUNT ABOVE SIGN NO. 2
14	Linwood Ave	92+75 R	48	12		✓		✓	G		SW			✓		17																						3/ MOUNT ABOVE SIGN NO. 2
15	Linwood Ave	78+00 L	36	12		✓		✓	G		SW			✓		15																						3/ MOUNT ABOVE SIGN NO. 2
16	Linwood Ave	98+45 R	36	36		✓			G		SW			✓		16																		2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ OFF BACK OF SIDEWALK
16a	Linwood Ave	98+45 R	24	18		✓			G		SW			✓																								3/ MOUNT BELOW SIGN 16
17	Linwood Ave	80+30 R	48	12		✓		✓	G		SW			✓		17																						3/ MOUNT ABOVE SIGN NO. 2

1/
BK=BLACK
BL=BLUE
BR=BROWN
FY=FLUORESCENT YELLOW
G=GREEN
O=ORANGE
P=PURPLE
R=RED
RB=RED-BLUE
SW=SILVER-WHITE
W=WHITE
Y=YELLOW
YG=FLOURESCENT YELLOW-GREEN

2/
NOTE: L,C,R ARE LOCATIONS OF POSTS FACING THE SIGN.
L = LEFT POST
C = CENTER POST
R = RIGHT POST

3/
DISTANCE FROM EDGE OF TRAVEL LANE, FACE OF CURB, CENTER LINE, GUARDRAIL, OR BARRIER TO THE CENTERLINE OF FOOTING. FOR ADDITIONAL INFORMATION SEE STANDARD DRAWINGS TM600, TM602, AND TM635.

4/
NOTE: THE LOCATIONS SHOWN ARE APPROXIMATE EXCEPT FOR SPEED ZONES, SCHOOL ZONES, OBJECT MARKERS NAD MILEPOST MARKERS. EXACT LOCATIONS ARE TO BE DETERMINED BY THE ENGINEER.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.09.28 16:03:56-07'00'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.10
JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.10.dwg

SIGN NO.	STREET NAME	SIGN LOCATION 4/	SIGN DIMENSIONS		SUB-STRATE				COLOR 1/ BACK-GROUND		COLOR 1/ LEGEND			LEGEND TYPE		SIGN NO. 2/	TYPE OF SUPPORT																	POST		FOOTING		REMARKS
																													SECONDARY SIGN (TM676 & TM678)									
			WIDTH	HEIGHT	PLYWOOD	SHEET ALUMINUM	EXTRUDED ALUMINUM (ODOT TM675)	DOUBLE-SIDED	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	NON-REFLECTIVE	PERMANENT	DEMOUNTABLE		WOOD POST (ODOT TM670-671, TM676)	PERF. STEEL SQUARE TUBE (ODOT TM671, TM676, TM681, TM687-689)	TRIANGULAR BASE BREAKAWAY (ODOT TM602)	MULTI-POST BREAKAWAY (ODOT TM220, TM600-601)	STAINLESS STEEL CLAMP (SSC) (TM677)	SIGNAL POLE MOUNT (ODOT TM680)	BRIDGE RAIL MOUNT	STRUCTURE MOUNT	CANTILEVER	CROSSWALK CLOSURE BARRICADE (ODOT TM240)	VERTICAL SIGN MOUNT ON EXISTING STRUCTURE	ADJUSTABLE SIGN MOUNT	MAST ARM SNS MOUNT	C 4 X 5.4	C 4 X 7.25	ROUTE MARKER FRAME (ODOT TM676 & TM678)	LENGTH (FT.)	SIZE (BASED ON ESTIMATED LENGTH)	LENGTH (MUST BE FIELD VERIFIED)	LOCATION 3/	MIN. DEPTH	
18	Linwood Ave	83+70 R	48	12		✓		✓	G		SW			✓		18																						3/ MOUNT ABOVE SIGN NO. 2
19	Johnson Creek Blvd	300' FROM STOP BAR	42	30		✓		✓	G		SW			✓		19																		2-1/2" x 2-1/2" - 12 ga	12'-0"	3'	3'	3/ FACE OF CURB
20	Linwood Ave	89+34 R	36	12		✓		✓	G		SW			✓		20																						3/ MOUNT ABOVE SIGN NO. 2
21	Linwood Ave	94+70 R	36	36		✓			G		SW			✓		21																		2-1/2" x 2-1/2" - 12 ga	15'-6"	5'	3'	3/ FACE OF CURB
21a	Linwood Ave	94+70 R	36	8		✓			G		SW			✓																								3/ MOUNT BELOW SIGN 16
25	Linwood Ave	59+45 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
25a	Linwood Ave	59+45 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 25
25	Linwood Ave	94+73 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
25a	Linwood Ave	94+73 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 25
26	Linwood Ave	59+96 R	24	18		✓			SW				BK	✓		26										✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	59+96 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	64+04 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	64+04 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	64+74 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	64+74 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	71+00 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	71+00 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	71+65 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	71+65 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	79+83 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	79+83 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	88+85 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	88+85 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26
	Linwood Ave	92+90 R	24	18		✓			SW				BK	✓												✓										1'	2'	3/ FACE OF CURB
	Linwood Ave	92+90 R	24	18		✓			SW				BK	✓																								3/ MOUNT BEHIND SIGN 26

1/
BK=BLACK
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2/
NOTE: L,C,R ARE LOCATIONS OF POSTS FACING THE SIGN.
L = LEFT POST
C = CENTER POST
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3/
DISTANCE FROM EDGE OF TRAVEL LANE, FACE OF CURB, CENTER LINE, GUARDRAIL, OR BARRIER TO THE CENTERLINE OF FOOTING. FOR ADDITIONAL INFORMATION SEE STANDARD DRAWINGS TM600, TM602, AND TM635.

4/
NOTE: THE LOCATIONS SHOWN ARE APPROXIMATE EXCEPT FOR SPEED ZONES, SCHOOL ZONES, OBJECT MARKERS NAD MILEPOST MARKERS. EXACT LOCATIONS ARE TO BE DETERMINED BY THE ENGINEER.

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.11.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.09.28 16:04:18-07'00'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **11.11**
JOB NO. CLA-93

SIGN NO.	STREET NAME	SIGN LOCATION 4/	SIGN DIMENSIONS		SUB-STRATE				COLOR 1/ BACK-GROUND		COLOR 1/ LEGEND			LEGEND TYPE		SIGN NO. 2/	TYPE OF SUPPORT																	POST		FOOTING		REMARKS
			WIDTH	HEIGHT	PLYWOOD	SHEET ALUMINUM	EXTRUDED ALUMINUM (ODOT TM675)	DOUBLE-SIDED (CLACKAMAS COUNTY T150)	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	ASTM TYPE III OR TYPE IV	ASTM TYPE IX	NON-REFLECTIVE	PERMANENT	DEMOUNTABLE		WOOD POST (ODOT TM670-671, TM676)	PERF. STEEL SQUARE TUBE (ODOT TM671, TM676, TM681, TM687-689)	TRIANGULAR BASE BREAKAWAY (ODOT TM602)	MULTI-POST BREAKAWAY (ODOT TM220, TM600-601)	STAINLESS STEEL CLAMP (SSC) (TM677)	SIGNAL POLE MOUNT (ODOT TM680)	BRIDGE RAIL MOUNT	STRUCTURE MOUNT	CANTILEVER	CROSSWALK CLOSURE BARRICADE (ODOT TM240)	VERTICAL SIGN MOUNT ON EXISTING STRUCTURE	ADJUSTABLE SIGN MOUNT	MAST ARM SNS MOUNT	SECONDARY SIGN (TM676 & TM678) C 4 X 5.4	C 4 X 7.25	ROUTE MARKER FRAME (ODOT TM676 & TM678)	LENGTH (FT.)	SIZE (BASED ON ESTIMATED LENGTH)	LENGTH (MUST BE FIELD VERIFIED)	LOCATION 3/	MIN. DEPTH	
27	Linwood Ave	60+64 R	36	36		✓			Y				BK	✓		27																						3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	60+64 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	60+84 L	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	60+84 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	80+45 R	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	80+45 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	80+64 L	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	80+64 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	89+44 R	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	89+44 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	89+55 L	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	89+55 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	92+05 R	36	36		✓			Y				BK	✓																								3/ MOUNT ON BACK OF SIGN NO. 7
27a	Linwood Ave	92+05 R	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN 27
27	Linwood Ave	92+28 L	36	36		✓			Y				BK	✓				✓																2-1/2" x 2-1/2" - 12 ga	15'-6"	3'	3'	3/ FACE OF CURB
27a	Linwood Ave	92+28 L	24	12		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 27
28	Linwood Ave	76+65 R	30	6		✓			Y				BK	✓		28																						3/ MOUNT BELOW SIGN NO. 13
	Linwood Ave	78+00 L	30	6		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 15
	Linwood Ave	83+70 R	30	6		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 18
29	Linwood Ave	76+65 R	30	6		✓			Y				BK	✓		29																						3/ MOUNT BELOW SIGN NO. 13
	Linwood Ave	78+00 L	30	6		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 15
	Linwood Ave	83+70 R	30	6		✓			Y				BK	✓																								3/ MOUNT BELOW SIGN NO. 18
40	Linwood Ave	76+06 R	24	24		✓			Y				BK	✓		40																		2" x 2" - 12 ga	13'-0"	1.5'	3'	3/ BACK OF WALK
	Linwood Ave	78+58 L	24	24		✓			Y				BK	✓																				2" x 2" - 12 ga	13'-0"	1.5'	3'	3/ BACK OF WALK
	Linwood Ave	83+14 R	24	24		✓			Y				BK	✓																				2" x 2" - 12 ga	13'-0"	1.5'	3'	3/ BACK OF WALK

1/
BK=BLACK
BL=BLUE
BR=BROWN
FY=FLUORESCENT YELLOW
G=GREEN
O=ORANGE
P=PURPLE
R=RED
RB=RED-BLUE
SW=SILVER-WHITE
W=WHITE
Y=YELLOW
YG=FLOURESCENT YELLOW-GREEN

2/
NOTE: L,C,R ARE LOCATIONS OF POSTS FACING THE SIGN.
L = LEFT POST
C = CENTER POST
R = RIGHT POST

3/
DISTANCE FROM EDGE OF TRAVEL LANE, FACE OF CURB, CENTER LINE, GUARDRAIL, OR BARRIER TO THE CENTERLINE OF FOOTING. FOR ADDITIONAL INFORMATION SEE STANDARD DRAWINGS TM600, TM602, AND TM635.

4/
NOTE: THE LOCATIONS SHOWN ARE APPROXIMATE EXCEPT FOR SPEED ZONES, SCHOOL ZONES, OBJECT MARKERS NAD MILEPOST MARKERS. EXACT LOCATIONS ARE TO BE DETERMINED BY THE ENGINEER.

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 11.12.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.11.08 15:50:32-08'00'
EXPIRES: DEC. 31, 2023

DKS 720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNING DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 11.12
JOB NO. CLA-93

LEGEND

CABINETS

- RX/C — REMOVE EXISTING CONTROLLER CABINET, CONTROLLER, EQUIPMENT, AND FOUNDATION.
- RX/CC — REMOVE EXISTING CONTROLLER CABINET AND CONTROLLER.
- EX/FND — RETAIN AND PROTECT EXISTING FOUNDATION.
- EX/RTC — RETAIN AND PROTECT EXISTING RECESSED TERMINAL CABINET.
- RX/SC — REMOVE EXISTING SERVICE CABINET AND FOUNDATION.
- BMCL — INSTALL 120/240 VOLT METERED WEATHERPROOF BASE MOUNTED SERVICE CABINET.
- 332S — INSTALL A MODEL 332S CABINET AND CONTROL EQUIPMENT WITH RISER FRAME, ORIENT LOUVERED DOOR AS SHOWN.
- C/ATC — FURNISH (ODOT STYLE) INSTALL MODEL ATC CONTROLLER (INTELLIGHT PART NUMBER 2070LDX) WITH MAXVIEW ATMS SOFTWARE (SINGLE LICENSE). CONTROLLER TO BE INSTALLED BY CLACKAMAS COUNTY.
- CID/656 — INSTALL TYPE CLICK 656 CABINET INTERFACE DEVICE (CID) AND SHELF FOR RADAR DETECTION SYSTEM. SEE DETAIL ON SHEET 12.9
- HUB — INSTALL SDLC HUB DEVICE.

POLES

- EX/MPL — RETAIN AND PROTECT EXISTING TRAFFIC MAST ARM POLE WITH LUMINAIRE EXTENSION.
- EX/LA — RETAIN AND PROTECT EXISTING LUMINAIRE ARM.
- EX/MA — RETAIN AND PROTECT EXISTING MAST ARM.
- EX/WP — RETAIN AND PROTECT EXISTING WOOD POLE.
- EX/AN — RETAIN AND PROTECT EXISTING BACK GUY AND ANCHOR(S).
- EX/ST — RETAIN AND PROTECT EXISTING MAST ARM TENON.
- RX/PP — REMOVE EXISTING PEDESTRIAN SIGNAL PEDESTAL.
- RX/PS — REMOVE EXISTING PUSHBUTTON POST.
- RR/UP — PGE TO REMOVE AND RELOCATE EXISTING WOOD UTILITY POLE.
- RI/UP — PGE TO REINSTALL EXISTING WOOD UTILITY POLE.
- PP — INSTALL PEDESTRIAN SIGNAL PEDESTAL WITH FRANGIBLE BASE.
- PS — INSTALL PEDESTRIAN PUSHBUTTON POST WITH FRANGIBLE BASE.
- VP — INSTALL VEHICLE PEDESTAL WITH TRANSFORMER BASE.

SIGNALS

- EX/VPh — RETAIN AND PROTECT EXISTING PHASE (Ph=PHASE) VEHICLE SIGNAL.
- RX/BP — REMOVE EXISTING BACKBOARD.
- RX/PB — REMOVE EXISTING PEDESTRIAN PUSHBUTTON AND INSTRUCTIONAL SIGN.
- RX/P/B — REMOVE EXISTING PEDESTRIAN SIGNAL, PUSHBUTTON, AND INSTRUCTIONAL SIGN.
- BP — INSTALL 2" FLUORESCENT YELLOW RETRO-REFLECTIVE SHEETING ON EXISTING BACKBOARD PER STANDARD DRAWING TM460. USE ALUMINUM STRIPS WITH PRE-APPLIED REFLECTORIZED MATERIAL POP RIVETED TO EXISTING BACKBOARD.
- C/A/Ph — INSTALL PHASE (PH=PHASE) COUNTDOWN PEDESTRIAN SIGNAL WITH CLAMSHELL MOUNT AND AUDIBLE PEDESTRIAN PUSHBUTTON WITH MOUNT. INCLUDE PHASE (PH=PHASE) AUDIBLE PEDESTRIAN SIGNAL (SEE SPECIAL PROVISIONS).
- V/Ph — INSTALL PHASE (Ph=PHASE) VEHICLE SIGNAL WITH 2" FLUORESCENT YELLOW REFLECTIVE SHEETING ON BACKBOARD PER STANDARD DRAWING TM460.
- C/Ph — INSTALL PHASE (PH=PHASE) COUNTDOWN PEDESTRIAN SIGNAL WITH CLAMSHELL MOUNT.
- A/Ph — INSTALL PHASE (PH=PHASE) AUDIBLE PEDESTRIAN PUSHBUTTON WITH MOUNT. INCLUDE PHASE (PH=PHASE) AUDIBLE PEDESTRIAN SIGNAL (SEE SPECIAL PROVISIONS).

JUNCTION BOXES

- RX/JB — REMOVE EXISTING JUNCTION BOX.
- AX/JB — ABANDON EXISTING JUNCTION BOX.
- EX/JB — RETAIN AND PROTECT EXISTING JUNCTION BOX.
- JB/2 — INSTALL 22"x12"x12" (MIN. DIMENSION) PRECAST CONCRETE JUNCTION BOX.
- JB/2A — INSTALL 22"x12"x12" (MIN. DIMENSION) PRECAST CONCRETE JUNCTION BOX WITH CONCRETE APRON.
- JB/3 — INSTALL 30"x17"x12" (MIN. DIMENSION) PRECAST CONCRETE JUNCTION BOX.
- JB/3A — INSTALL 30"x17"x12" (MIN. DIMENSION) PRECAST CONCRETE JUNCTION BOX WITH CONCRETE APRON.

DETECTION

- EX/RAD (T) — RETAIN AND PROTECT EXISTING RADAR VEHICLE DETECTOR UNIT (T).
- R-F/(T) — INSTALL FAR-RANGE RADAR DETECTOR UNIT (T=RADAR). COORDINATE WITH CARL OLSON, CLACKAMAS COUNTY, (503) 742-4684, 14 DAYS PRIOR TO INSTALLATION. SEE GREEN SHEETS.
- R-N/(T) — INSTALL NEAR-RANGE RADAR DETECTOR UNIT (T=RADAR). COORDINATE WITH CARL OLSON, CLACKAMAS COUNTY, (503) 742-4684, 14 DAYS PRIOR TO INSTALLATION. SEE GREEN SHEETS.
- TDC/Ph — INSTALL TRAFFISENSE2 THERMAL DETECTION CAMERA FOR PHASE (PH). SEE SPECIAL PROVISIONS. SEE GREEN SHEETS.

RADAR WITH MOUNTING OPTIONS

W1=WAVETRONIX RADAR DETECTION UNIT (RDU) MOUNTING BRACKET.

WIRES

- EX/W — RETAIN AND PROTECT EXISTING WIRING.
- RX/W — REMOVE EXISTING WIRING.
- X-N/G — INSTALL (X=NUMBER OF CABLES) CONTROL CABLES WITH (N=NUMBER) (G= AWG WIRE SIZE) AWG CONDUCTORS.
- N|G — INSTALL (N=NUMBER) NO. (G=AWG WIRE SIZE) XHHW WIRES.
- RCC/T — INSTALL RADAR CONTROL CABLE (T=RADAR)
- TDF/T — INSTALL 3-CONDUCTOR CABLE FOR PHASE (PH) THERMAL DETECTION CAMERA. SEE SPECIAL PROVISIONS.
- SDLC — INSTALL SYNCHRONOUS DATA LINK CONTROL (SDLC) CABLE. SEE SHEET 12.9 FOR DETAILS.
- N-C — INSTALL (N=NUMBER) NO. 8 AWG THWN (SIGNAL SYSTEM COMMON)
- CAT6 — INSTALL SHIELDED CAT6 INDUSTRIAL ETHERNET CABLE
- N-A — INSTALL (N=NUMBER) PEDESTRIAN BUTTON INTERCONNECT CABLES. SEE SPECIAL PROVISIONS *USE SPARE #14 AWG CONDUCTOR FOR PEDESTRIAN PUSHBUTTON COMMON.
- PL — INSTALL POLY PULL LINE.
- N/G — INSTALL (N=NUMBER) NO. (G=AWG WIRE SIZE) TYPE THWN CONDUCTORS

* USE SPARE #14 AWG CONDUCTOR FOR PEDESTRIAN PUSHBUTTON COMMON.

MISCELLANEOUS

- EX/PTZ — RETAIN AND PROTECT EXISTING PAN-TILT-ZOOM CAMERA.

LUMINAIRES

- EX/LUM — RETAIN AND PROTECT EXISTING LUMINAIRE.
- EX/PE — RETAIN AND PROTECT EXISTING PHOTO ELECTRONIC CONTROL RELAY.

SIGNS

- EX/AL — RETAIN AND PROTECT EXISTING ALUMINUM SIGN AND MOUNT.
- RX/AL — REMOVE EXISTING ALUMINUM SIGN AND MOUNT.
- EX/SNS — RETAIN AND PROTECT EXISTING STREET NAME SIGN.
- PTR/3 — INSTALL LED PART TIME RESTRICTION (30"x36") "NO TURN ON RED" SIGN (R10-11a). SEE DETAIL ON SHEET 12.8.
- AL/22 — INSTALL ALUMINUM (18"X24") "BIKE SIGNAL" SIGN (R10-10b).

FIRE PREEMPTION

- EX/FD (Ch) — RETAIN AND PROTECT EXISTING CHANNEL (Ch) FIRE PREEMPTION DETECTOR UNIT.

CONDUITS

- AX/C — ABANDON EXISTING CONDUIT.
- EX/EC (S) — RETAIN AND PROTECT EXISTING (S=SIZE) CONDUIT.
- EX/IC (S) — RETAIN AND PROTECT EXISTING (S=SIZE) INTERCONNECT CONDUIT.
- EX/DC (S) — RETAIN AND PROTECT EXISTING (S=SIZE) DETECTOR CONDUIT.
- S — INSTALL (S=SIZE) INCH CONDUIT.
- CJ — SPLICE NEW ELECTRICAL CONDUIT TO EXISTING ELECTRICAL CONDUIT.
- W — INSTALL CONDUIT AND WIRE AS REQUIRED BY POWER COMPANY.
- HDD — INSTALL CONDUIT BY HORIZONTAL DIRECTIONAL DRILLING, OPEN TRENCH NOT ALLOWED.

INTERCONNECT

- FO/N — INSTALL (N=NUMBER) SINGLE MODE FIBER OPTIC CABLE FOR FIBER OPTIC CONNECTION PATCH PANEL BY PANEL MANUFACTURER. SEE ODOT GREEN SHEETS FOR PRODUCT INFO.
- X/CFO — COIL (X=NUMBER) FEET OF EACH FIBER OPTIC CABLE.
- HH/1 — INSTALL 24"x30"x24" (MIN. DIMENSION) FIBER OPTIC HAND HOLE.
- EX/OHIC — MAINTAIN AND PROTECT EXISTING OVERHEAD FIBER OPTIC INTERCONNECT LINE.
- RR/OHIC — AGENCIES TO REMOVE AND RELOCATE EXISTING OVERHEAD FIBER OPTIC INTERCONNECT LINE.
- RI/OHIC — AGENCIES TO REINSTALL EXISTING OVERHEAD FIBER OPTIC INTERCONNECT LINE.
- EX/SPC — MAINTAIN AND PROTECT EXISTING FIBER OPTIC AERIAL SPLICE CLOSURE.
- RR/SPC — REMOVE AND RELOCATE EXISTING FIBER OPTIC AERIAL SPLICE CLOSURE.
- RI/SPC — REINSTALL EXISTING FIBER OPTIC AERIAL SPLICE CLOSURE.
- FCCP — INSTALL FIBER OPTIC PATCH PANEL. SEE ODOT GREEN SHEET.

GENERAL NOTES:

1. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO CLACKAMAS COUNTY ORDINANCES AND SPECIAL PROVISIONS, THE 2021 OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION, AND THE OREGON STANDARD DRAWINGS LISTED BELOW.
2. THE CONTRACTOR SHALL SUPPLY ALL EQUIPMENT, MATERIALS, AND LABOR REQUIRED FOR THE SIGNAL OPERATIONS SHOWN ON THIS PLAN. ALL SIGNAL CONTROL EQUIPMENT SHALL BE TESTED AT THE ODOT SIGNAL LAB IN SALEM AT THE CONTRACTORS EXPENSE PER SPECIFICATION.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION OF EXISTING UTILITIES AND COORDINATE THIS WORK WITH THE UTILITY COMPANIES/AGENCIES TO ELIMINATE ANY CONFLICTS.
4. THE CONTRACTOR SHALL COORDINATE WORK WITH PGE FOR POWER SERVICE CONNECTION. THE CONTRACTOR SHALL INSTALL CONDUIT AND WIRING TO THE POWER SOURCE AS REQUIRED BY PGE. CONTRACTOR SHALL COORDINATE WITH PGE (SERVICE DESK, 503-736-5450) FOR ALL POWER REQUIREMENTS.
5. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION OF ALL SIGNAL EQUIPMENT BEFORE INSTALLATION.
6. CLACKAMAS COUNTY WILL PROVIDE SIGNAL FIELD TESTING SERVICES AT THE CONTRACTOR'S EXPENSE.
7. CLACKAMAS COUNTY WILL PROVIDE SIGNAL TIMING.
8. EQUIPMENT SUBMITTALS AND POLE DRAWINGS SHALL BE PROVIDED TO CLACKAMAS COUNTY BY THE CONTRACTOR AFTER AN INITIAL REVIEW HAS BEEN COMPLETED BY THE PROJECT ENGINEER. CLACKAMAS COUNTY APPROVAL OF THESE SUBMITTALS MUST BE OBTAINED PRIOR TO CONSTRUCTION.
9. RETAIN AND PROTECT EXISTING SIGNAL AND DETECTION DURING CONSTRUCTION UNTIL NEW SIGNAL INSTALLATION IS COMPLETE. AND READY FOR TURN-ON. MAINTAIN MINIMUM SIGNAL OPERATION DOWN TIME.
10. ALL JUNCTION BOXES SHALL BE PLACED IN SIDEWALK OR CONCRETE APRON AS PROVIDED.
11. INSTALL #12 STANDARD COPPER (ORANGE) TRACER WIRE IN ALL CONDUITS. GROUND ALL TRACER WIRES.
12. CONDUIT SHALL BE PLACED IN THE SAME TRENCH WITH OTHER CONDUITS WHEN POSSIBLE.
13. TOP OF SIGNAL AND PEDESTRIAN FOUNDATIONS SHALL MATCH TOP OF FINISHED GRADE OF SIDEWALKS.
14. ALL CONDUIT RUNS SHALL BE WITHIN RIGHT-OF-WAY.
15. INSTALL POLY PULL TAPE (1800 LBF MIN. STRENGTH, NON CONDUCTIVE) IN ALL CONDUITS.
16. ALL UNDERGROUND CONDUITS AND FITTINGS SHALL BE SCHEDULE 80 PVC.
17. IF PEDESTRIAN RAMP DESIGNS REQUIRED FIELD MODIFICATIONS, PUSHBUTTON POSTS AND AND PEDESTRIAN POLE LOCATIONS WILL NEED FIELD ADJUSTMENT TO MODIFIED LANDING AREAS. IF FIELD ADJUSTMENTS ARE REQUIRED ENSURE A MINIMUM 10" REACH TO PUSHBUTTON IS ACHIEVABLE FROM LANDING AREA, AND MINIMUM 4' PEDESTRIAN ZONE IS ACHIEVABLE AROUND POLES.
18. ACCOMPANIED BY OREGON STANDARD DRAWINGS TM450, TM457, TM460, TM462, TM466, TM467, TM470, TM471, TM472, TM482, TM485 & CLACKAMAS STANDARD DRAWINGS U200.

HEADS AND SIGNAL HEAD MOUNTING OPTIONS

6R	=	12"RRTA, 12"YRTA, 12"YRTFA, 12"GRTA
AB	=	ADJUSTABLE SIGN BRACKET ASSEMBLY W/RAIN CAP(S) (INSTALL 1" GALVANIZED CHASE NIPPLE)
B	=	ADJUSTABLE SIGNAL BRACKET ASSEMBLY W/RAIN CAP(S) (INSTALL 1" GALVANIZED CHASE NIPPLE)
SM	=	4" SIDE POLE SIGNAL MOUNT
4B	=	12"RBS, 12"YBS, 12"GSA, BS=BIKE SYMBOL (SEE SHEET 12.8 FOR DETAILS)

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.11.08 15:51:01-08'00'
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNAL LEGEND

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **12.0**

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 12.0.dwg

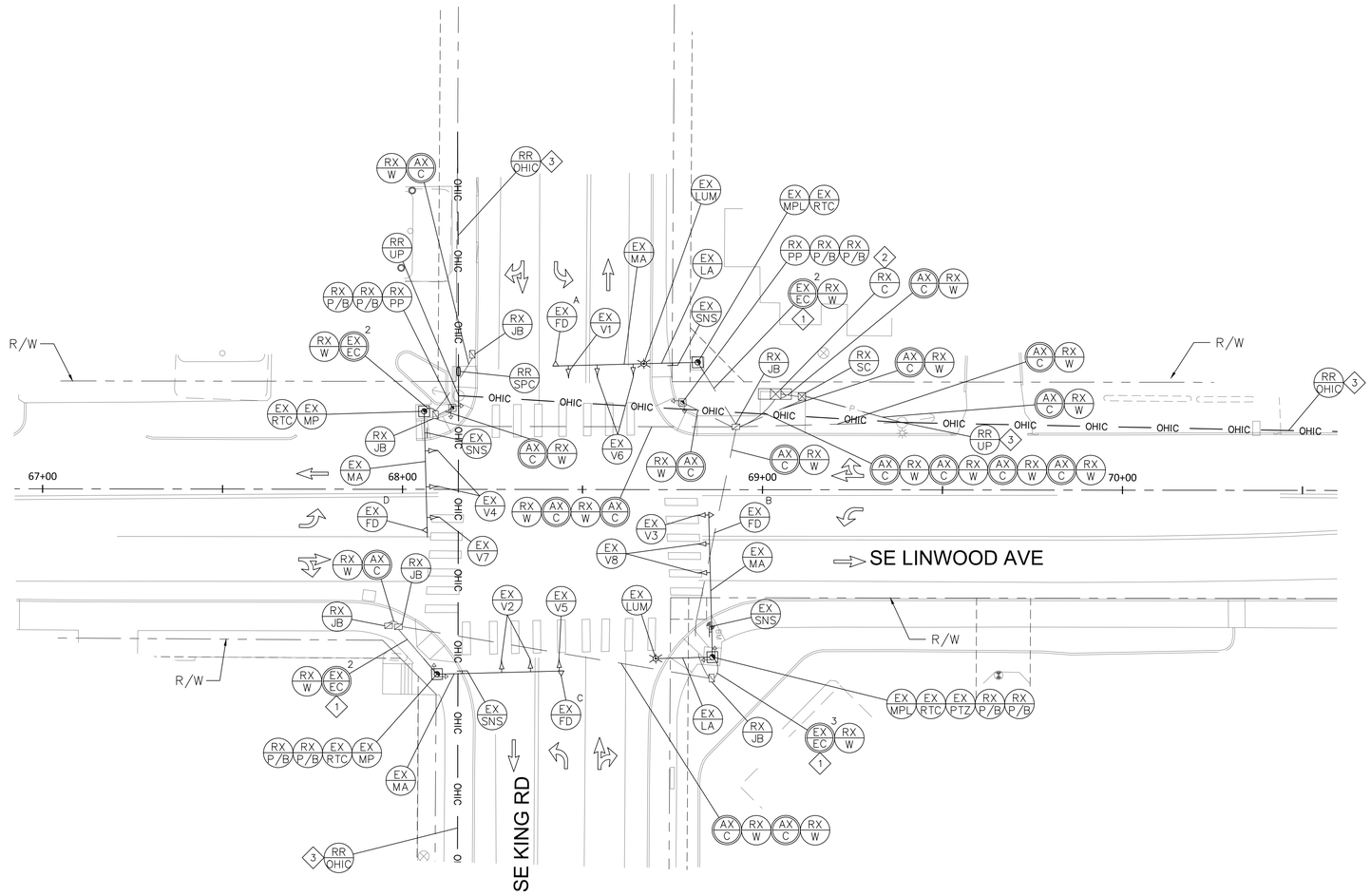
CONSTRUCTION NOTES

1. CONTRACTOR TO SPLICE EXISTING CONDUIT INTO NEW CONDUIT/JUNCTION BOX (SEE SIGNAL PLAN).
2. RELOCATE FIBER OPTIC COMMUNICATIONS RACK AND ETHERNET FIBER SWITCH (SEE SIGNAL PLAN).
3. UTILITIES AND COUNTY TO RELOCATE FIBER AND POWER SERVICE ATTACHMENTS FROM UTILITIY POLE TO BE REMOVED TO NEW UTILITY POLE. CONTRACTOR TO COORDINATE RELOCATIONS WITH PGE AND COUNTY.

GENERAL NOTES:

1. ABANDON EXISTING LOOP DETECTION, INCLUDING ASSOCIATED JUNCTION BOXES, CONDUIT, AND FEEDER CABLES.

SIGNAL REMOVAL PLAN
LINWOOD AVE AT KING RD
(CLACKAMAS COUNTY, OREGON)



0 20 40 80
SCALE: 1" = 40'

PREPARED FOR				
CLACKAMAS COUNTY DEVELOPMENT AGENCY DEVELOPMENT SERVICES BLDG. 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE	NO.	DESCRIPTION	DESIGNED: CAL
				DRAWN: KCD
				CHECKED: SJB
				DATE: 09-28-22
	R E V I S I O N S			

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
Digitally Signed 2022.09.29 14:01:44-07'00'
EXPIRES: DEC. 31, 2023

DKS 720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

SIGNAL REMOVAL PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

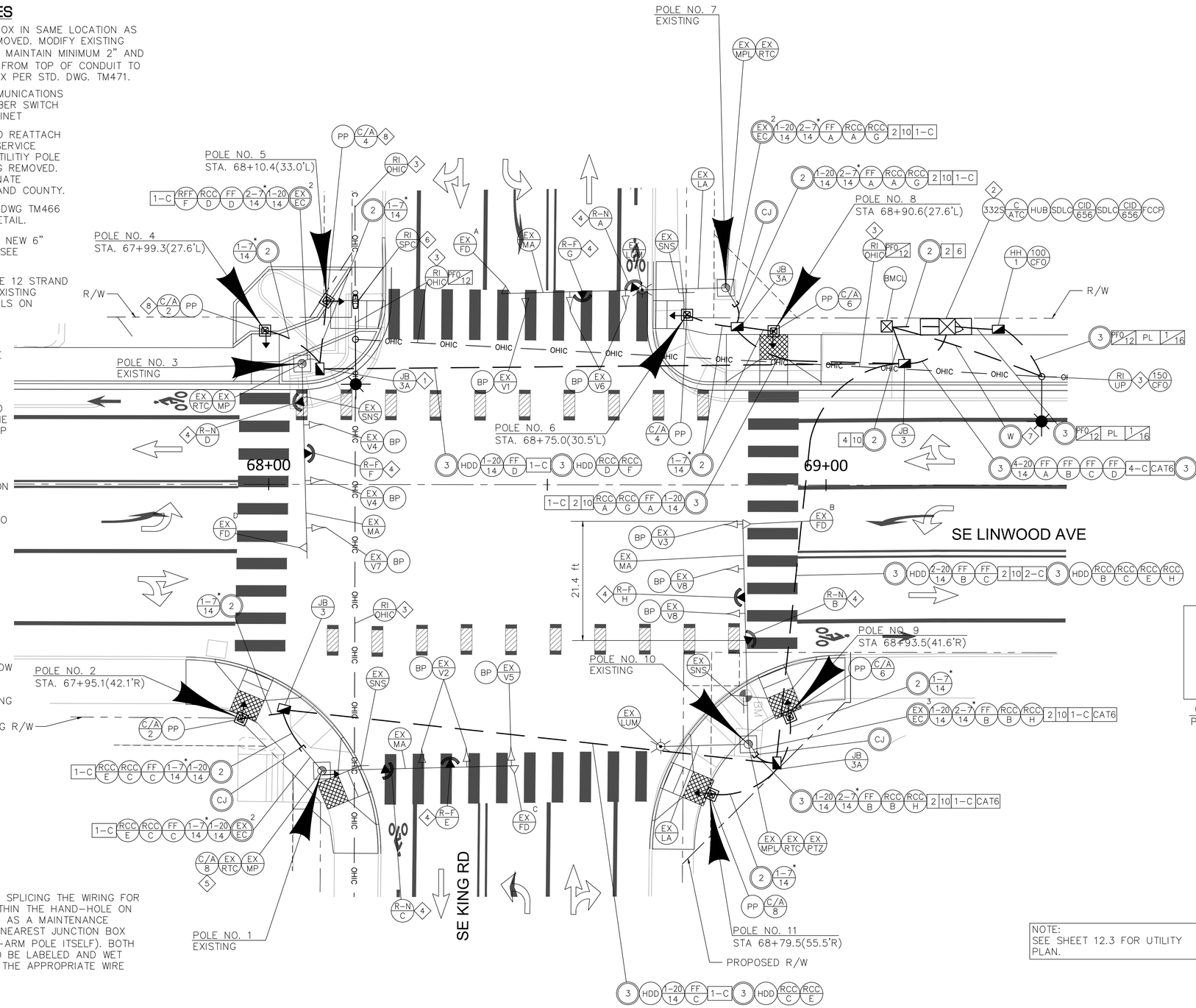
SHEET NO. **12.1**
JOB NO. CLA-93

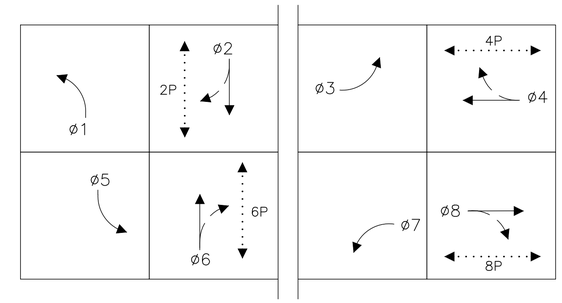
X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 12.1.dwg

CONSTRUCTION NOTES

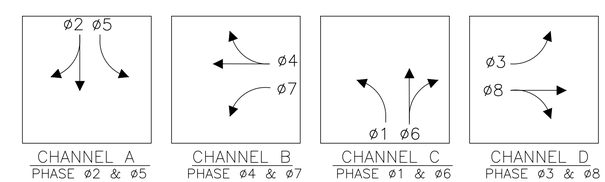
1. INSTALL NEW JUNCTION BOX IN SAME LOCATION AS JUNCTION BOX BEING REMOVED. MODIFY EXISTING CONDUITS AS NEEDED TO MAINTAIN MINIMUM 2" AND MAXIMUM 3" CLEARANCE FROM TOP OF CONDUIT TO BOTTOM OF JUNCTION BOX PER STD. DWG. TM471.
2. REINSTALL EXISTING COMMUNICATIONS PANEL AND ETHERNET FIBER SWITCH IN NEW CONTROLLER CABINET
3. UTILITIES AND COUNTY TO REATTACH NEW FIBER AND POWER SERVICE ATTACHMENTS TO NEW UTILITIY POLE FROM UTILITY POLE BEING REMOVED. CONTRACTOR TO COORDINATE RELOCATIONS WITH PGE AND COUNTY.
4. SEE SHEET OREGON STD DWG TM466 FOR RADAR MOUNTING DETAIL.
5. INSTALL PUSHBUTTON ON NEW 6" PUSHBUTTON EXTENDER. SEE DETAIL ON SHEET 12.8
6. CONTRACTOR TO RESPLICE 12 STRAND FIBER OPTIC CABLE AT EXISTING SPLICE VAULT. SEE DETAILS ON SHEETS 12.10 – 12.12
7. CONTACT PGE SERVICE COORDINATOR PRIOR TO CONSTRUCTION AT PHONE NUMBER 503–323–6700. REFERENCE WORK ORDER NUMBER #M3265750.
8. BREAK EXISTING CURB SO THAT THE BOTTOM OF THE FRANGIBLE BASE LINES UP FLUSH WITH THE GUTTER POINT OF CURB AT SIDEWALK FINISH GRADE. CONSTRUCT PEDESTRIAN PUSH BUTTON FOUNDATION PRIOR TO POURING TURN SPACE CONCRETE. POUR FOUNDATION CONCRETE TO WITHIN 4" OF THE FOUNDATION CORNER ELEVATIONS. THE HORIZ. HOOPS SHALL BE COMPLETELY ERASED IN CONCRETE DURING THE FIRST POUR. THE REMAINING 4" OF FOUNDATION CONCRETE SHALL BE POURED AND FINISHED AS TURNING SPACE. TOP OF FOUNDATION SHALL FOLLOW THE SAME FINISH GRADE SLOPE REQUIREMENTS AS THE SURROUNDING TURNING SPACE.

SIGNAL PLAN
LINWOOD AVE AT KING RD
(CLACKAMAS COUNTY, OREGON)





NORMAL PHASE ROTATION



FIRE PREEMPTION OPERATION

GENERAL NOTES

THE COUNTY APPROVES OF SPLICING THE WIRING FOR THE PEDESTRIAN POLES WITHIN THE HAND–HOLE ON MAST–ARM POLE, AS LONG AS A MAINTENANCE LOOP IS PROVIDED IN THE NEAREST JUNCTION BOX (NOT COILED IN THE MAST–ARM POLE ITSELF). BOTH SIDES OF SPLICES NEED TO BE LABELED AND WET LOCATIONS NEED TO HAVE THE APPROPRIATE WIRE NUTS.

NOTE:
FIELD VERIFY MEASUREMENTS PRIOR TO CONSTRUCTION.

NOTE:
SEE SHEET 12.0 FOR TRAFFIC SIGNAL LEGEND.

NOTE:
SEE SHEET 12.7 FOR POLE ENTRANCE CHART.

NOTE:
SEE SHEET 12.3 FOR UTILITY PLAN.

0 5 10 20
SCALE: 1" = 10'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
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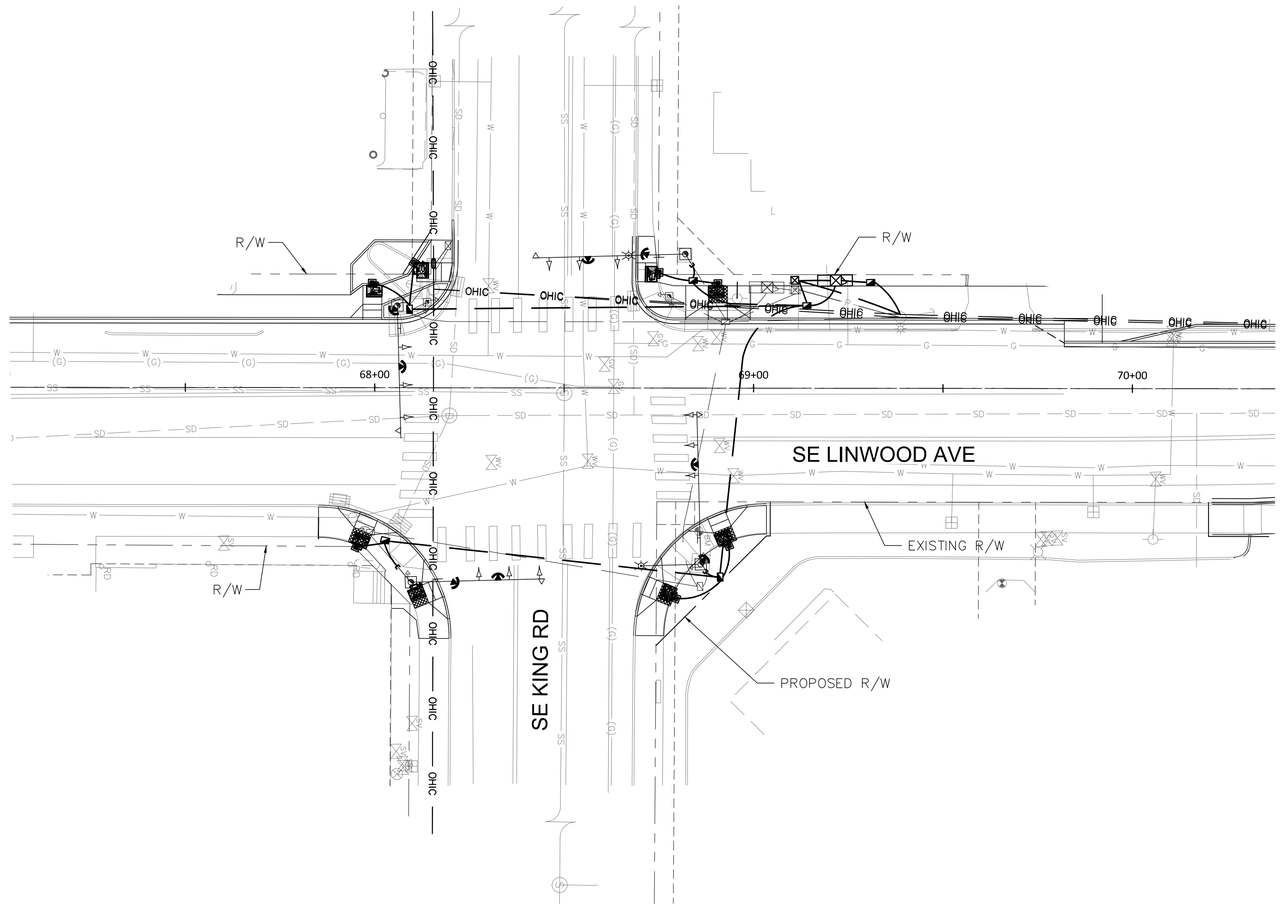
SIGNAL PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **12.2**
JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 12.2.dwg

EXISTING UTILITY PLAN
LINWOOD AVE AT KING RD
(CLACKAMAS COUNTY, OREGON)



NOTE:
PROPOSED TRAFFIC SIGNAL EQUIPMENT SHOWN FOR REFERENCE ONLY.

0 10 20 40
SCALE: 1" = 20'

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 12.3.dwg

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DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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JUNE 12, 2013
STEVEN J. BOICE
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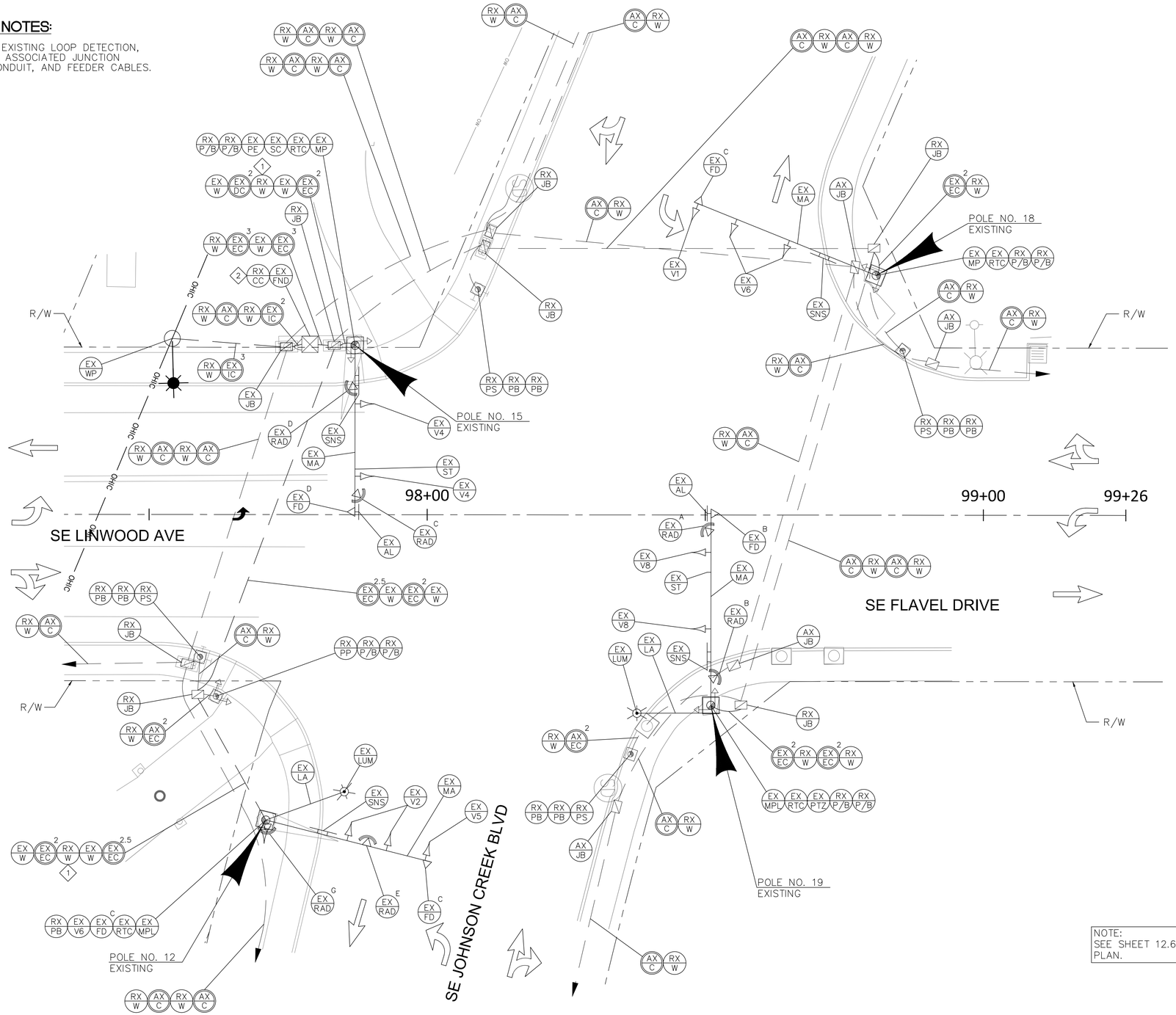
EXISTING UTILITY PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **12.3**
JOB NO. CLA-93

GENERAL NOTES:

1. ABANDON EXISTING LOOP DETECTION, INCLUDING ASSOCIATED JUNCTION BOXES, CONDUIT, AND FEEDER CABLES.

SIGNAL REMOVAL PLAN
LINWOOD AVE AT JOHNSON CREEK BLVD
(CLACKAMAS COUNTY, OREGON)



CONSTRUCTION NOTES

1. REMOVE EXISTING WIRING RUNNING FROM TRAFFIC SIGNAL POLE 12 TO PUSHBUTTON POLE SHOWN FOR REMOVAL. INSTALL NEW WIRING AS SHOWN ON SIGNAL PLAN SHEET.
2. REMOVE EXISTING CONTROLLER CABINET AND CONTROLLER AND MAINTAIN EXISTING FOUNDATION FOR NEW CONTROLLER CABINET INSTALLATION AS SHOWN ON SIGNAL PLAN. RELOCATE EXISTING RADAR EQUIPMENT, SDLC HUB, FIBER OPTIC COMMUNICATIONS RACK, AND ETHERNET FIBER SWITCH AND REINSTALL IN NEW CONTROLLER CABINET AS SHOWN ON SIGNAL PLAN SHEET.

NOTE:
FIELD VERIFY MEASUREMENTS PRIOR TO CONSTRUCTION.

NOTE:
SEE SHEET 12.0 FOR TRAFFIC SIGNAL LEGEND.

NOTE:
SEE SHEET 12.6 FOR UTILITY PLAN.

NOTE:
SEE SHEET 12.7 FOR POLE ENTRANCE CHART.

0 5 10 20
SCALE: 1" = 10'

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OREGON CITY, OR 97045

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SIGNAL REMOVAL PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **12.4**
JOB NO. CLA-93

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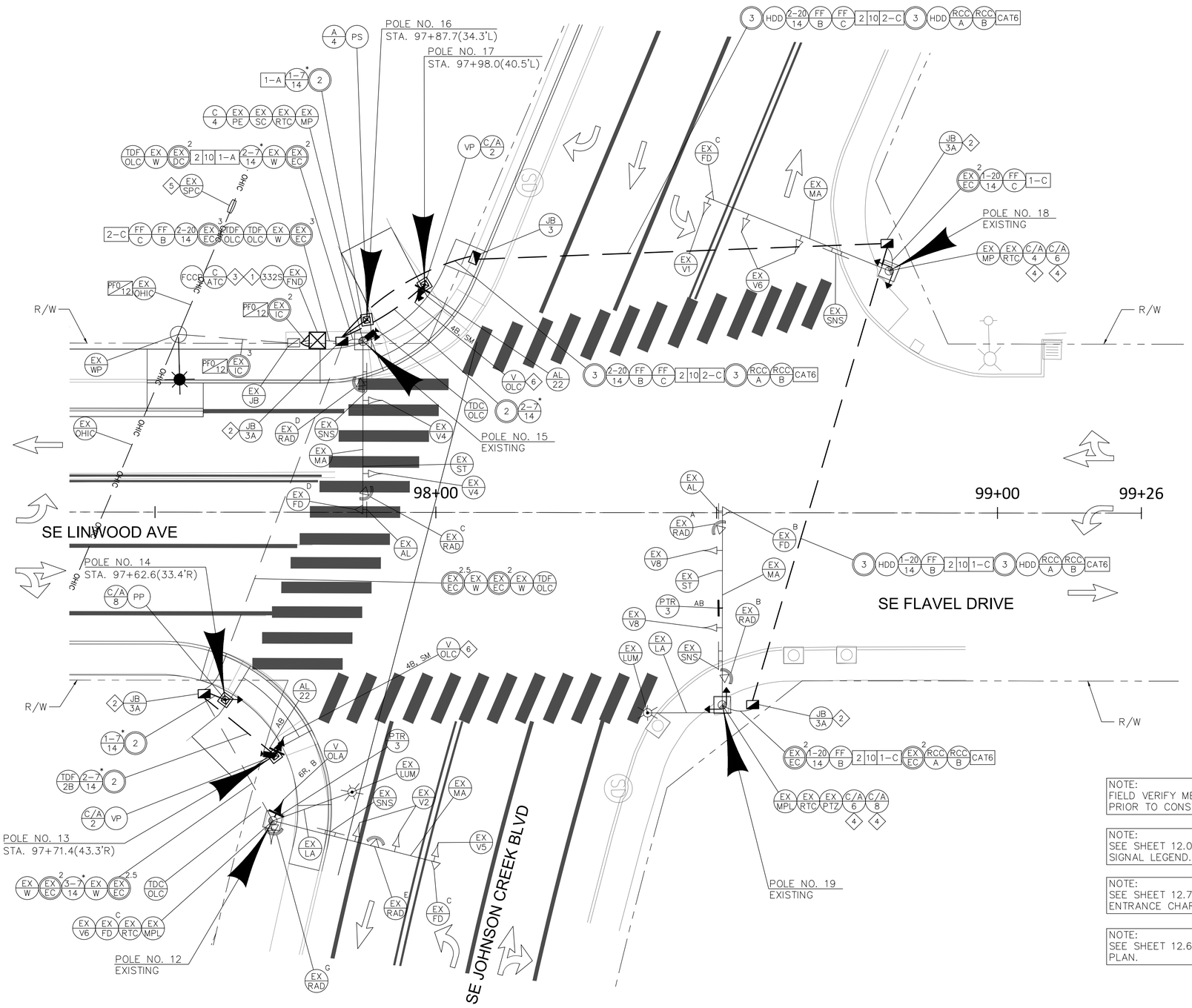
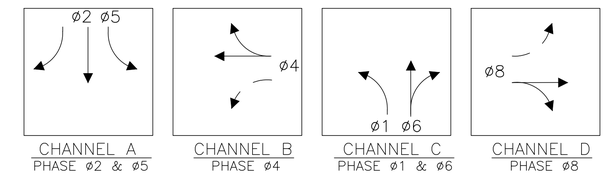
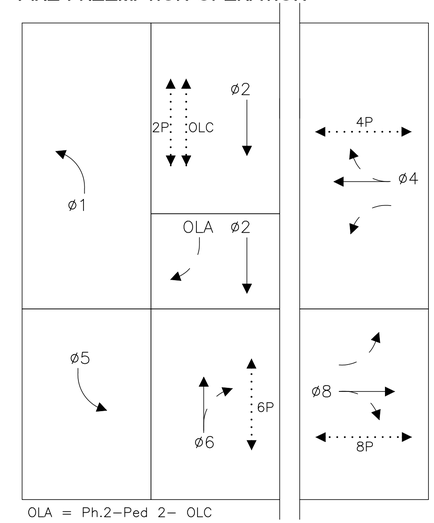
SIGNAL PLAN
LINWOOD AVE AT JOHNSON CREEK BLVD
(CLACKAMAS COUNTY, OREGON)





FIRE PREEMPTION OPERATION



OLA = Ph.2–Ped 2– OLC
OLC = BIKE 2

NORMAL PHASE ROTATION

CONSTRUCTION NOTES

1. INSTALL NEW CONTROLLER CABINET AND CONTROLLER ON EXISTING FOUNDATION, SEE SHEET 12.9 FOR DETAILS. REINSTALL EXISTING RADAR EQUIPMENT, SDLC EQUIPMENT, AND FIBER OPTIC EQUIPMENT.
2. INSTALL NEW JUNCTION BOX IN SAME LOCATION AS JUNCTION BOX BEING REMOVED. MODIFY CONDUITS AS NEEDED TO MAINTAIN MINIMUM 2" AND MAXIMUM 3" CLEARANCE FROM TOP OF CONDUIT TO BOTTOM OF JUNCTION BOX PER ODOT STD. DWG. TM471. REPLACE SIDEWALK PANEL AS NEEDED.
3. INSTALL TWO NEW BPL2 EDGE RACK CARDS IN CONTROLLER CABINET FOR NEW THERMAL DETECTION CAMERAS.
4. INSTALL PUSHBUTTON ON NEW 6" PUSHBUTTON EXTENDER. SEE DETAIL ON SHEET 12.8
5. CONTRACTOR TO RESPLICE 12 STRAND FIBER OPTIC CABLE AT EXISTING SPLICE VAULT. SEE DETAILS ON SHEETS 12.10 – 12.12
6. MOUNT BOTTOM OF SIGNAL HEAD 17' FROM BOTTOM OF VEHICLE POLE WITH SIGN MOUNTED BELOW. SEE ODOT STD. DWG. TM450.

NOTE:
FIELD VERIFY MEASUREMENTS PRIOR TO CONSTRUCTION.

NOTE:
SEE SHEET 12.0 FOR TRAFFIC SIGNAL LEGEND.

NOTE:
SEE SHEET 12.7 FOR POLE ENTRANCE CHART.

NOTE:
SEE SHEET 12.6 FOR UTILITY PLAN.

0 5 10 20
SCALE: 1" = 10'

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SIGNAL MODIFICATION PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 12.5
JOB NO. CLA-93

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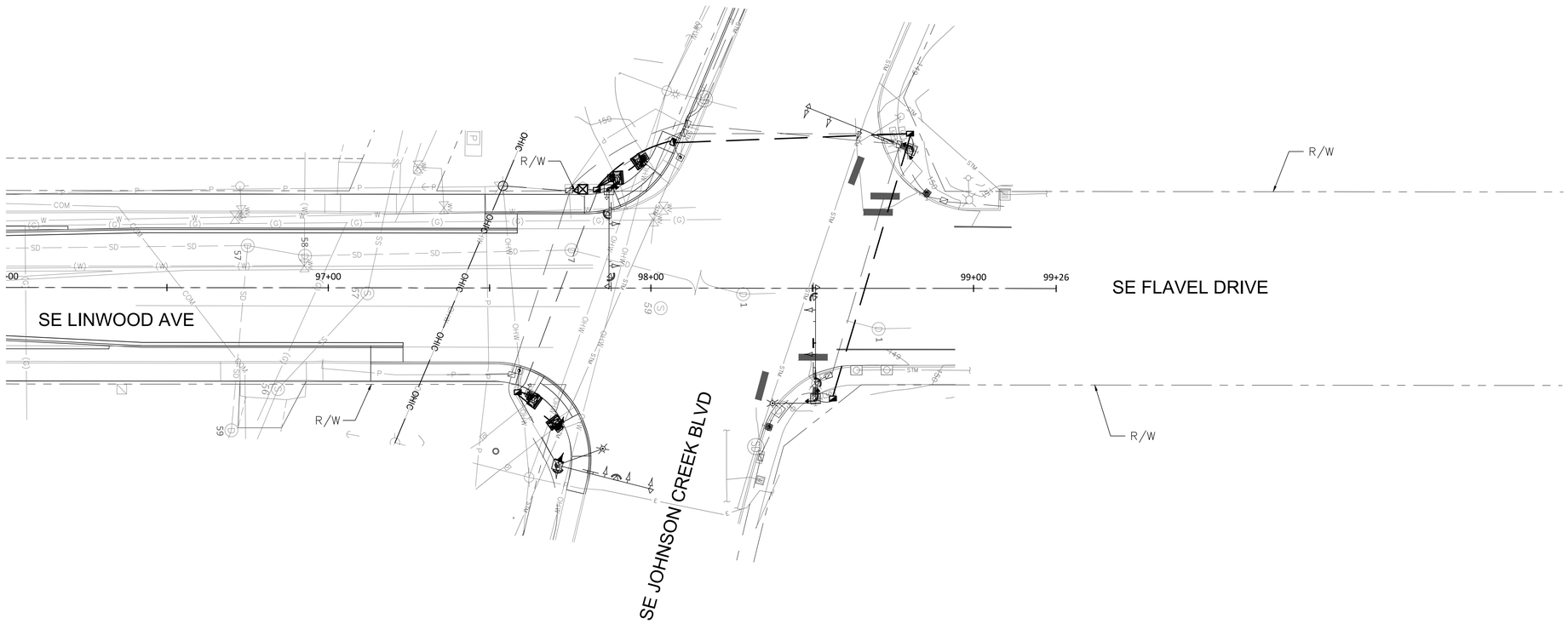
EXISTING UTILITY PLAN
LINWOOD AVE AT JOHNSON CREEK BLVD
(CLACKAMAS COUNTY, OREGON)



NOTE:
PROPOSED TRAFFIC SIGNAL EQUIPMENT SHOWN FOR REFERENCE ONLY.

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

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EXISTING UTILITY PLAN
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. **12.6**
JOB NO. CLA-93

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POLE ENTRANCE CHART

		SEE TM650 THRU TM653	EQUIPMENT ON POLE					EQUIPMENT ON MAST ARM (LENGTH IN FEET AND EQUIPMENT TYPE)									FOUNDATION INFORMATION (SEE STD. DWG. TM457)	LUMINAIRES					MISC. EQUIP.
POLE NO.	DWG. NO.	TYPE	PED. SIGNAL DEG.	PED. PUSHBUTTON DEG.	TERM. CABINET DEG.	SIGN DEG.	TRAFFIC SIGNAL DEG.	ARM LENGTH	D1	D2	D3	D4	D5	D6	D7	D8	–	ARM LENGTH	ARM DEG.	MOUNTING HEIGHT	FIXTURE TYPE	WATTAGE	ON ARM
1	12.2	EX MP	90	90	EX	–	–	EX	EX FD	EX V3L	EX V2	12.0 RAD	EX V2	24.0 RAD	EX SNS	– –	EXISTING	–	–	–	–	–	–
2	12.2	PP	0	0	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
3	12.2	EX MP	–	–	EX	–	–	EX	EX FD	EX V3L	EX V2	19.0 RAD	EX V2	28.5 RAD	EX SNS	– –	EXISTING	–	–	–	–	–	–
4	12.2	PP	0	0	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
5	12.2	PP	90	90	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
6	12.2	PP	90	90	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
7	12.2	EX MPL	–	–	EX	–	–	EX	EX FD	EX V3L	EX V2	15.0 RAD	EX V2	30.0 RAD	25.0 RAD	EX SNS	EXISTING	EX	EX	EX	EX	EX	–
8	12.2	PP	180	180	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
9	12.2	PP	180	180	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
10	12.2	EX MPL	–	–	EX	–	–	EX	EX FD	EX V3L	EX V2	12.5 RAD	EX V2	21.5 RAD	EX SNS	– –	EXISTING	EX	EX	EX	EX	EX	–
11	12.2	PP	270	270	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
12	12.6	EX MPL	–	–	EX	280	280	EX	EX FD	EX V3L	EX V2	EX RAD	EX V2	EX SNS	– –	– –	EXISTING	EX	EX	EX	EX	EX	–
13	12.6	VP	15	195	–	300	300	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
14	12.6	PP	270	90	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
15	12.6	EX MP	180	–	EX	–	–	EX	EX AL	EX FD	EX RAD	EX V2	EX ST	EX V2	EX RAD	EX SNS	EXISTING	–	–	–	–	–	–
16	12.6	PS	–	260	–	–	–	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
17	12.6	VP	10	190	–	120	120	–	– –	– –	– –	– –	– –	– –	– –	– –	*	–	–	–	–	–	–
18	12.6	EX MPL	90/180	0/260	EX	–	–	EX	EX FD	EX V3L	EX V2	EX V2	EX SNS	– –	– –	– –	EXISTING	–	–	–	–	–	–
19	12.6	EX MPL	90/180	0/270	EX	–	–	EX	EX AL	EX FD	EX RAD	EX V2	EX ST	EX V2	EX SNS	EX RAD	EXISTING	EX	EX	EX	EX	EX	–

NOTES

V2 = TRAFFIC SIGNAL TYPE 2, ADJUSTABLE BRACKET MOUNT (SEE STD. DWG. TM462)
V3L = TRAFFIC SIGNAL TYPE 3L, ADJUSTABLE BRACKET MOUNT (SEE STD. DWG. TM462)
MPL = MAST ARM POLE WITH LUMINAIRE EXTENSION
MP = MAST ARM POLE
PP = PEDESTRIAN SIGNAL PEDESTAL
WP = WOOD POLE
RAD = RADAR DETECTOR
FD = FIRE PREEMPTION DETECTOR
ST = MAST ARM TENON
AL = ALUMINUM SIGN
SNS = STREET NAME SIGN

EX = EXISTING

* = SEE ODOT STD. DWG. TM457 FOR PEDESTRIAN SIGNAL PEDESTAL AND VEHICLE PEDESTAL FOUNDATION INFORMATION.

NOTE:
SEE SHEET 12.8 FOR POLE ORIENTATION DIAGRAMS.

PREPARED FOR

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DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REVISIONS

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REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
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SIGNAL DETAILS
LINWOOD AVENUE IMPROVEMENTS
CLACKAMAS COUNTY, OREGON

SHEET NO. 12.7
JOB NO. CLA-93

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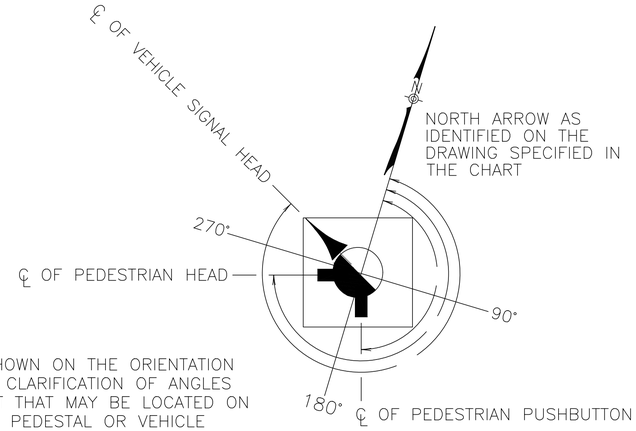
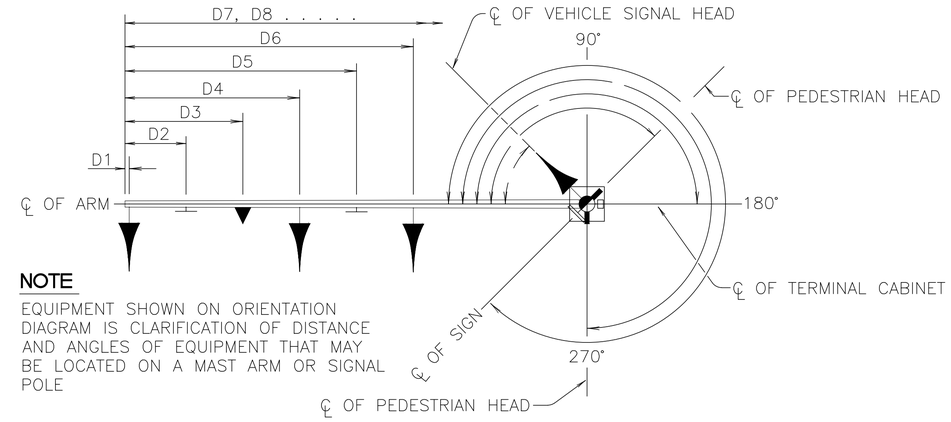


NOTE

EQUIPMENT SHOWN ON THE ORIENTATION DIAGRAM IS A CLARIFICATION OF ANGLES OF EQUIPMENT THAT MAY BE LOCATED ON A PEDESTRIAN PEDESTAL OR VEHICLE PEDESTAL

PEDESTRIAN PEDESTAL / VEHICLE PEDESTAL ORIENTATION DIAGRAM

DEGREES MEASURED CLOCKWISE FROM NORTH ARROW



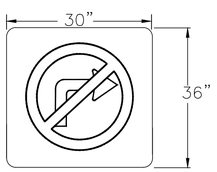
NOTE

EQUIPMENT SHOWN ON ORIENTATION DIAGRAM IS CLARIFICATION OF DISTANCE AND ANGLES OF EQUIPMENT THAT MAY BE LOCATED ON A MAST ARM OR SIGNAL POLE

MAST ARM / LUMINAIRE ARM POLE ORIENTATION DIAGRAM

DEGREES MEASURED CLOCKWISE FROM MAST ARM

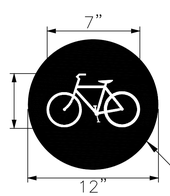
LED NO RIGHT TURN
PART–TIME RESTRICTION (PTR) SIGN



MUTCD R3–1
RIGHT ARROW – WHITE (INTERNALLY ILLUMINATED)
CIRCLE – RED (INTERNALLY ILLUMINATED)
BACKGROUND – BLACK (NON–REFLECTIVE)

PART-TIME RESTRICTION SIGN DETAIL

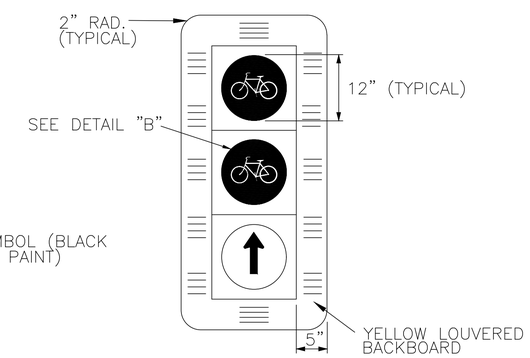
NOT TO SCALE



DETAIL "B"

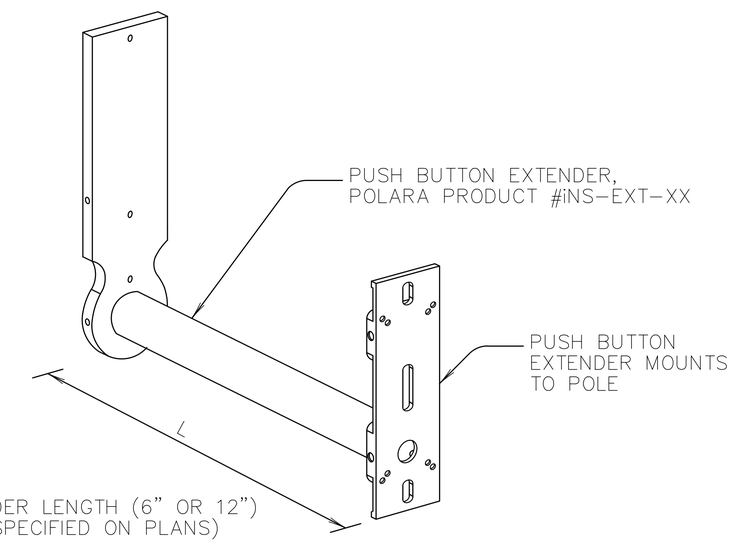
NOT TO SCALE

BIKE SYMBOL (BLACK LACQUER PAINT)



BIKE SIGNAL HEAD DETAIL (4B)

NOT TO SCALE



PUSH BUTTON EXTENDER DETAIL

NOT TO SCALE

PREPARED FOR

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OREGON CITY, OR 97045

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DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74,348 OREGON JUNE 12, 2013 STEVEN J. BOICE
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SIGNAL DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 12.8

JOB NO. CLA-93

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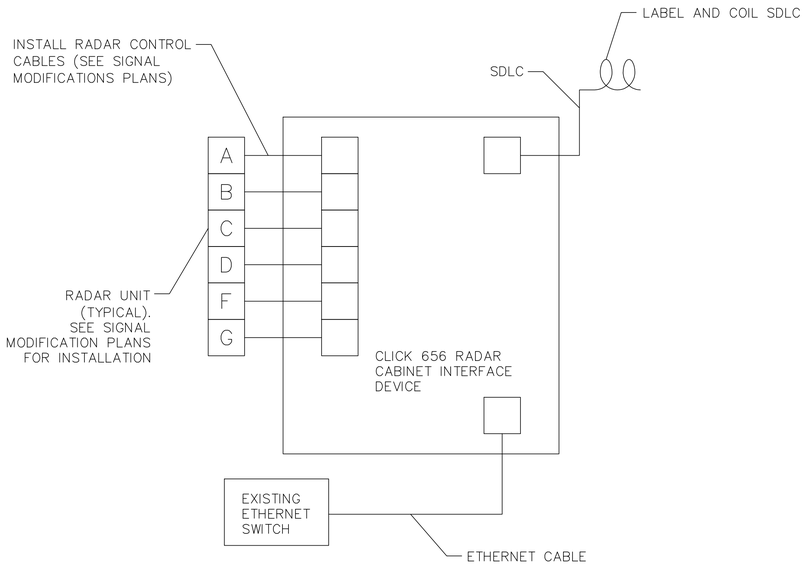
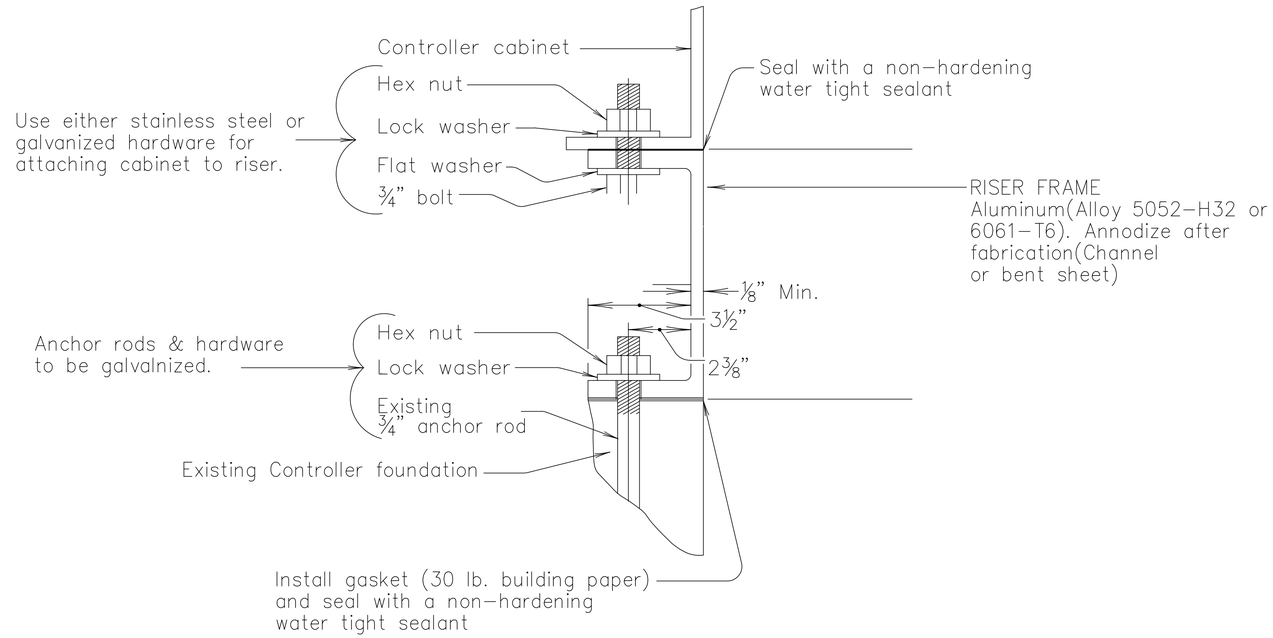


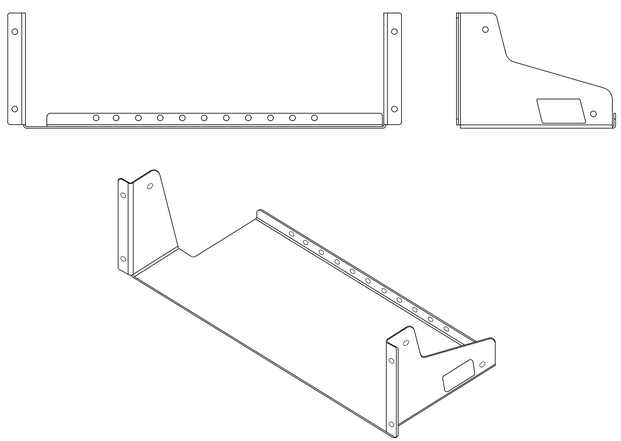
RADAR CABINET INTERFACE DEVICE INSTALLATION

NO SCALE



332S CABINET WITH RISER FRAME CONNECTION TO EXISTING FOUNDATION DETAIL

NO SCALE



CLICK 656 3U MOUNTING SHELF

NO SCALE

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150 BEAVERCREEK ROAD
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RADAR DETAILS

LINWOOD AVENUE IMPROVEMENTS

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JOB NO. CLA-93

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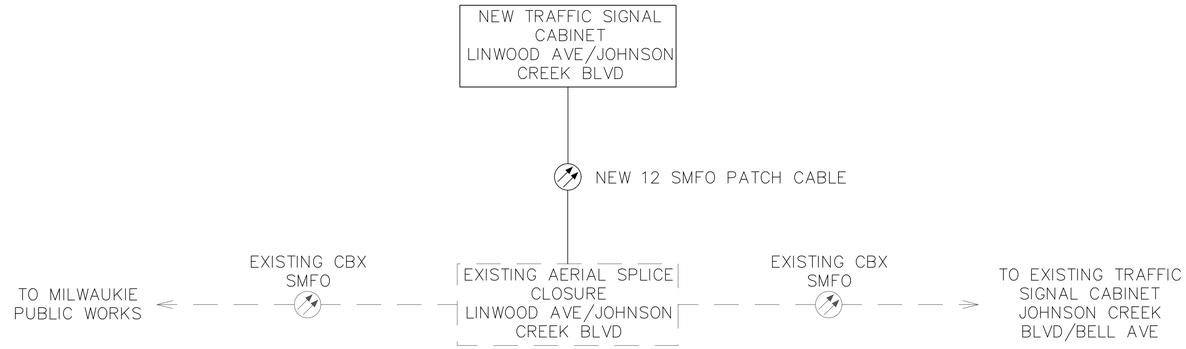

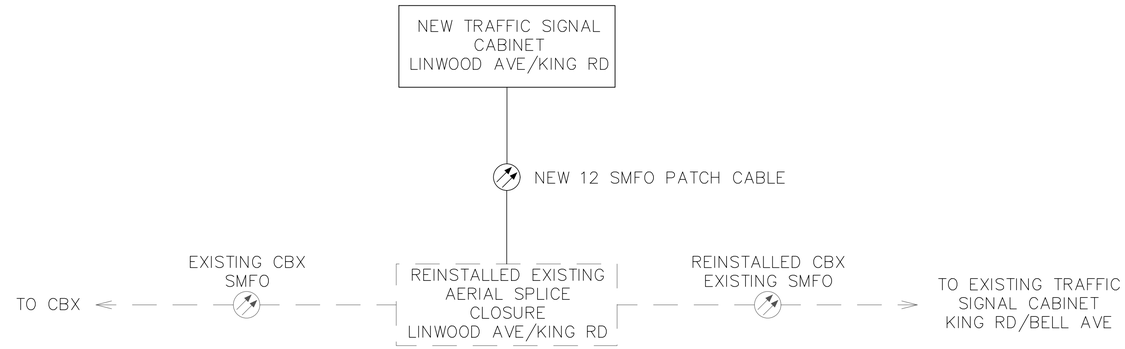

LEGEND

EXISTING PROPOSED

SPLICE CLOSURE/CONTROLLER CABINET

FIBER OPTIC CABLE

CBX = CLACKAMAS BROADBAND EXCHANGE

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150 BEAVERCREEK ROAD
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COMMUNICATIONS LINE DIAGRAM

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **12.10**

JOB NO. CLA-93

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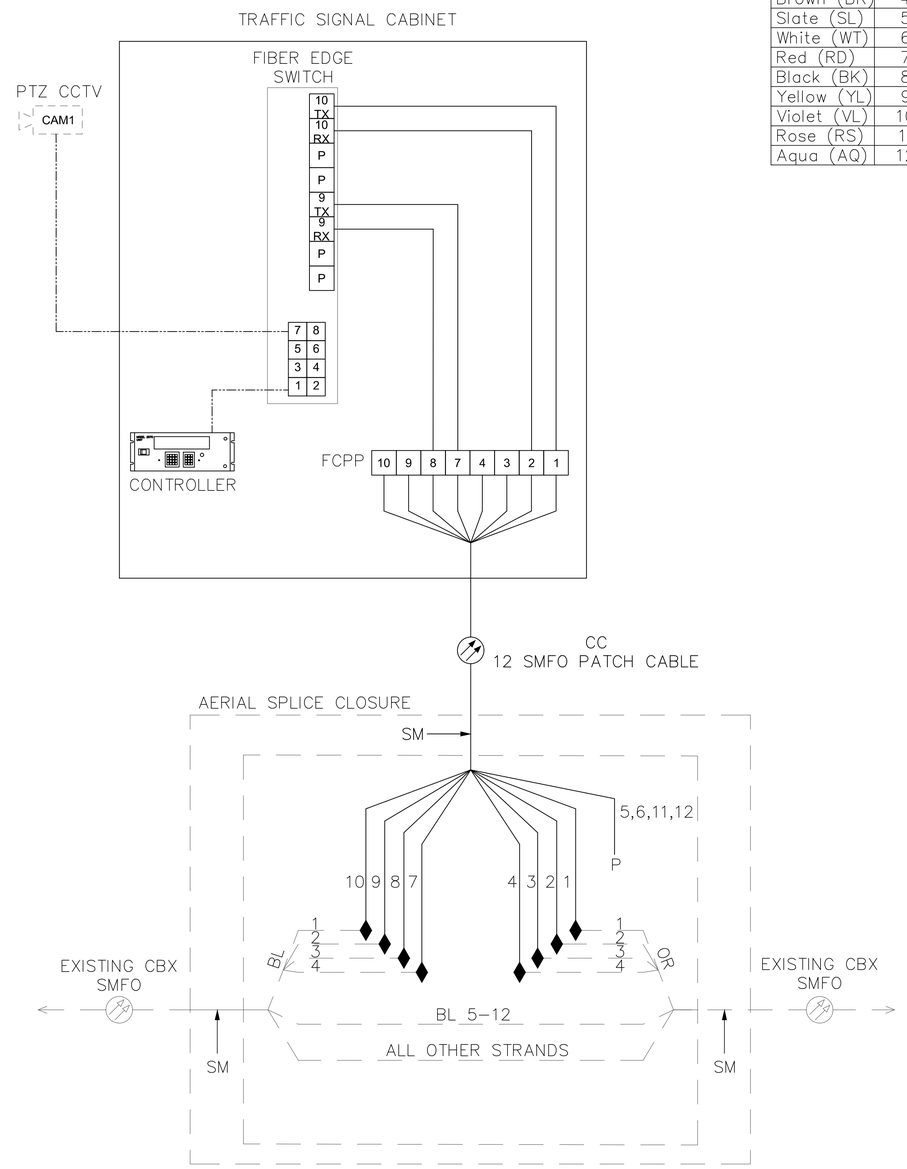
LEGEND

EXISTING	PROPOSED	
		EQUIPMENT
		FIBER OPTIC CABLE
		FIBER OPTIC STRAND
		FUSION SPLICE
		PTZ CCTV CAMERA
		INDUSTRIAL CAT6 SHIELDED ETHERNET CABLE
		2070/ATC SIGNAL CONTROLLER

P	PROTECT END OF FIBER
SMFO	SINGLE MODE FIBER OPTIC CABLE
FCPP	FIBER OPTIC CONNECTION PATCH PANEL
SM	SEQUENTIAL MARKING
CBX	CLACKAMAS BROADBAND EXCHANGE
CC	CLACKAMAS COUNTY

FIBER COLOR CODE

Fiber Color	Blue Tube	Orange Tube	Green Tube	Brown Tube	Slate Tube	White Tube	Red Tube	Black Tube
Blue (BL)	1	13	25	37	49	61	73	85
Orange (OR)	2	14	26	38	50	62	74	86
Green (GR)	3	15	27	39	51	63	75	87
Brown (BR)	4	16	28	40	52	64	76	88
Slate (SL)	5	17	29	41	53	65	77	89
White (WT)	6	18	30	42	54	66	78	90
Red (RD)	7	19	31	43	55	67	79	91
Black (BK)	8	20	32	44	56	68	80	92
Yellow (YL)	9	21	33	45	57	69	81	93
Violet (VL)	10	22	34	46	58	70	82	94
Rose (RS)	11	23	35	47	59	71	83	95
Aqua (AQ)	12	24	36	48	60	72	84	96



GENERAL NOTES:

1. THIS IS A TYPICAL DRAWING AND SHALL BE USED FOR BOTH THE LINWOOD AVE/KING RD AND LINWOOD AVE/JOHNSON CREEK BLVD INTERSECTIONS.
2. THIS DRAWING PROVIDES A SCHEMATIC OF THE COMMUNICATIONS SYSTEM ONLY. NOT ALL HAND HOLES ARE SHOWN.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74,348 OREGON JUNE 12, 2013 STEVEN J. BOICE
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TYPICAL FIBER OPTIC SPLICE DIAGRAM

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **12.11**

JOB NO. CLA-93

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COMMUNICATIONS COMPONENT SCHEDULE

Location	Cabinet	Jurisdiction	Equipment	Equipment Options	Quantity for Proposed Items	Quantity for Reinstalling Existing
Linwood Ave/King Rd	New 332S Traffic Signal Cabinet	Clackamas County	Communications Bracket (Existing, Reinstalled)	Fiber Interconnect		1
			Fiber Edge Switch (Existing, Reinstalled)	Configured and installed by agency		1
			Fiber Optic Patch Panel	LC	1	
			Fiber Optic Patch Cable	Duplex LC-LC, Max Length	4	
			Network Ethernet Cord	6 ft length	1	
			IP PTZ CCTV Camera (Existing, Reinstalled)	Axis Q6155		1
			Network Ethernet Cord	100 ft length (Cat 6)	1	
Linwood Ave/Johnson Creek Blvd	New 332S Traffic Signal Cabinet	Clackamas County	Communications Bracket (Existing, Reinstalled)	Fiber Interconnect		1
			Fiber Edge Switch (Existing, Reinstalled)	Configured and installed by agency		1
			Fiber Optic Patch Panel	LC	1	
			Fiber Optic Patch Cable	Duplex LC-LC, Max Length	4	
			Network Ethernet Cord	6 ft length (Cat 6)	1	
			IP PTZ CCTV Camera (Existing, Reinstalled)	Axis Q6155		1
			Network Ethernet Cord	100 ft length (Cat 6)	1	

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 12.12.dwg

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OREGON CITY, OR 97045

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COMMUNICATIONS LINE DIAGRAM

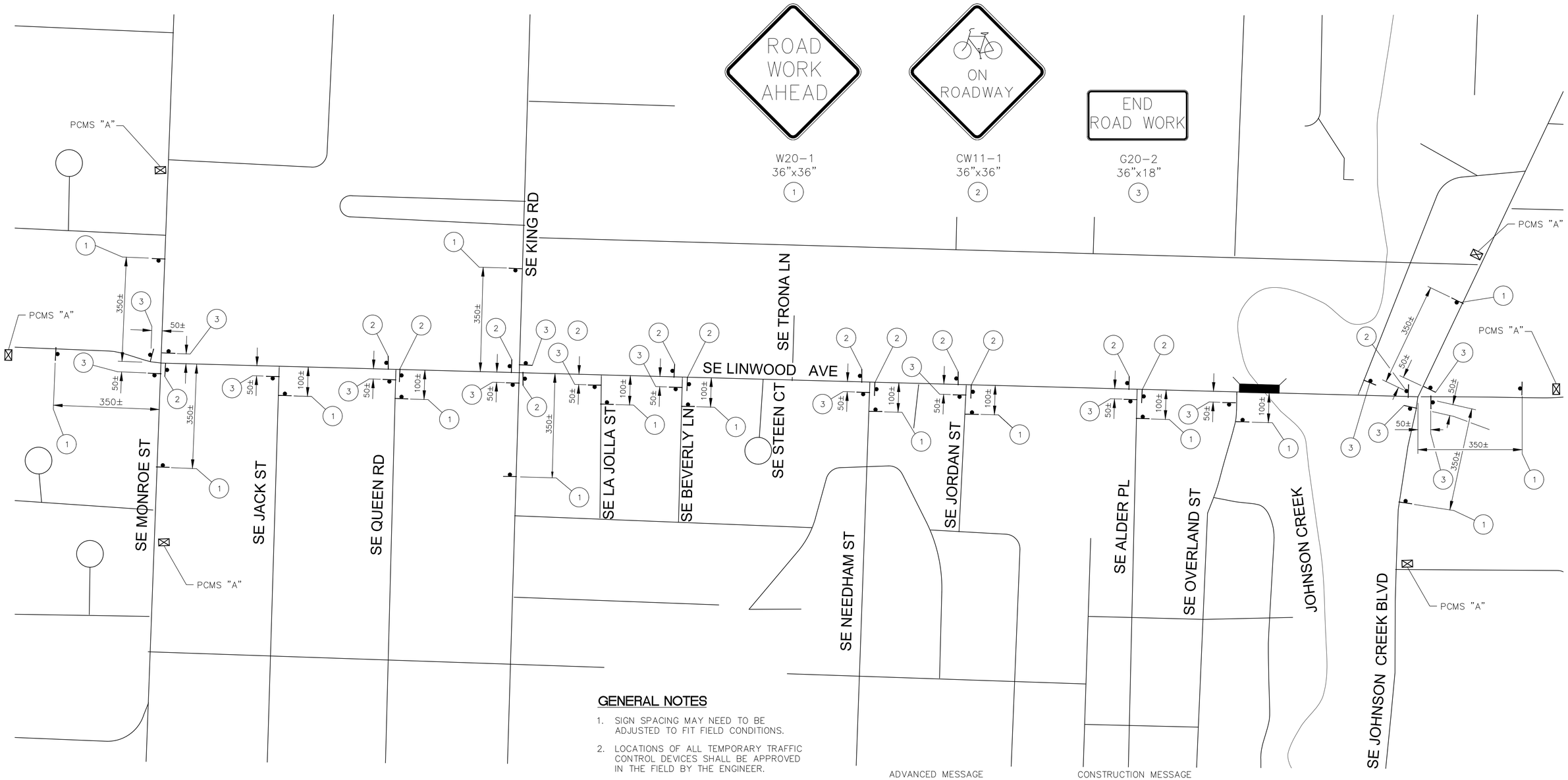
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **12.12**

JOB NO. CLA-93

ADVANCE AREA STAGING PLAN



GENERAL NOTES

1. SIGN SPACING MAY NEED TO BE ADJUSTED TO FIT FIELD CONDITIONS.
2. LOCATIONS OF ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE APPROVED IN THE FIELD BY THE ENGINEER.
3. ALL TRAFFIC CONTROL DEVICES SHALL BE COMPLIANT FOR NIGHT REFLECTIVITY.
4. THE WEST SIDE OF SE LINWOOD AVE TO BE CONSTRUCTED FIRST BEFORE THE EAST SIDE.
5. ACCOMPANIED BY ODOT STD. DWGS. TM800, TM820, TM821, TM822, TM841, TM842, TM843, TM844.

ADVANCED MESSAGE

ROADWORK ON LINWOOD	MM/DD TO MM/DD

CONSTRUCTION MESSAGE

ROADWORK ON LINWOOD	USE CAUTION

PORTABLE CHANGEABLE MESSAGE SIGN "A"
(SUGGESTED MESSAGE)
(INSTALL PCMS 10–14 DAYS IN ADVANCE OF CLOSURE)
(LOCATE AS DIRECTED BY ENGINEER)

LEGEND

- TEMPORARY SIGN ON TEMPORARY SUPPORT
- (X) TEMPORARY SIGN NUMBER. SEE DETAILS ON THIS SHEET.
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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JUNE 12, 2013
STEVEN J. BOICE
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ADVANCE AREA SIGNAGE PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 13.0

JOB NO. CLA-93

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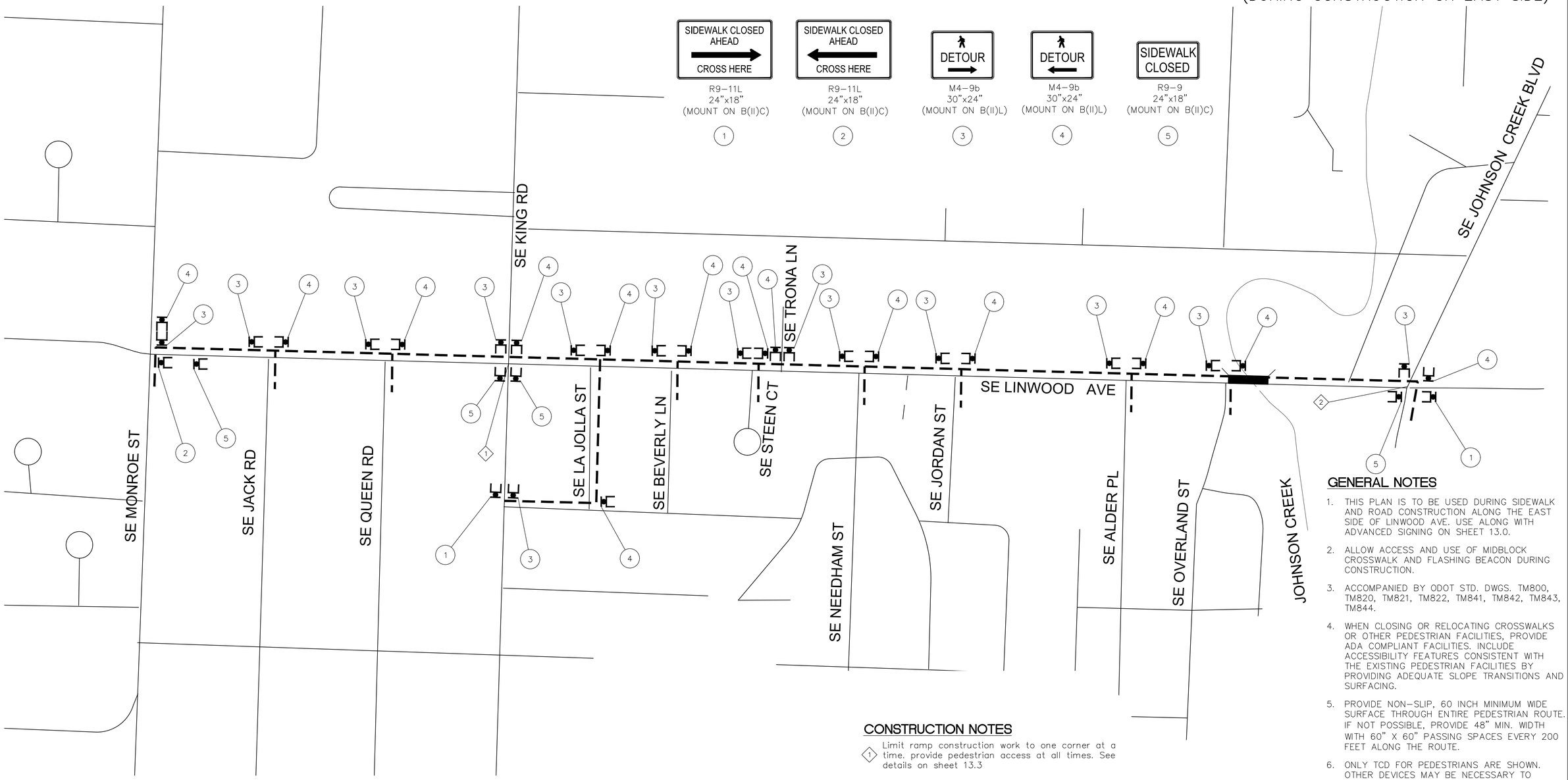
PEDESTRIAN ROUTING PLAN
(DURING CONSTRUCTION ON EAST SIDE)



GENERAL NOTES

1. THIS PLAN IS TO BE USED DURING SIDEWALK AND ROAD CONSTRUCTION ALONG THE EAST SIDE OF LINWOOD AVE. USE ALONG WITH ADVANCED SIGNING ON SHEET 13.0.
2. ALLOW ACCESS AND USE OF MIDBLOCK CROSSWALK AND FLASHING BEACON DURING CONSTRUCTION.
3. ACCOMPANIED BY ODOT STD. DWGS. TM800, TM820, TM821, TM822, TM841, TM842, TM843, TM844.
4. WHEN CLOSING OR RELOCATING CROSSWALKS OR OTHER PEDESTRIAN FACILITIES, PROVIDE ADA COMPLIANT FACILITIES. INCLUDE ACCESSIBILITY FEATURES CONSISTENT WITH THE EXISTING PEDESTRIAN FACILITIES BY PROVIDING ADEQUATE SLOPE TRANSITIONS AND SURFACING.
5. PROVIDE NON-SLIP, 60 INCH MINIMUM WIDE SURFACE THROUGH ENTIRE PEDESTRIAN ROUTE. IF NOT POSSIBLE, PROVIDE 48" MIN. WIDTH WITH 60" X 60" PASSING SPACES EVERY 200 FEET ALONG THE ROUTE.
6. ONLY TCD FOR PEDESTRIANS ARE SHOWN. OTHER DEVICES MAY BE NECESSARY TO CONTROL VEHICULAR TRAFFIC.
7. STAGE WORK, AS NECESSARY, TO PROVIDE A TEMPORARY PEDESTRIAN ACCESS ROUTE AT ALL TIMES. FOR ROADWAYS WITH NO AVAILABLE DETOURS, MAINTAIN ONE OPEN SIDEWALK AT ALL TIMES.
8. MINIMIZE PEDESTRIAN OUT-OF-DIRECTION TRAVEL.

CONSTRUCTION NOTES

1. Limit ramp construction work to one corner at a time. provide pedestrian access at all times. See details on sheet 13.3
2. Limit ramp construction work to half of ramp at a time. Provide pedestrian access at all times. See details on sheet 13.4

LEGEND

- SIGN ON BARRICADE
- TEMPORARY PEDESTRIAN ROUTE
- (X) TEMPORARY SIGN NUMBER. SEE DETAILS ON THIS SHEET.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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CHECKED:	SJB
DATE:	09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
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CONSTRUCTION PEDESTRIAN ROUTING PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **13.1**

JOB NO. CLA-93

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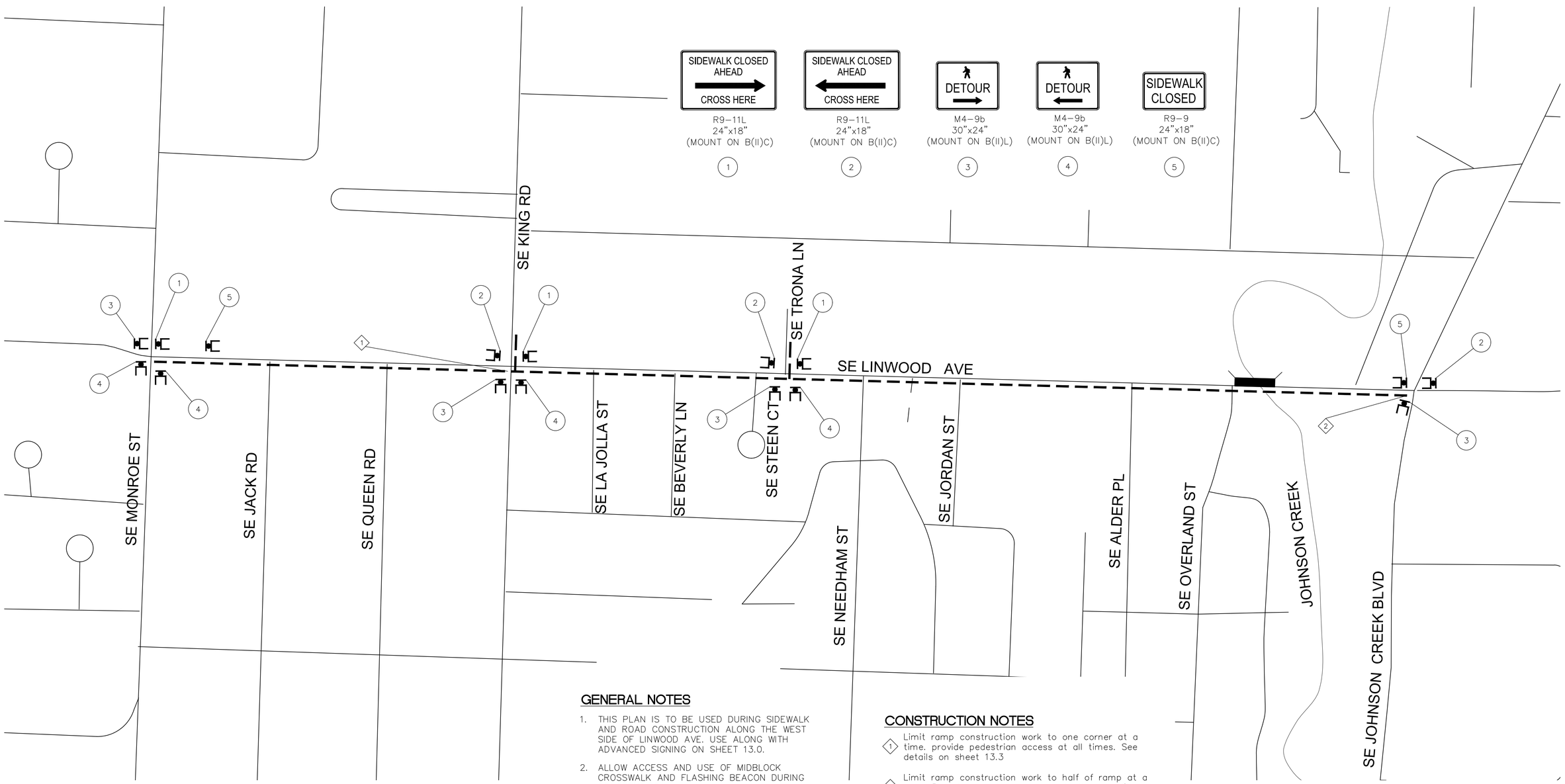
PEDESTRIAN ROUTING PLAN
(DURING CONSTRUCTION ON WEST SIDE)



GENERAL NOTES

1. THIS PLAN IS TO BE USED DURING SIDEWALK AND ROAD CONSTRUCTION ALONG THE WEST SIDE OF LINWOOD AVE. USE ALONG WITH ADVANCED SIGNING ON SHEET 13.0.
2. ALLOW ACCESS AND USE OF MIDBLOCK CROSSWALK AND FLASHING BEACON DURING CONSTRUCTION.

CONSTRUCTION NOTES

1. Limit ramp construction work to one corner at a time. provide pedestrian access at all times. See details on sheet 13.3
2. Limit ramp construction work to half of ramp at a time. Provide pedestrian access at all times. See details on sheet 13.4

LEGEND

- SIGN ON BARRICADE
- TEMPORARY PEDESTRIAN ROUTE
- (X) TEMPORARY SIGN NUMBER. SEE DETAILS ON THIS SHEET.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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CONSTRUCTION PEDESTRIAN ROUTING PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **13.2**

JOB NO. CLA-93

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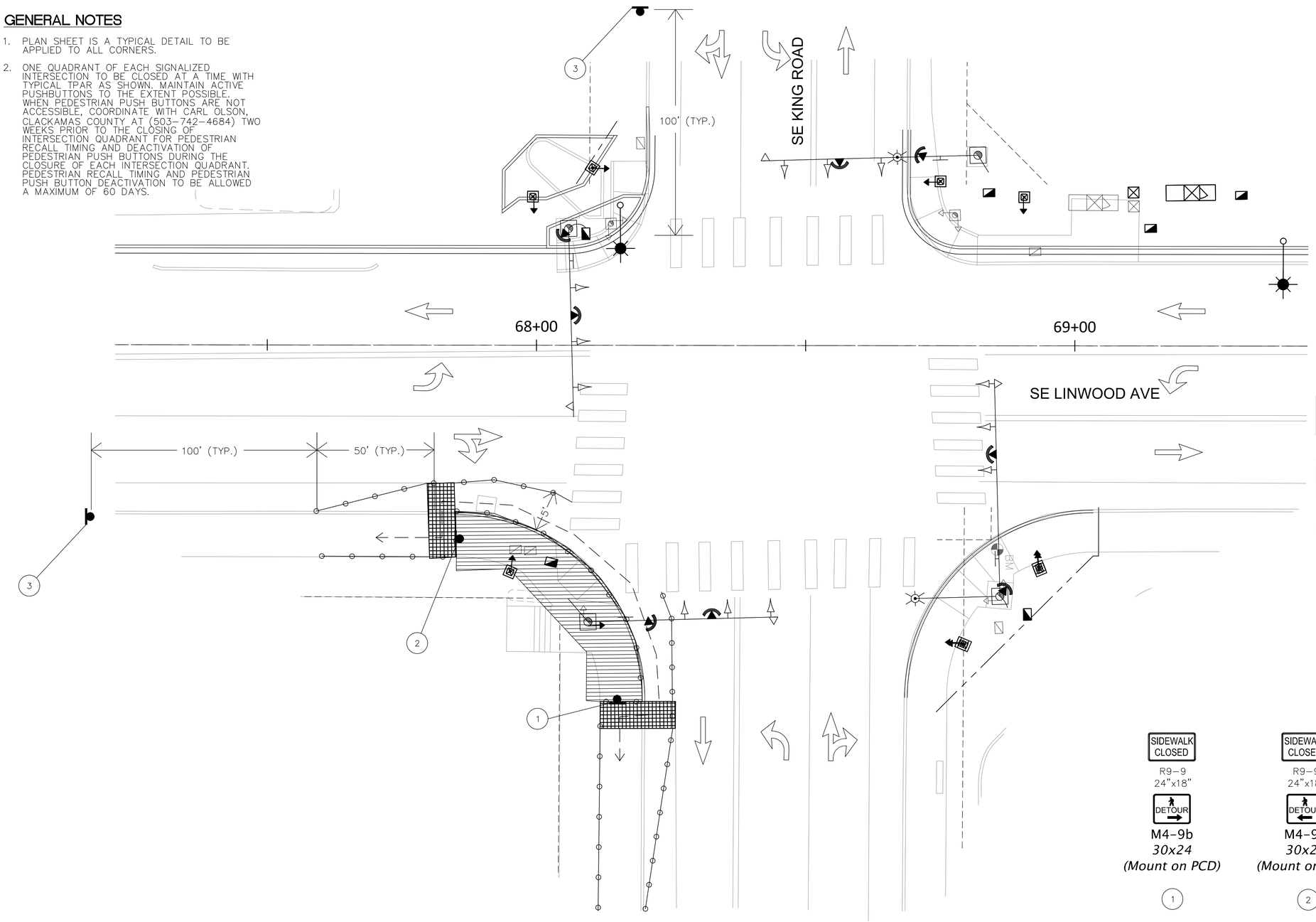
LINWOOD AVE/KING RD
TEMPORARY PEDESTRIAN ROUTE PLAN
(TYPICAL)

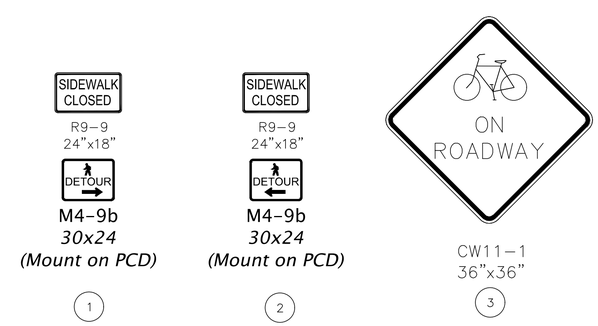
GENERAL NOTES

1. PLAN SHEET IS A TYPICAL DETAIL TO BE APPLIED TO ALL CORNERS.
2. ONE QUADRANT OF EACH SIGNALIZED INTERSECTION TO BE CLOSED AT A TIME WITH TYPICAL TPAR AS SHOWN. MAINTAIN ACTIVE PUSHBUTTONS TO THE EXTENT POSSIBLE. WHEN PEDESTRIAN PUSH BUTTONS ARE NOT ACCESSIBLE, COORDINATE WITH CARL OLSON, CLACKAMAS COUNTY AT (503-742-4684) TWO WEEKS PRIOR TO THE CLOSING OF INTERSECTION QUADRANT FOR PEDESTRIAN RECALL TIMING AND DEACTIVATION OF PEDESTRIAN PUSH BUTTONS DURING THE CLOSURE OF EACH INTERSECTION QUADRANT. PEDESTRIAN RECALL TIMING AND PEDESTRIAN PUSH BUTTON DEACTIVATION TO BE ALLOWED A MAXIMUM OF 60 DAYS.



LEGEND

- TEMPORARY PEDESTRIAN RAMP WITH TRUNCATED DOME DETECTABLE WARNING SURFACES
- UNDER CONSTRUCTION
- PEDESTRIAN CHANNELIZATION DEVICE (PCD)
- TEMPORARY PEDESTRIAN ACCESSIBILE ROUTE (TPAR)
- TEMPORARY SIGN ON TEMPORARY SUPPORT
- (X) TEMPORARY SIGN NUMBER. SEE DETAILS ON THIS SHEET.



PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 — Digitally Signed 2022.09.29 14:20:03-07'00' — OREGON — JUNE 12, 2013 — STEVEN J. BOICE — EXPIRES: DEC. 31, 2023

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Temporary Pedestrian Accessible Route Plan

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **13.3**

JOB NO. CLA-93

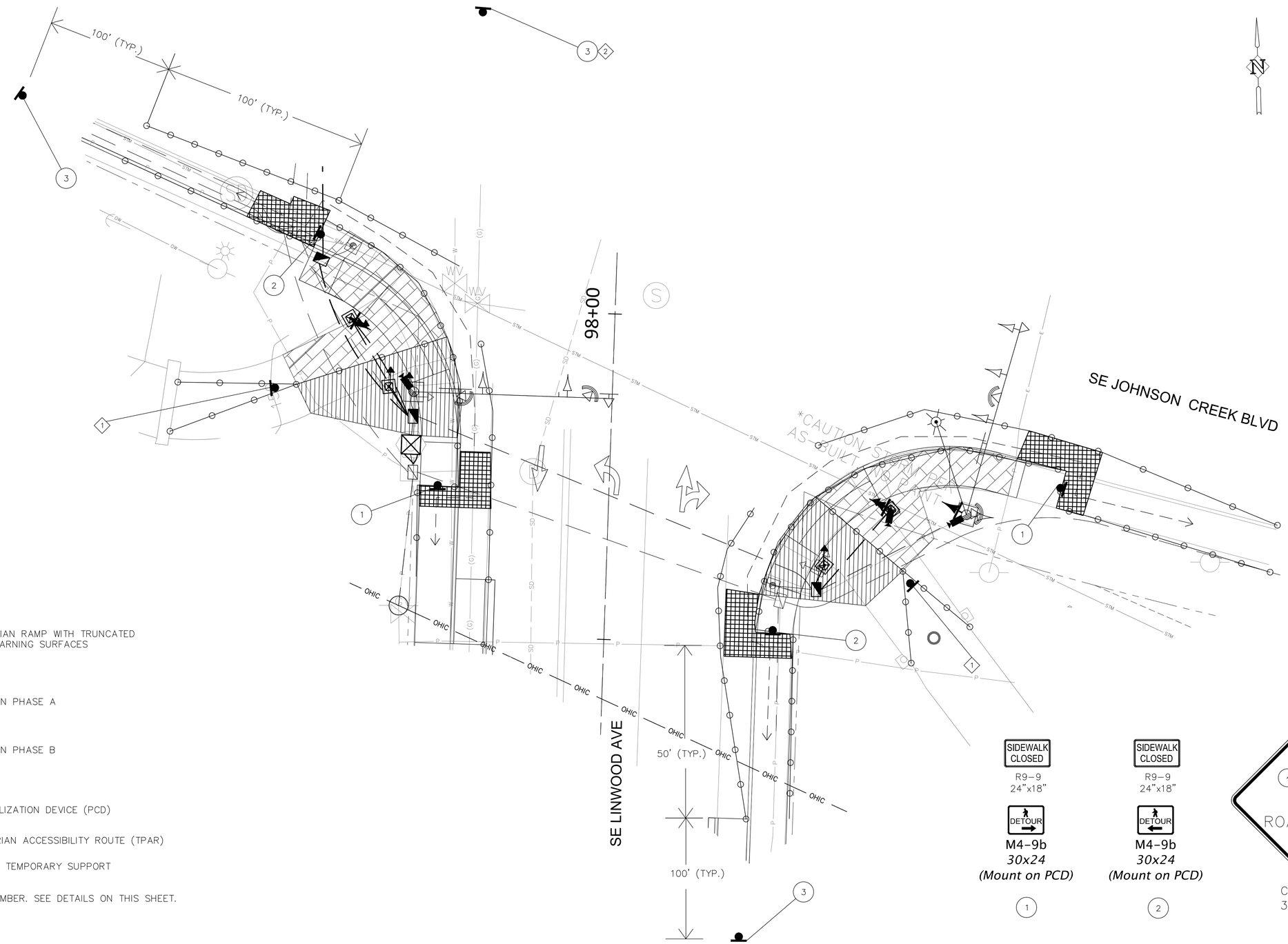
X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 13.3.dwg

CONSTRUCTION NOTES

1. CONTRACTOR INSTALL SIGN 1/SIGN 2 BASED ON WHICH PHASE IS BEING CONSTRUCTED
2. INSTALL SIGN 100' NORTH OF INTERSECTION ON FLAVEL ROAD FACING SOUTHBOUND TRAFFIC.

GENERAL NOTES

1. HALF OF RAMP TO BE CLOSED AT A TIME WITH TYPICAL TPAR AS SHOWN. MAINTAIN ACTIVE PUSHBUTTONS TO THE EXTENT POSSIBLE. WHEN PEDESTRIAN PUSH BUTTONS ARE NOT ACCESSIBLE, COORDINATE WITH CARL OLSON, CLACKAMAS COUNTY AT (503-742-4684) TWO WEEKS PRIOR TO THE CLOSING OF INTERSECTION QUADRANT FOR PEDESTRIAN RECALL TIMING AND DEACTIVATION OF PEDESTRIAN PUSH BUTTONS DURING THE CLOSURE OF EACH INTERSECTION QUADRANT. PEDESTRIAN RECALL TIMING AND PEDESTRIAN PUSH BUTTON DEACTIVATION TO BE ALLOWED A MAXIMUM OF 30 DAYS.



LEGEND

- TEMPORARY PEDESTRIAN RAMP WITH TRUNCATED DOME DETECTABLE WARNING SURFACES
- UNDER CONSTRUCTION PHASE A
- UNDER CONSTRUCTION PHASE B
- PEDESTRIAN CHANNELIZATION DEVICE (PCD)
- TEMPORARY PEDESTRIAN ACCESSIBILITY ROUTE (TPAR)
- TEMPORARY SIGN ON TEMPORARY SUPPORT
- (X) TEMPORARY SIGN NUMBER. SEE DETAILS ON THIS SHEET.

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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Temporary Pedestrian Accessible Route Plan

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 13.4

JOB NO. CLA-93

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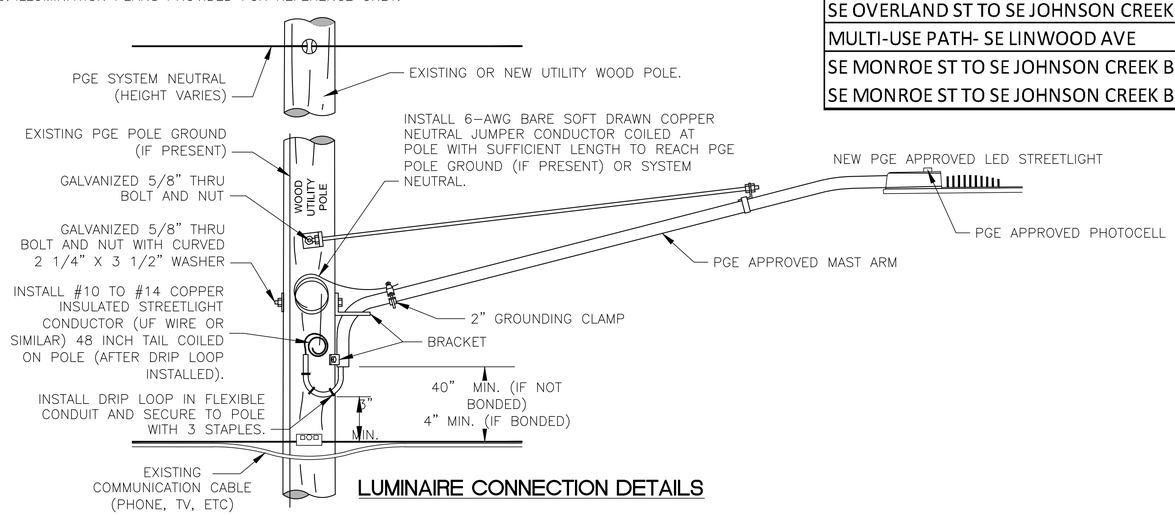
LEGEND

- EX/UP — RETAIN AND PROTECT EXISTING WOOD POLE.
- EX/LA — RETAIN AND PROTECT EXISTING LUMINAIRE ARM AND LED.
- EX/TS — RETAIN AND PROTECT EXISTING TRAFFIC SIGNAL/ILLUMINATION POLE.
- RX/UP — PGE TO REMOVE EXISTING UTILITY POLE.
- RX/LA — PGE TO REMOVE EXISTING LUMINAIRE ARM AND EXISTING LUMINAIRE.
- RR/UP — PGE TO REMOVE AND RELOCATE EXISTING WOOD UTILITY POLE.
- N — LUMINAIRE NO. (N) FOR ROADWAY ILLUMINATION (SEE LUMINAIRE TABLE).
- RI/UP — PGE TO REINSTALL EXISTING WOOD UTILITY POLE.
- UP — PGE TO FURNISH AND INSTALL WOOD UTILITY POLE (SEE LUMINAIRE TABLE).
- LA/N — PGE TO FURNISH AND INSTALL NEW LUMINAIRE ARM, (N) = LENGTH (SEE LUMINAIRE TABLE).
- LED — PGE TO FURNISH AND INSTALL NEW LIGHT EMITTING DIODE LUMINAIRE (SEE LUMINAIRE TABLE).

GENERAL NOTES

1. STREET LIGHTING AND INSTALLATIONS ALONG LINWOOD AVE SHALL CONFORM TO PORTLAND GENERAL ELECTRIC (P.G.E.) SCHEDULE 95 OPTION "A" SPECIFICATIONS. MATERIALS AND INSTALLATION SHALL BE APPROVED BY P.G.E., UNLESS NOTED OTHERWISE.
2. PLANS ARE SHOWN FOR BIDDING AND REFERENCE ONLY. CONTACT RICO SOLIS (503)-403-9084 FOR PGE APPROVED LIGHTING MATERIALS. REFER TO PGE WORK ORGER NUMBER M3037605.
3. ALL UTILITY POLES, LUMINAIRE ARMS, LUMINAIRES, LAMPS, AND WIRING SHALL BE FURNISHED AND INSTALLED BY PGE.
4. UTILITY LOCATIONS ARE APPROXIMATE AND NOT ALL UTILITIES ARE SHOWN. LOCATIONS OF EXISTING UTILITIES SHALL BE VERIFIED. MAINTAIN AND PROTECT ALL EXISTING UTILITIES UNLESS OTHERWISE NOTED. COORDINATE ALL WORK WITH UTILITY COMPANIES TO ELIMINATE CONFLICTS.
5. MAINTAIN A MINIMUM OF 12 INCH CLEARANCE BETWEEN ALL EXISTING UTILITIES.
6. ILLUMINATION PLANS PROVIDED FOR REFERENCE ONLY.



LUMINAIRE CONNECTION DETAILS

LIGHTING VALUES TABLE					
LOCATION	CLASSIFICATION	TARGETED AVERAGE ILLUMINANCE (fc)	ACHIEVED AVERAGE ILLUMINANCE (fc)	TARGETED UNIFORMITY (Avg/Min)	ACHIEVED UNIFORMITY (Avg/Min)
INTERSECTIONS					
SE LINWOOD AVE/ SE JACK ST	MAJOR/LOCAL	≥2.0	2.1	≤3:1	2.8
SE LINWOOD AVE/ SE QUEEN RD	MAJOR/LOCAL	≥2.0	2.4	≤3:1	1.8
SE LINWOOD AVE/ SE KING RD	MAJOR/MAJOR	≥2.4	2.5	≤3:1	2.8
SE LINWOOD AVE/ SE LA JOLLA ST	MAJOR/LOCAL	≥2.0	2.3	≤3:1	2.6
SE LINWOOD AVE/ SE BEVERLY LN	MAJOR/LOCAL	≥2.0	2.3	≤3:1	1.8
SE LINWOOD AVE/ SE STEEN CT	MAJOR/LOCAL	≥2.0	2.2	≤3:1	1.2
SE LINWOOD AVE/ SE TRONA LN	MAJOR/LOCAL	≥2.0	2.9	≤3:1	2.1
SE LINWOOD AVE/ SE NEEDHAM ST	MAJOR/LOCAL	≥2.0	2.4	≤3:1	2.2
SE LINWOOD AVE/ SE NEEDHAM CT	MAJOR/LOCAL	≥2.0	2.4	≤3:1	1.8
SE LINWOOD AVE/ SE ALDER PL	MAJOR/LOCAL	≥2.0	2.3	≤3:1	2.1
SE LINWOOD AVE/ SE OVERLAND ST	MAJOR/LOCAL	≥2.0	2.2	≤3:1	2.5
ROADWAY SEGMENTS - SE LINWOOD AVE					
SE MONROE ST TO JACK ST	MAJOR	≥1.3	1.3	≤3:1	2.3
SE JACK ST TO SE QUEEN RD	MAJOR	≥1.3	1.4	≤3:1	2.1
SE QUEEN RD TO SE KING RD	MAJOR	≥1.3	1.3	≤3:1	2.5
SE KING RD TO SE LA JOLLA ST	MAJOR	≥1.3	1.3	≤3:1	2.5
SE LA JOLLA ST TO SE BEVERLY LN	MAJOR	≥1.3	1.7	≤3:1	2.2
SE BEVERLY LN TO SE STEEN CT	MAJOR	≥1.3	1.4	≤3:1	2.3
SE STEEN CT TO SE TRONA LN	MAJOR	≥1.3	1.6	≤3:1	1.8
SE TRONA LN TO SE NEEDHAM ST	MAJOR	≥1.3	1.4	≤3:1	1.7
SE NEEDHAM ST TO SE NEEDHAM CT	MAJOR	≥1.3	1.3	≤3:1	2.2
SE NEEDHAM CT TO SE ALDER PL	MAJOR	≥1.3	1.4	≤3:1	2.3
SE ALDER PL TO SE OVERLAND ST	MAJOR	≥1.3	1.4	≤3:1	1.5
SE OVERLAND ST TO SE JOHNSON CREEK BLVD	MAJOR	≥1.3	1.3	≤3:1	2.5
MULTI-USE PATH- SE LINWOOD AVE					
SE MONROE ST TO SE JOHNSON CREEK BLVD (WEST)	MEDIUM	≥0.5	0.9	≤4:1	2.8
SE MONROE ST TO SE JOHNSON CREEK BLVD (EAST)	MEDIUM	≥0.5	1.1	≤4:1	3.7

INFORMATION ONLY - NOT FOR CONSTRUCTION

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER 74,948 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

DKS 720 SW Washington St, Suite 500 Portland, Oregon 97205 www.dksassociates.com

ILLUMINATION LEGEND

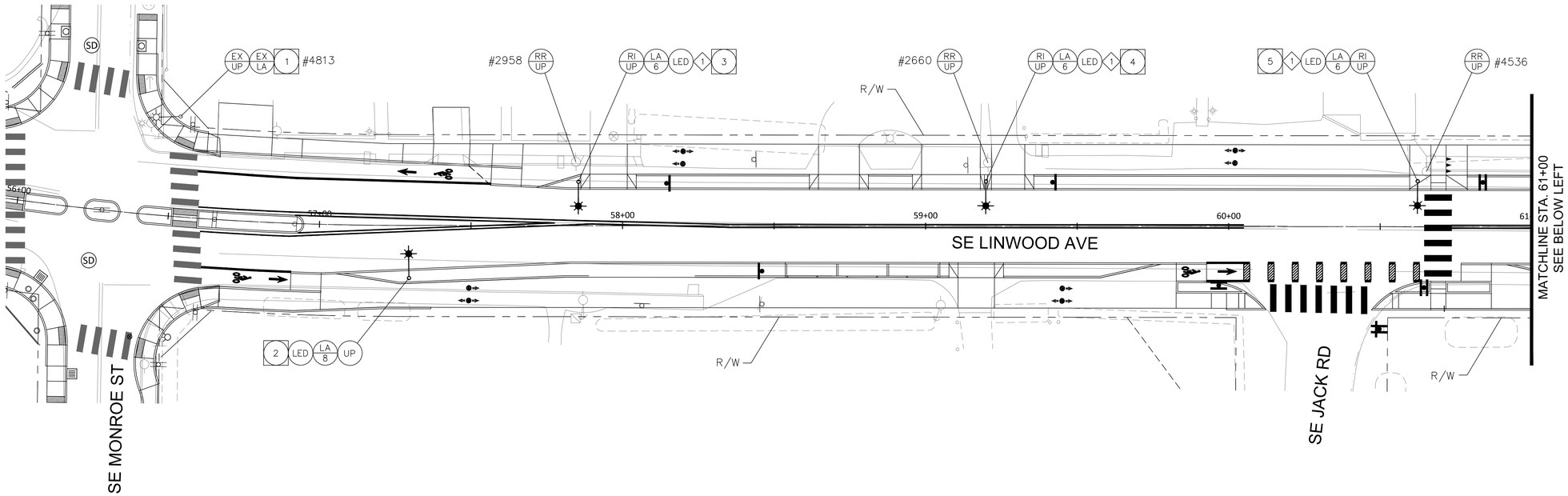
LINWOOD AVENUE IMPROVEMENTS

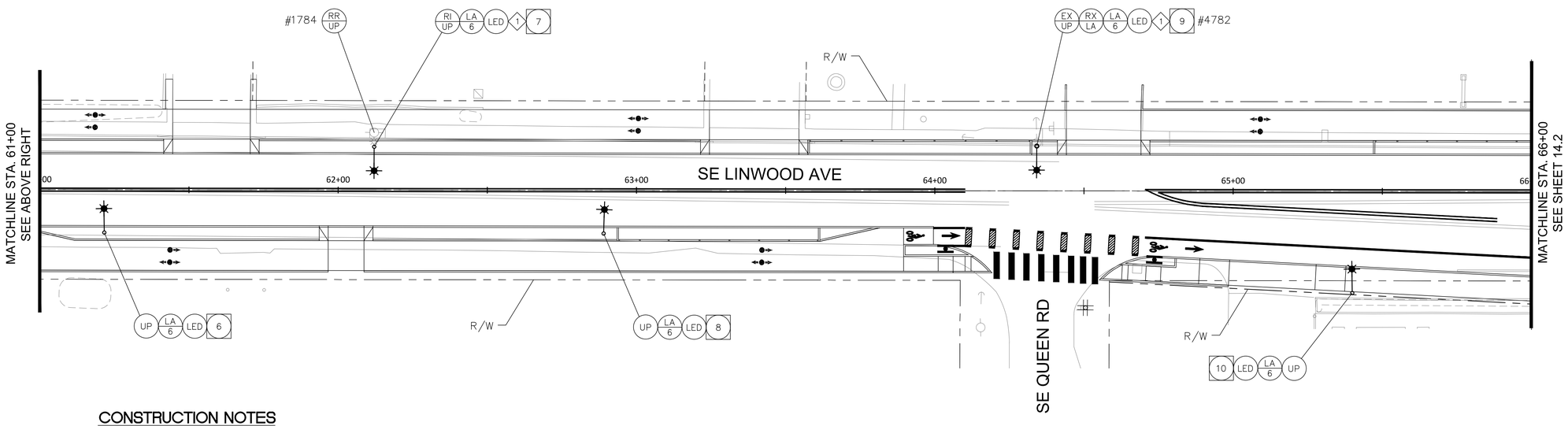
CLACKAMAS COUNTY, OREGON

SHEET NO. 14.0

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 14.0.dwg





CONSTRUCTION NOTES

1. PGE TO INSTALL LED LUMINAIRE WITH HOUSE SIDE SHIELD.

NOTE:
SEE SHEET 14.0 FOR LEGEND.

0 10 20 40
SCALE: 1" = 20'

INFORMATION ONLY - NOT FOR CONSTRUCTION

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

ILLUMINATION PLAN

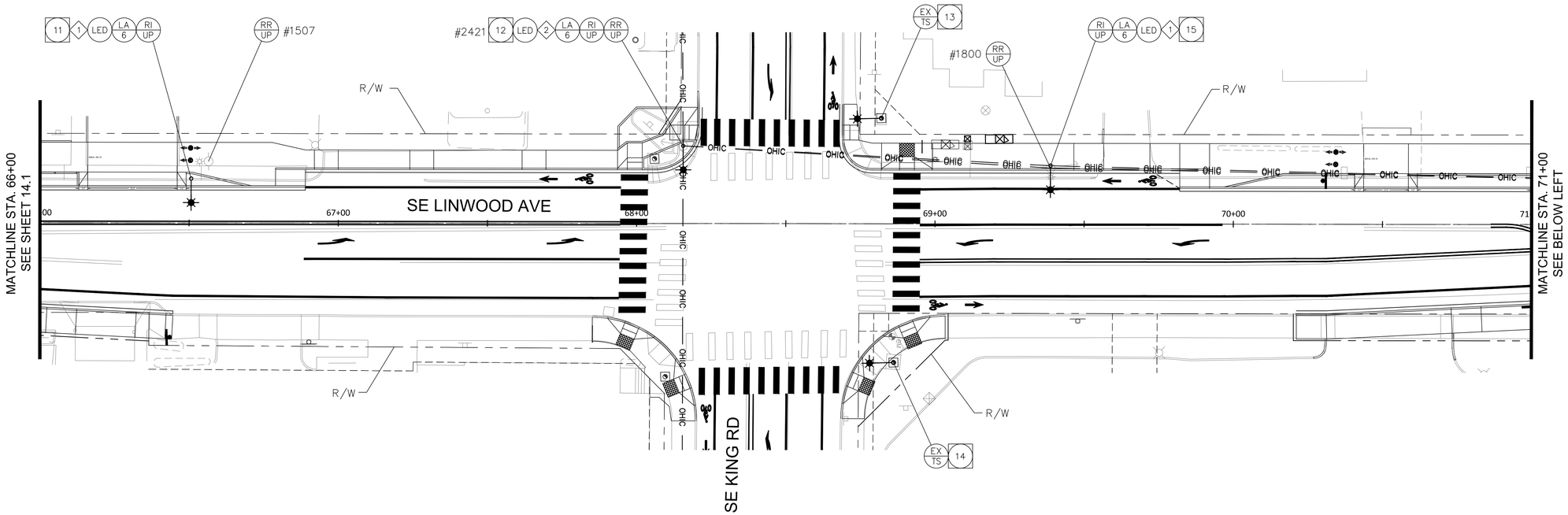
LINWOOD AVENUE IMPROVEMENTS

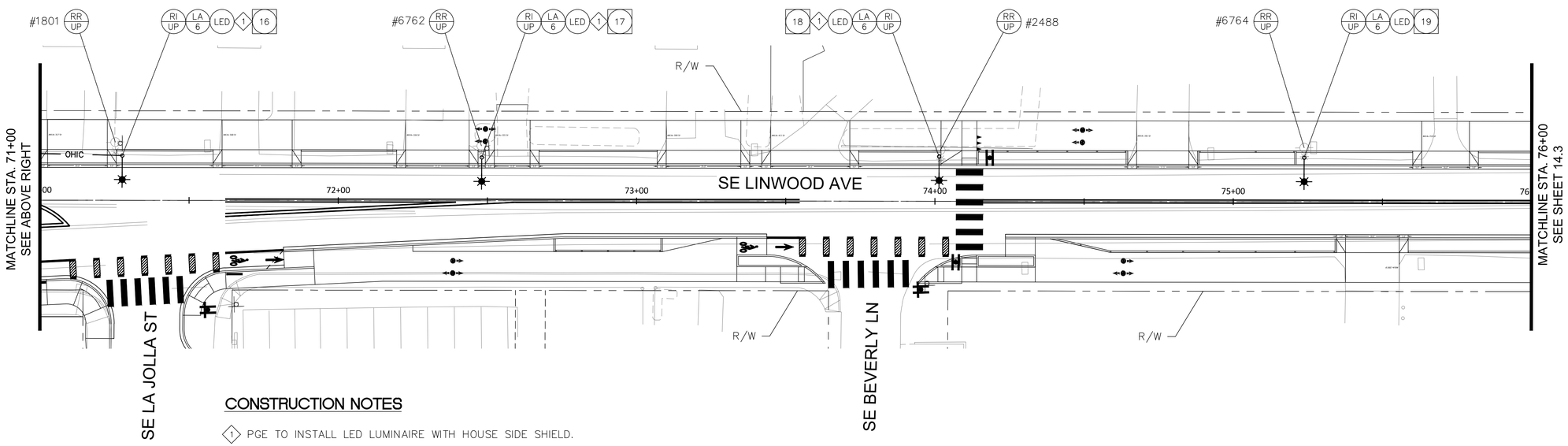
CLACKAMAS COUNTY, OREGON

SHEET NO. 14.1

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 14.1.dwg





CONSTRUCTION NOTES

1. PGE TO INSTALL LED LUMINAIRE WITH HOUSE SIDE SHIELD.
2. ANGLE ARM AND FIXTURE TO MAINTAIN 3" MINIMUM SEPARATION FROM SECONDARY, AS NEEDED.

NOTE:
SEE SHEET 14.0 FOR LEGEND.

0 10 20 40
SCALE: 1" = 20'

INFORMATION ONLY - NOT FOR CONSTRUCTION

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74,348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

ILLUMINATION PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 14.2

JOB NO. CLA-93

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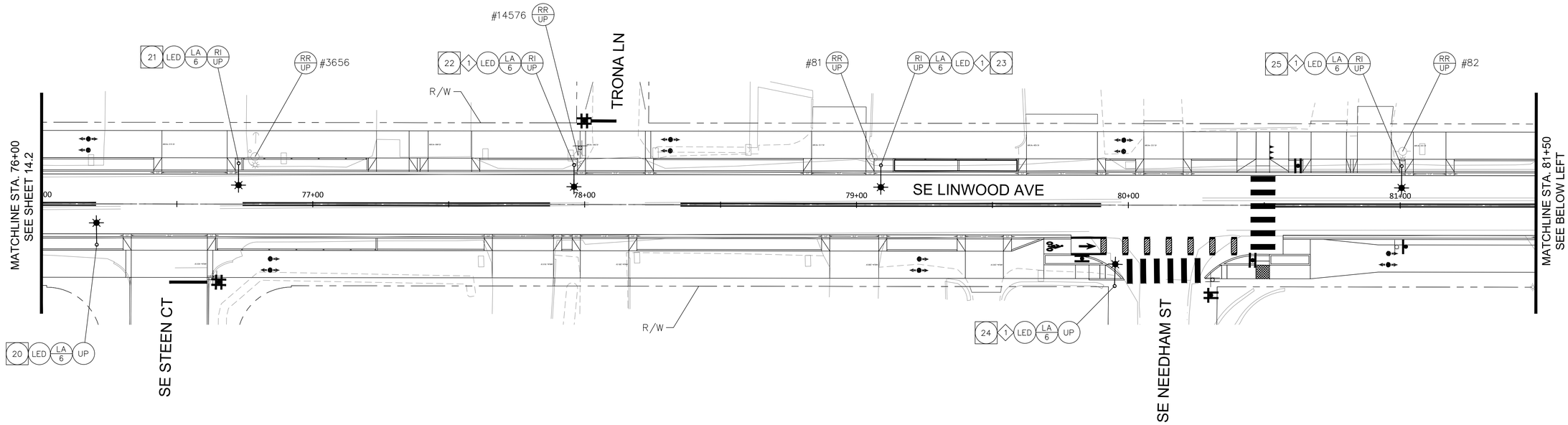

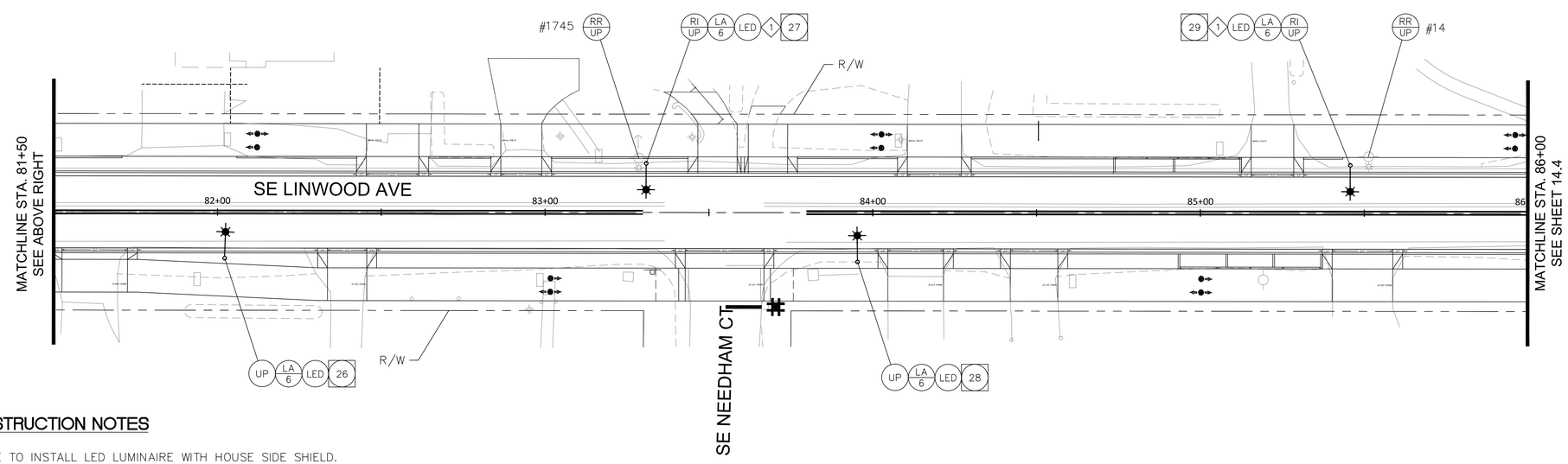

CONSTRUCTION NOTES

1. PGE TO INSTALL LED LUMINAIRE WITH HOUSE SIDE SHIELD.

NOTE:
SEE SHEET 14.0 FOR LEGEND.

0 10 20 40
SCALE: 1" = 20'

INFORMATION ONLY - NOT FOR CONSTRUCTION

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74,348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

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ILLUMINATION PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 14.3

JOB NO. CLA-93

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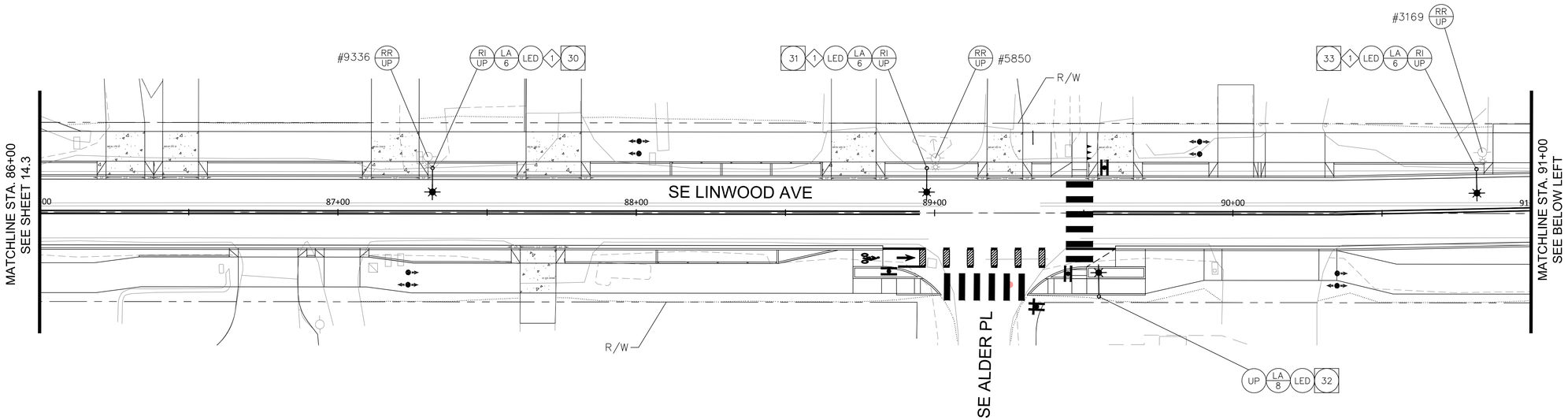

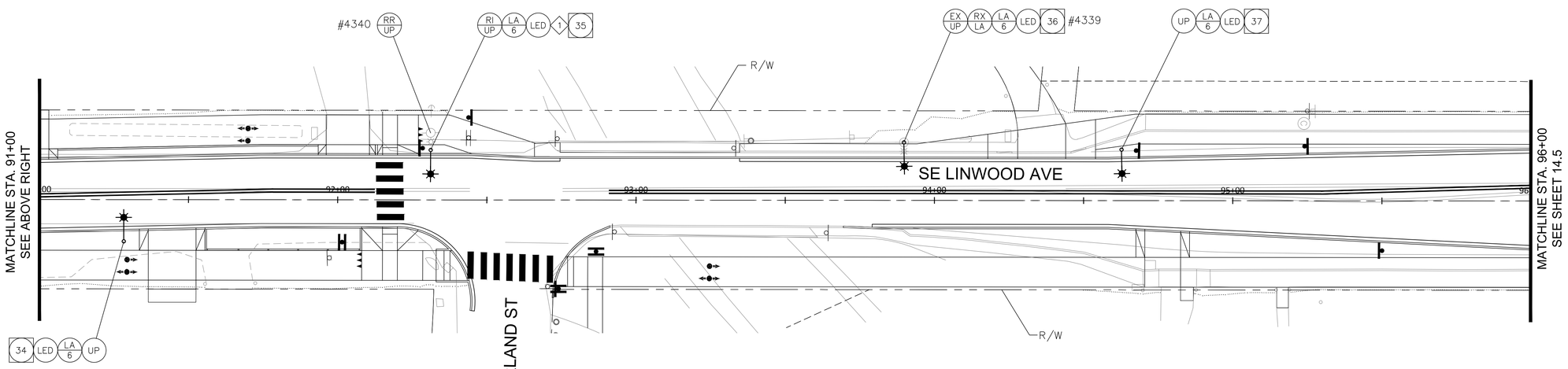

CONSTRUCTION NOTES

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NOTE:
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0 10 20 40
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CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

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REVISIONS

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DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

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ILLUMINATION PLAN

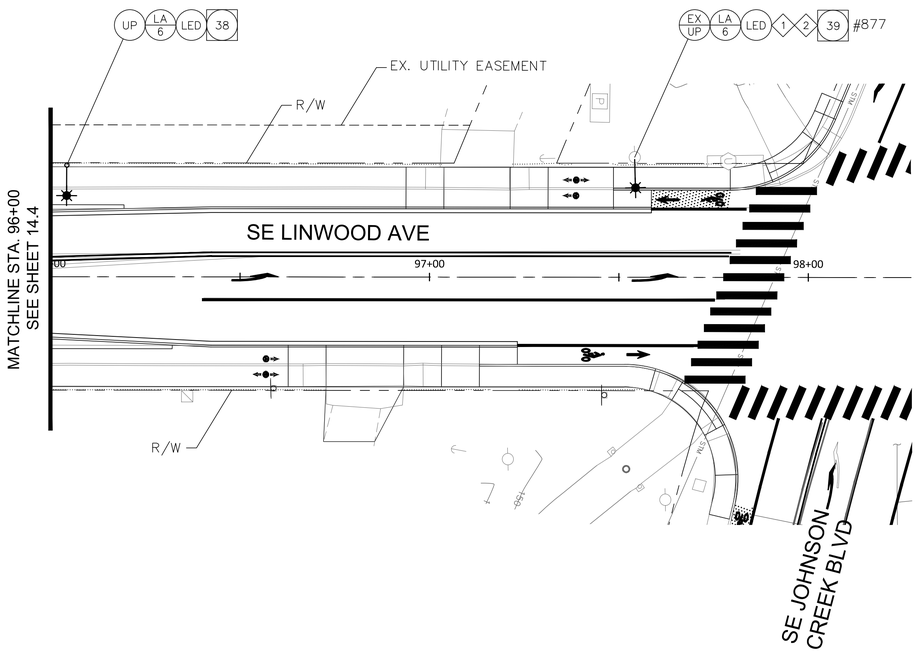
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 14.4

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 14.4.dwg



CONSTRUCTION NOTES

1. PGE TO INSTALL LED LUMINAIRE WITH HOUSE SIDE SHIELD.
2. ANGLE ARM AND FIXTURE TO MAINTAIN 3" MINIMUM SEPARATION FROM SECONDARY, AS NEEDED.

INFORMATION ONLY - NOT FOR CONSTRUCTION

NOTE:
SEE SHEET 14.0 FOR LEGEND.

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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REGISTERED PROFESSIONAL ENGINEER 74,348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

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ILLUMINATION PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 14.5

JOB NO. CLA-93

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 14.5.dwg

ILLUMINATION POLE SCHEDULE												
POLE NO.	STREET	STATIONING	OFFSET * (ft)	POLE TYPE	MOUNTING HEIGHT (ft)	ARM LENGTH (ft)	LUMINAIRE					
							MANUFACTURER	PGE PART NUMBER	LIGHT SOURCE	WATTAGE	TYPE	LIGHT LOSS FACTOR
1	LINWOOD AVENUE	EX	EX	EX	EX	EX	EX	EX	EX	EX	EX	EX
2	LINWOOD AVENUE	57+29	17.0 RT	UP	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
3	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
4	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
5	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
6	LINWOOD AVENUE	61+21	14.0 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
7	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
8	LINWOOD AVENUE	62+89	14.0 LT	UP	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
9	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
10	LINWOOD AVENUE	65+40	32.0 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
11	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
12	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
13	LINWOOD AVENUE	See Traffic Signal Plans										
14	LINWOOD AVENUE	See Traffic Signal Plans										
15	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
16	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
17	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
18	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
19	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
20	LINWOOD AVENUE	76+20	14.0 RT	UP	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
21	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
22	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
23	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
24	LINWOOD AVENUE	79+95	29.0 RT	UP	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
25	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
26	LINWOOD AVENUE	82+05	14.0 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
27	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
28	LINWOOD AVENUE	83+95	14.0 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
29	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
30	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
31	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
32	LINWOOD AVENUE	89+55	26.5 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
33	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
34	LINWOOD AVENUE	91+28	12.0 RT	UP	35	6	LEOTEK	GCJ2-20H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	45	II	0.88
35	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88
36	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
37	LINWOOD AVENUE	94+63	16.0 LT	UP	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
38	LINWOOD AVENUE	96+04	28.0 LT	UP	35	6	LEOTEK	GCM2-40H-MV-WW-2R-GY-700-PCR7-RWG-WL-FDC-PGE	LED	88	II	0.88
39	LINWOOD AVENUE	EX	EX	EX	35	6	LEOTEK	GCL-80G-MV-WW-3R-GY-610-PCR7-RWG-WL-FDC-PGE	LED	160	III	0.88

EX= EXISTING

UP = NEW UTILITY STREET LIGHT ONLY POLE

*OFFSET MEASURED FROM CENTERLINE TO FACE OF POLE (PROVIDE 2.0 FT MIN. FROM FACE OF CURB TO FACE OF POLE)

INFORMATION ONLY - NOT FOR CONSTRUCTION

X:\Projects\2019\P19210-000 (Clackamas County Linwood Ave Imps)\CAD\ 14.6.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: CAL
DRAWN: KCD
CHECKED: SJB
DATE: 09-28-22

REGISTERED PROFESSIONAL ENGINEER 74348 OREGON JUNE 12, 2013 STEVEN J. BOICE
INFORMATION ONLY
EXPIRES: DEC. 31, 2023

DKS
720 SW Washington St, Suite 500
Portland, Oregon 97205
www.dksassociates.com

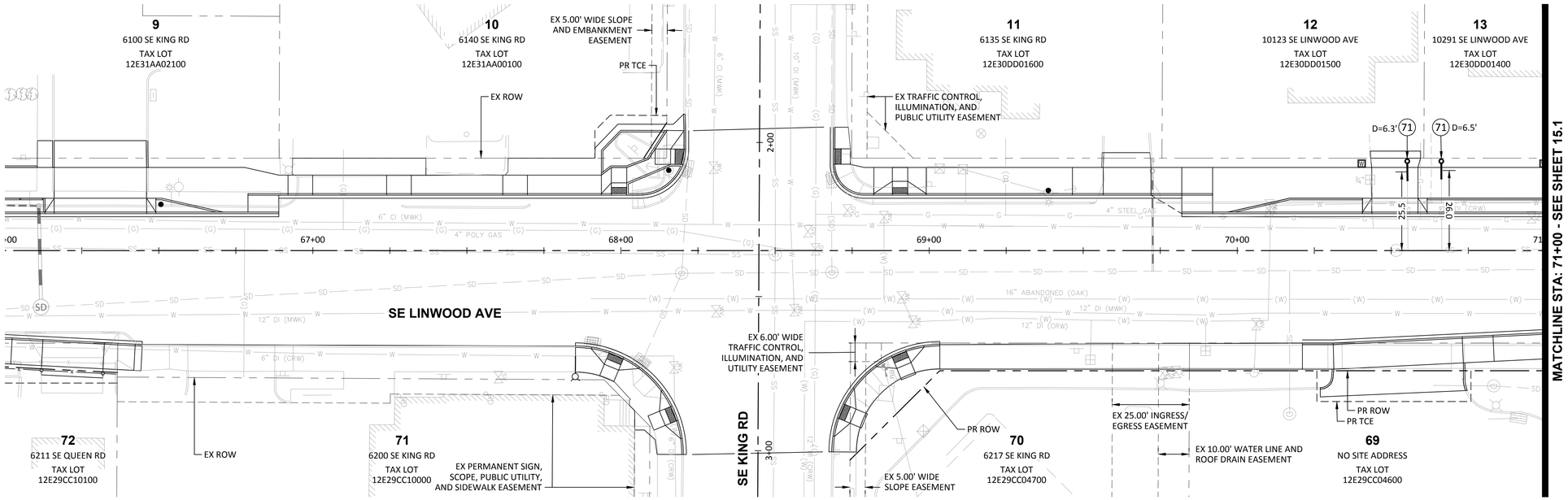
ILLUMINATION DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. **14.6**

JOB NO. CLA-93

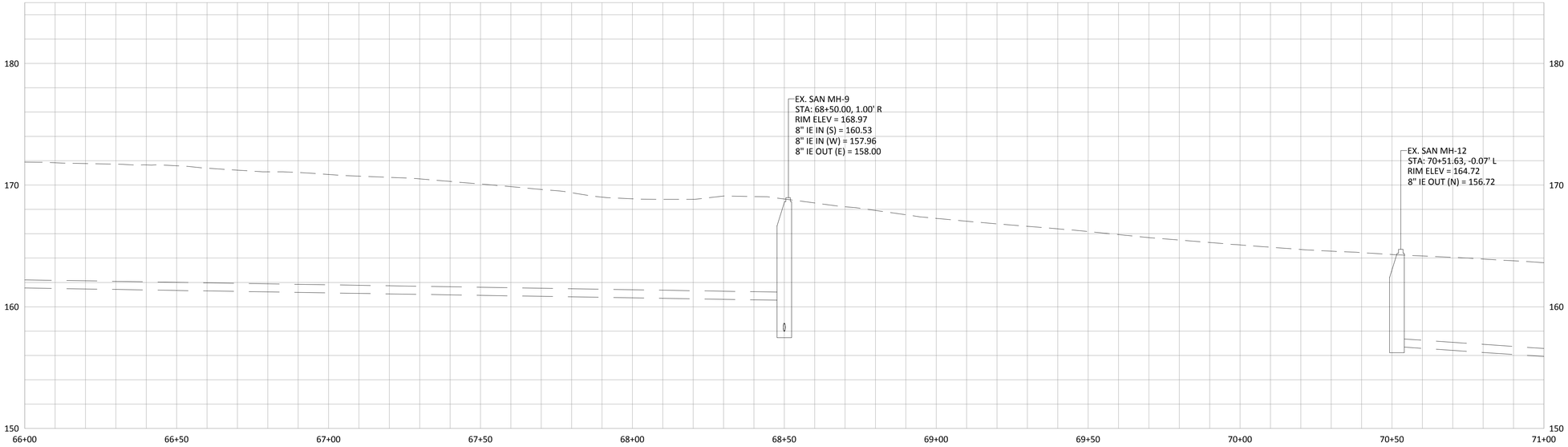


LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

71 EXTEND EXISTING SANITARY LATERAL AND INSTALL CLEANOUT PER DETAIL ON SHEET 15.6. APPROXIMATE DEPTH (D) OF EXISTING LATERAL NOTED ON PLANS. FIELD VERIFY LOCATION OF EXISTING LATERAL STUB PRIOR TO BEGINNING WORK. CONNECTION LOCATION SHOWN ON PLANS IS APPROXIMATE.



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED:	HHPR TEAM
DRAWN:	HHPR TEAM
CHECKED:	DSH/JSH
DATE:	11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

SANITARY PLAN AND PROFILE

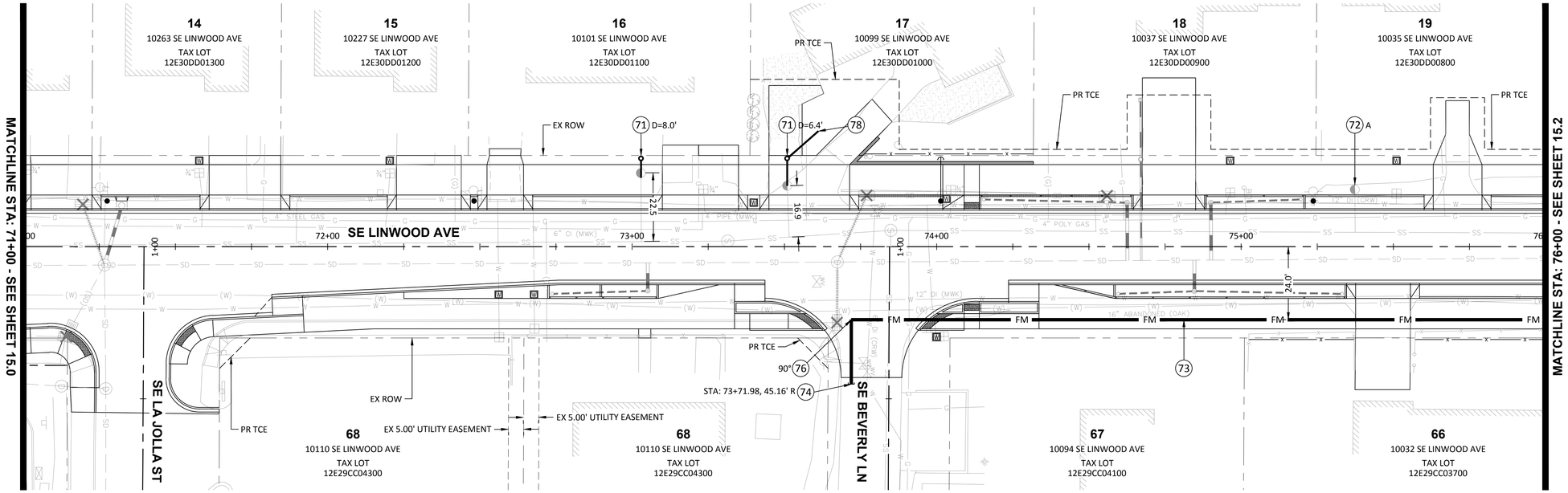
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.0

JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-15.0 SANITARY PLAN AND PROFILE.dwg



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

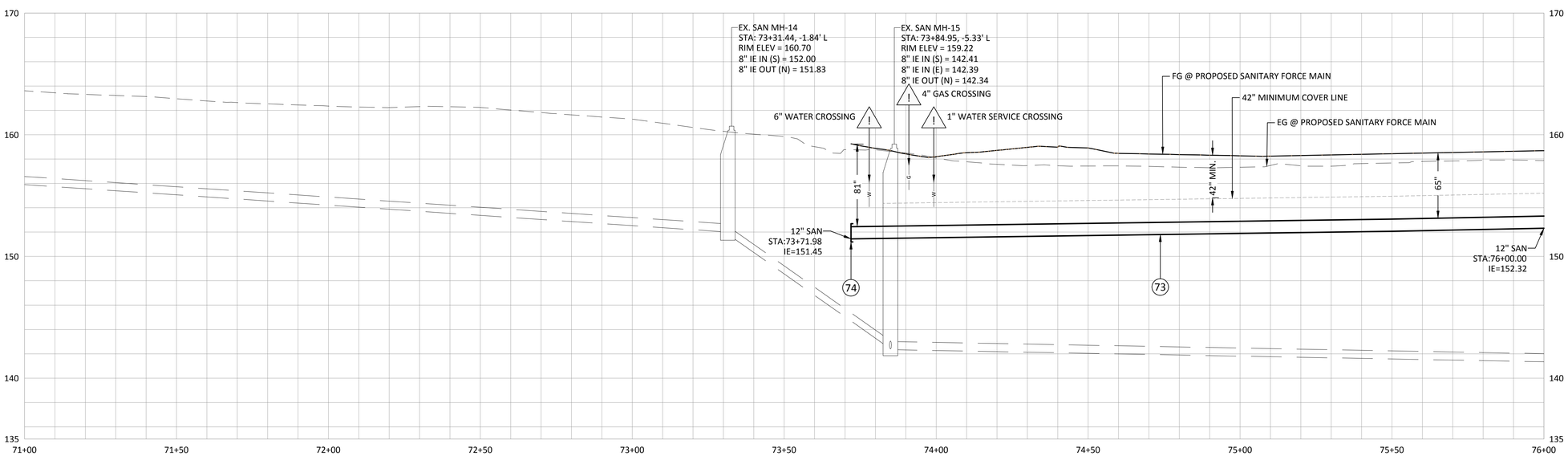
71. EXTEND EXISTING SANITARY LATERAL AND INSTALL CLEANOUT PER DETAIL ON SHEET 15.6. APPROXIMATE DEPTH (D) OF EXISTING LATERAL NOTED ON PLANS. FIELD VERIFY LOCATION OF EXISTING LATERAL STUB PRIOR TO BEGINNING WORK. CONNECTION LOCATION SHOWN ON PLANS IS APPROXIMATE.
72. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING SANITARY CLEANOUT.
73. CONSTRUCT 12" DIAMETER DUCTILE IRON SANITARY FORCE MAIN WITH RESTRAINED JOINTS.
74. PROVIDED FLANGED CAP AND TEMPORARY BLOWOFF FOR TESTING FORCE MAIN. MAINTAIN 42" MIN. OF COVER OVER FORCE MAIN. INSTALL LOCATE MARKER BALL AT END.
78. CONNECT EXISTING PRIVATE SANITARY SEWER TO EXTENDED SANITARY SEWER LATERAL. CONTRACTOR TO COORDINATE CONNECTION LOCATION. EXISTING SEPTIC SYSTEM TO BE DECOMMISSIONED IN-PLACE BY CONTRACTOR. CONFIRM PROPERTY OWNER HAS PAID CONNECTION FEES TO WES PRIOR TO CONSTRUCTION.

CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING. CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK. DEFLECT AS REQUIRED OR INSTALL VERTICAL/HORIZONTAL BENDS ON SANITARY FORCE MAIN AS NECESSARY TO MAINTAIN MINIMUM REQUIRED SEPARATION BETWEEN UTILITIES. COORDINATE ADJUSTMENT OF UTILITY SERVICE LINE CROSSINGS AS REQUIRED. SEE ROADWAY SERIES 5.0 FOR WATER METER RELOCATIONS.

NOTES:

1. ALL JOINTS SHALL BE RESTRAINED WITH FIELD LOCK GASKETS.
2. PROVIDE JOINT DEFLECTION TO MAINTAIN ADEQUATE CLEARANCE FROM OTHER UTILITIES. MAXIMUM DEFLECTION SHALL NOT EXCEED 3°.
3. COORDINATE ALL EXISTING ¾" TO 2" GAS LINES SHALL BE RELOCATIONS PRIOR TO SANITARY FORCE MAIN WORK.
4. COORDINATE WITH WES FOR AS-BUILT SURVEY DATA FOR ALL BENDS, ENDS, ETC.



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWG\SHEETS\ CLA93-15.0 SANITARY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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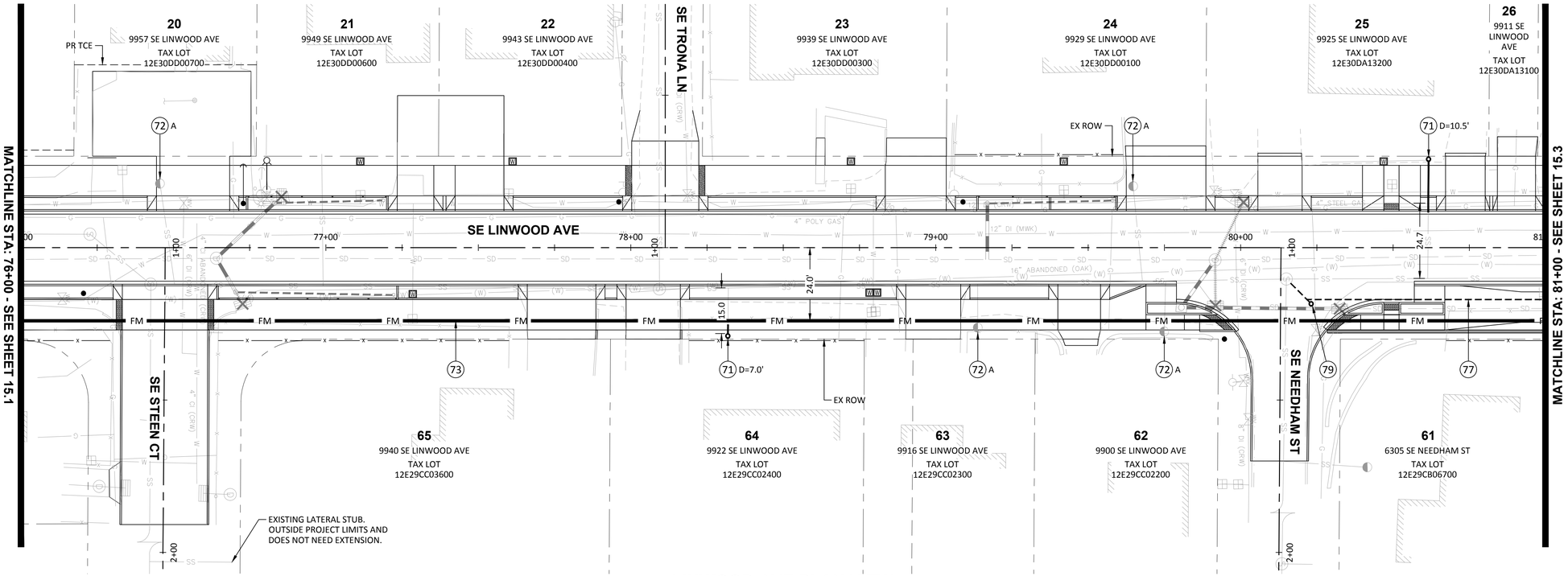
SANITARY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.1

JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

71 EXTEND EXISTING SANITARY LATERAL AND INSTALL CLEANOUT PER DETAIL ON SHEET 15.6. APPROXIMATE DEPTH (D) OF EXISTING LATERAL NOTED ON PLANS. FIELD VERIFY LOCATION OF EXISTING LATERAL STUB PRIOR TO BEGINNING WORK. CONNECTION LOCATION SHOWN ON PLANS IS APPROXIMATE.

72 RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING SANITARY CLEANOUT.

73 CONSTRUCT 12" DIAMETER DUCTILE IRON SANITARY FORCE MAIN WITH RESTRAINED JOINTS.

77 INSTALL 4" GRAVITY SANITARY OVERFLOW DRAIN FROM BOTTOM OF CARV MANHOLE TO EXISTING SANITARY MANHOLE. MINIMUM SLOPE 2%.

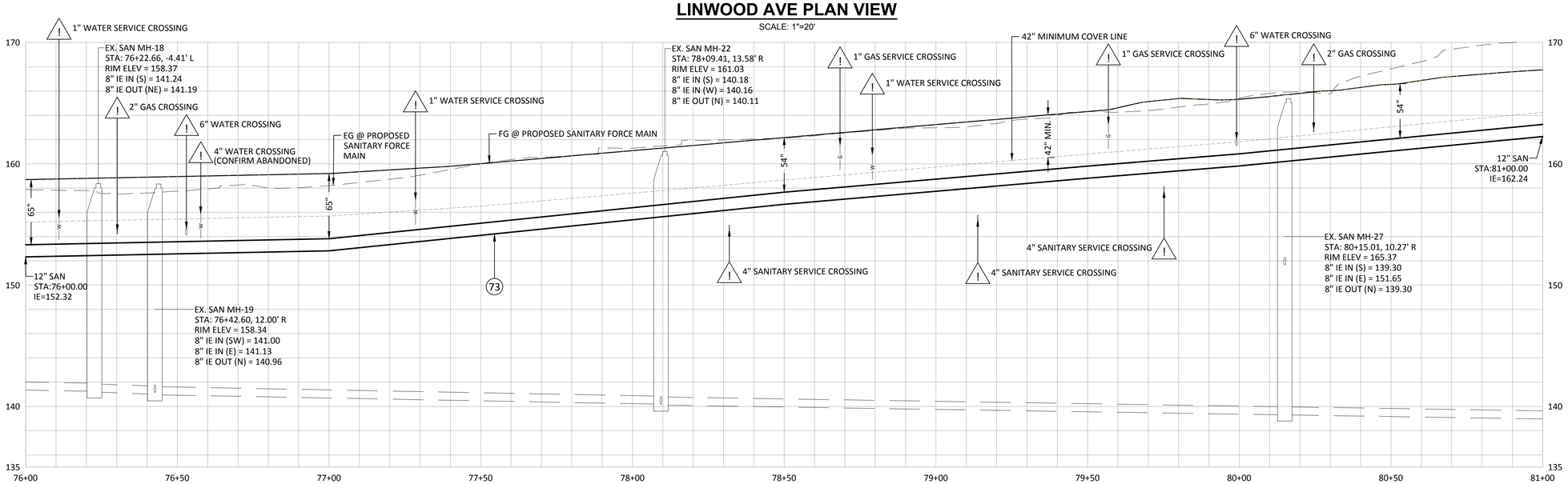
79 INSTALL SANITARY CLEANOUT.

CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING. CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK. DEFLECT AS REQUIRED OR INSTALL VERTICAL/HORIZONTAL BENDS ON SANITARY FORCE MAIN AS NECESSARY TO MAINTAIN MINIMUM REQUIRED SEPARATION BETWEEN UTILITIES. COORDINATE ADJUSTMENT OF UTILITY SERVICE LINE CROSSINGS AS REQUIRED. SEE ROADWAY SERIES 5.0 FOR WATER METER RELOCATIONS.

NOTES:

1. ALL JOINTS SHALL BE RESTRAINED WITH FIELD LOCK GASKETS.
2. PROVIDE JOINT DEFLECTION TO MAINTAIN ADEQUATE CLEARANCE FROM OTHER UTILITIES. MAXIMUM DEFLECTION SHALL NOT EXCEED 3°.
3. COORDINATE ALL EXISTING ¾" TO 2" GAS LINES SHALL BE RELOCATIONS PRIOR TO SANITARY FORCE MAIN WORK.
4. COORDINATE WITH WES FOR AS-BUILT SURVEY DATA FOR ALL BENDS, ENDS, ETC.



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
205 SE Spokane Street, Suite 200, Portland, OR 97202
phone: 503.221.1131 www.hhpr.com fax: 503.221.1171

SANITARY PLAN AND PROFILE

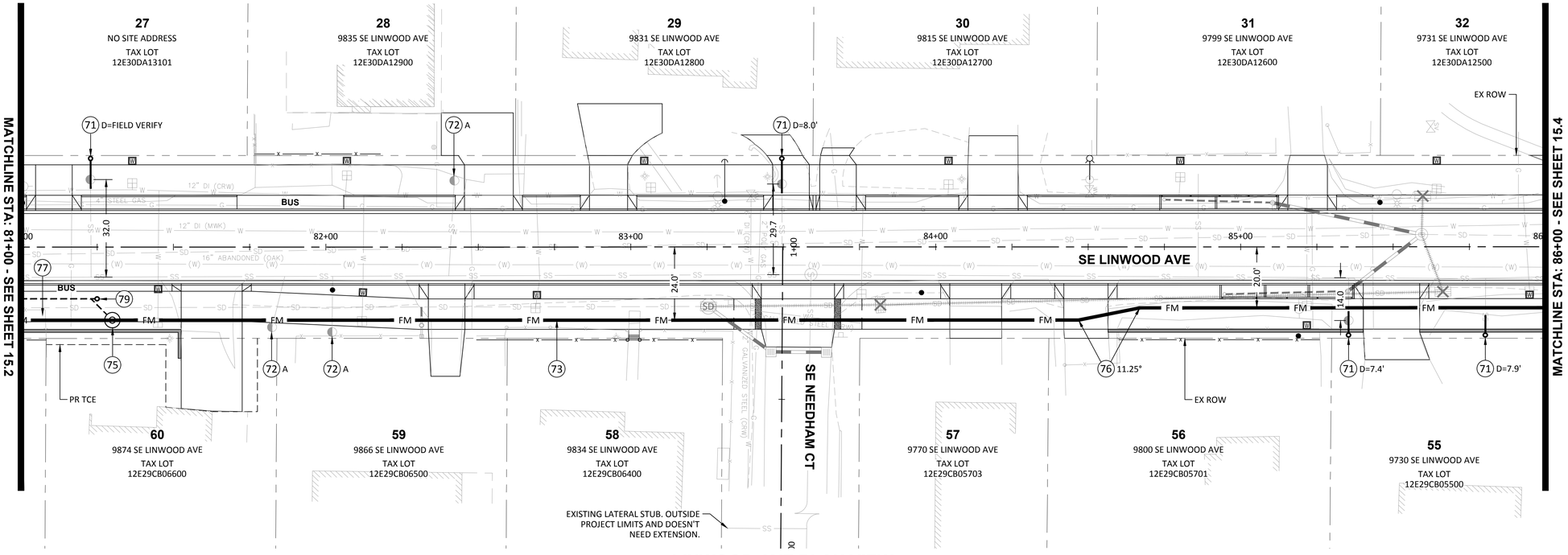
LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.2

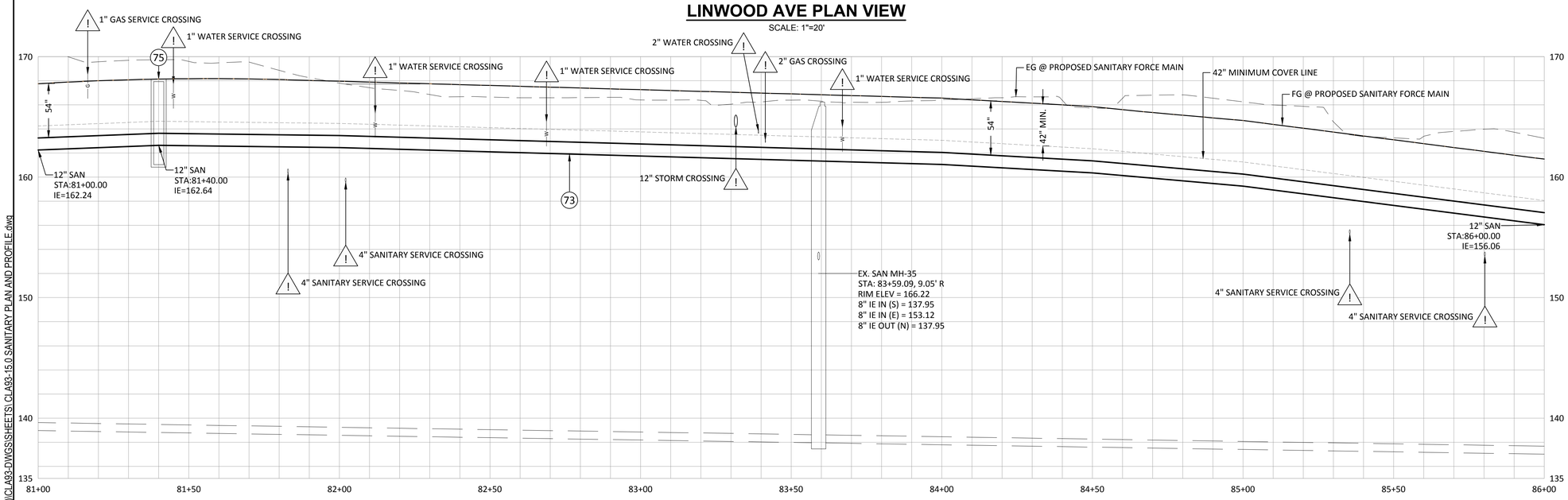
JOB NO. CLA-93

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-15.0 SANITARY PLAN AND PROFILE.dwg



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'



LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

CONSTRUCTION NOTES:

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72 RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING SANITARY CLEANOUT.

73 CONSTRUCT 12" DIAMETER DUCTILE IRON SANITARY FORCE MAIN WITH RESTRAINED JOINTS.

75 STA 81+30.00 24.0 R, RIM ELEV=168.1, CONSTRUCT 2" AIR RELEASE/VACUUM VALVE. SEE DETAIL ON SHEET 15.6.

76 INSTALL 12" MJ BEND WITH JOINT RESTRAINT. BEND DEGREE NOTED ON PLANS.

77 INSTALL 4" GRAVITY SANITARY OVERFLOW DRAIN FROM BOTTOM OF CARV MANHOLE TO EXISTING SANITARY MANHOLE. MINIMUM SLOPE 2%.

79 INSTALL SANITARY CLEANOUT.

CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING. CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK. DEFLECT AS REQUIRED OR INSTALL VERTICAL/HORIZONTAL BENDS ON SANITARY FORCE MAIN AS NECESSARY TO MAINTAIN MINIMUM REQUIRED SEPARATION BETWEEN UTILITIES. COORDINATE ADJUSTMENT OF UTILITY SERVICE LINE CROSSINGS AS REQUIRED. SEE ROADWAY SERIES 5.0 FOR WATER METER RELOCATIONS.

NOTES:

1. ALL JOINTS SHALL BE RESTRAINED WITH FIELD LOCK GASKETS.
2. PROVIDE JOINT DEFLECTION TO MAINTAIN ADEQUATE CLEARANCE FROM OTHER UTILITIES. MAXIMUM DEFLECTION SHALL NOT EXCEED 3°.
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4. COORDINATE WITH WES FOR AS-BUILT SURVEY DATA FOR ALL BENDS, ENDS, ETC.

0 10 20 40
SCALE: 1" = 20'

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DWGS\SHEETS\ CLA93-15.0 SANITARY PLAN AND PROFILE.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: HHPR TEAM
DRAWN: HHPR TEAM
CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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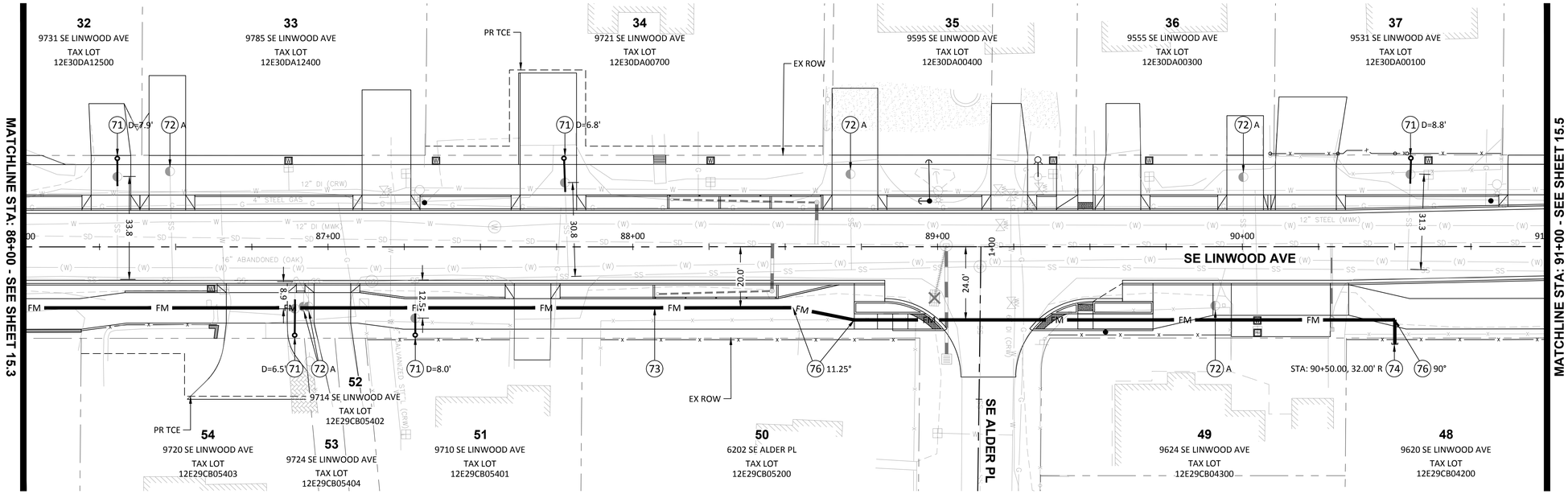
SANITARY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.3

JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

71. EXTEND EXISTING SANITARY LATERAL AND INSTALL CLEANOUT PER DETAIL ON SHEET 15.6. APPROXIMATE DEPTH (D) OF EXISTING LATERAL NOTED ON PLANS. FIELD VERIFY LOCATION OF EXISTING LATERAL STUB PRIOR TO BEGINNING WORK. CONNECTION LOCATION SHOWN ON PLANS IS APPROXIMATE.
72. RELOCATE (REL), ADJUST (A), OR PROTECT (P) EXISTING SANITARY CLEANOUT.
73. CONSTRUCT 12" DIAMETER DUCTILE IRON SANITARY FORCE MAIN WITH RESTRAINED JOINTS.
74. PROVIDED FLANGED CAP AND TEMPORARY BLOWOFF FOR TESTING FORCE MAIN. MAINTAIN 42" MIN. OF COVER OVER FORCE MAIN. INSTALL LOCATE MARKER BALL AT END.
76. INSTALL 12" MJ BEND WITH JOINT RESTRAINT. BEND DEGREE NOTED ON PLANS.

CAUTION:

PROPOSED UNDERGROUND UTILITY CROSSING. CONTRACTOR TO POTHOLE PRIOR TO BEGINNING WORK. DEFLECT AS REQUIRED OR INSTALL VERTICAL/HORIZONTAL BENDS ON SANITARY FORCE MAIN AS NECESSARY TO MAINTAIN MINIMUM REQUIRED SEPARATION BETWEEN UTILITIES. COORDINATE ADJUSTMENT OF UTILITY SERVICE LINE CROSSINGS AS REQUIRED. SEE ROADWAY SERIES 5.0 FOR WATER METER RELOCATIONS.

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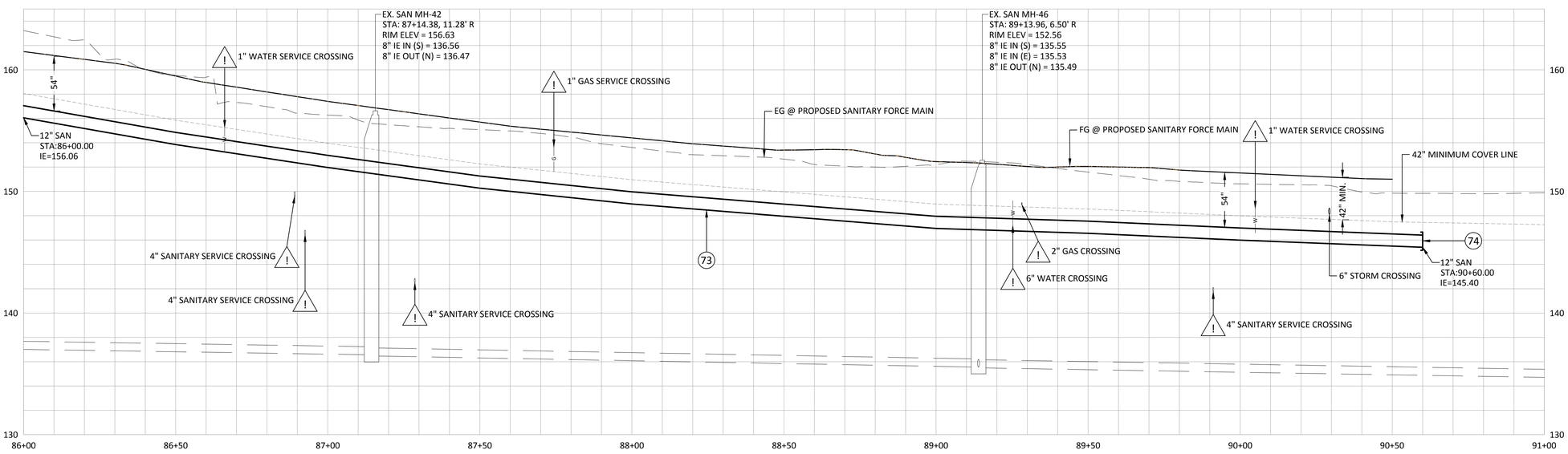

LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

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PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

REVISIONS

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CHECKED: DSH/JSH
DATE: 11-11-2022

REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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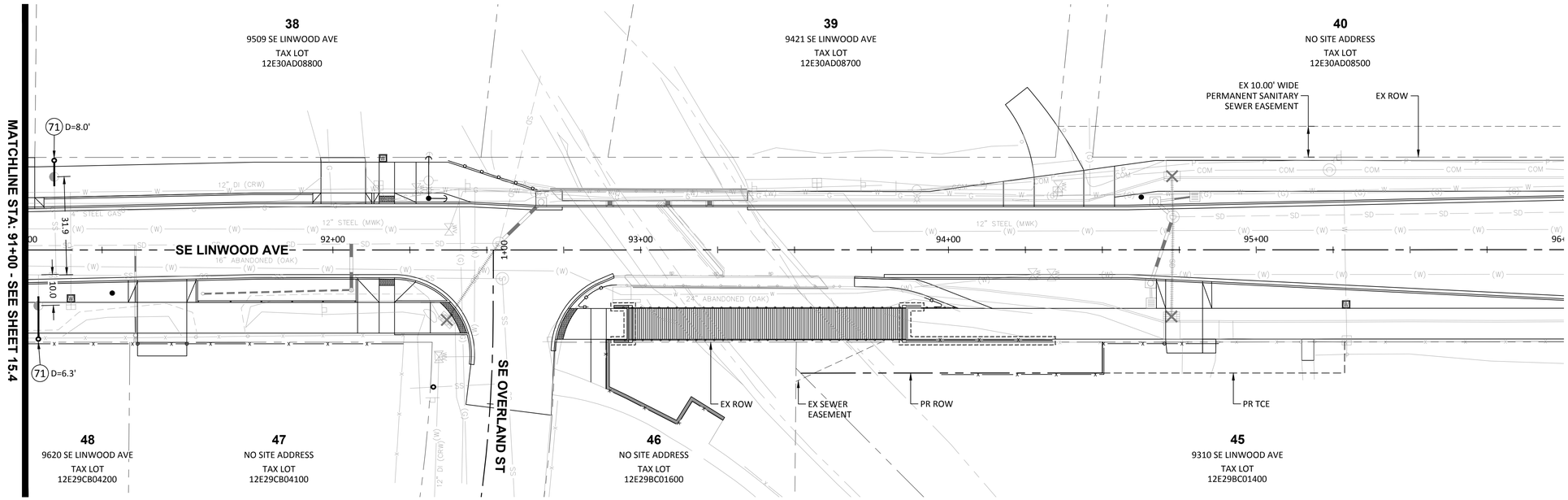
SANITARY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.4

JOB NO. CLA-93



LINWOOD AVE PLAN VIEW

SCALE: 1"=20'

CONSTRUCTION NOTES:

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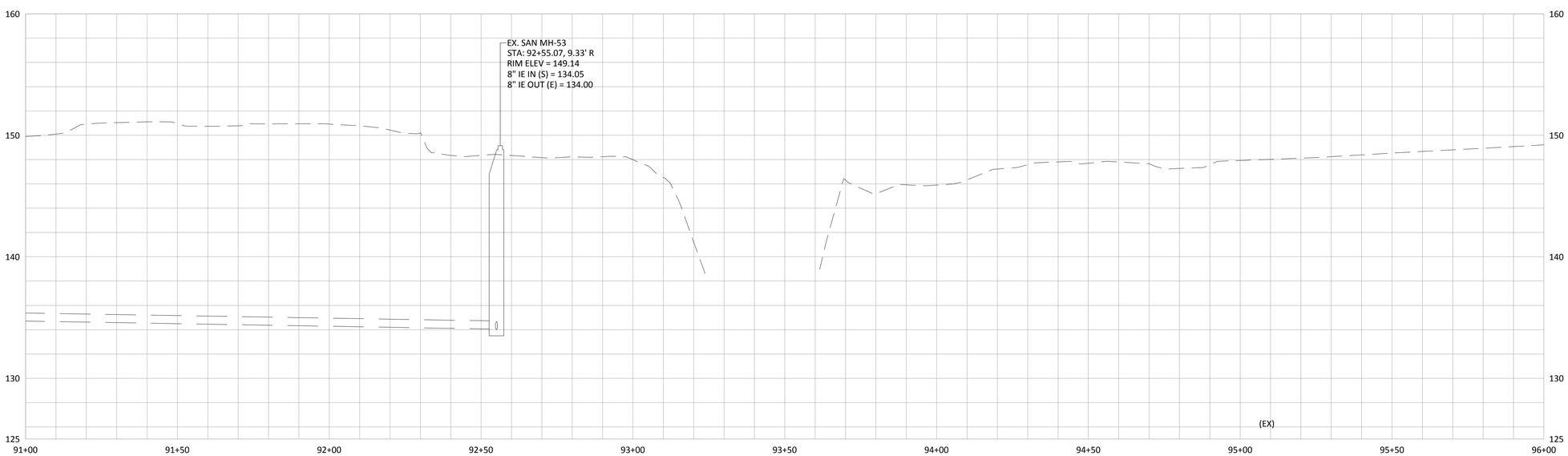

LINWOOD AVE - CENTERLINE PROFILE

SCALE: 1"=20' (HORIZ.)
1"=5' (VERT.)

0 10 20 40
SCALE: 1" = 20'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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SANITARY PLAN AND PROFILE

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.5

JOB NO. CLA-93

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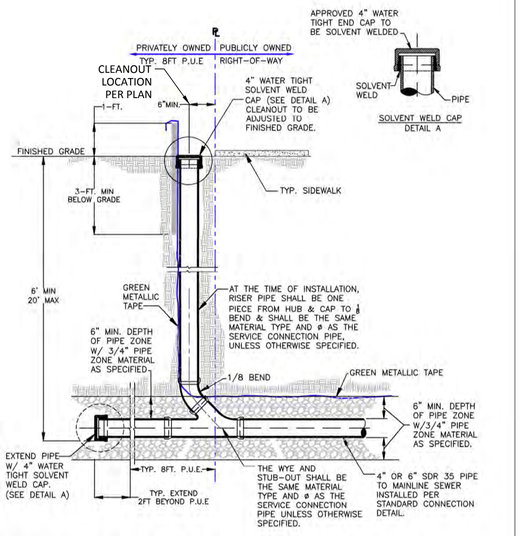
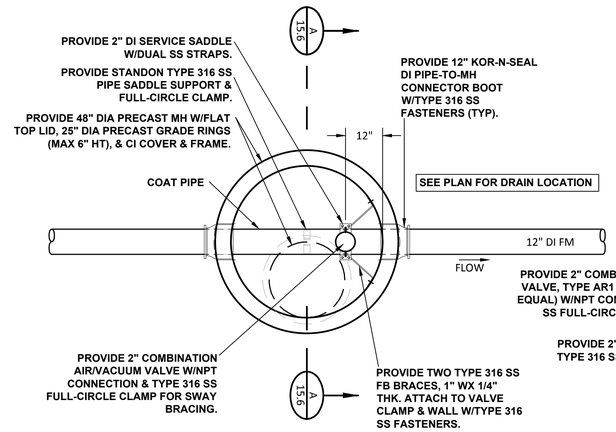


NOTES:
1. ALL PIPE AND FITTINGS SHALL BE ASTM D-3034, SDR 35.
2. ON LOTS WITH EXISTING HOMES, CONTRACTOR SHALL INSTALL APPROVED HUBS AND CAPS FLUSH WITH FINISHED GRADE.
3. CLEANOUTS SHALL NOT BE CONSTRUCTED SO THE CLEANOUT CAP WILL END UP IN SIDEWALKS, STEPS OR DRIVEWAYS.
4. EVERY PROPERTY SHALL HAVE A SEPARATE SERVICE LATERAL CONNECTED DIRECTLY TO THE MAINLINE, UNLESS OTHERWISE APPROVED BY THE DISTRICT. SHARED SERVICES ARE NOT ALLOWED.
5. THE SERVICE CONNECTION LOCATION SHALL GENERALLY BE LOCATED TEN FEET (10) OFFSET FROM THE PROPERTY LINE ON THE LOW SIDE OF LOT.
6. TEES FOR SERVICE CONNECTIONS SHALL BE LOCATED NO CLOSER THAN FIVE FEET (5) TO MANHOLES. SEPARATION BETWEEN WATER LINE, SANITARY SERVICE CONNECTION AND STORM SERVICE CONNECTION SHALL GENERALLY BE TEN FEET (10) WITH A MINIMUM OF FIVE FEET (5).
7. ANY OTHER PROPOSED LOCATION SHALL BE AT THE DISCRETION OF THE DISTRICT ON CASE BY CASE BASIS.

WATER ENVIRONMENT SERVICES www.co.clackamas.or.us/wes	CLACKAMAS COUNTY 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: 2013 SCALE: N.T.S. SERVICE CONNECTION P.U.E.	STANDARD DRAWING SAN-017



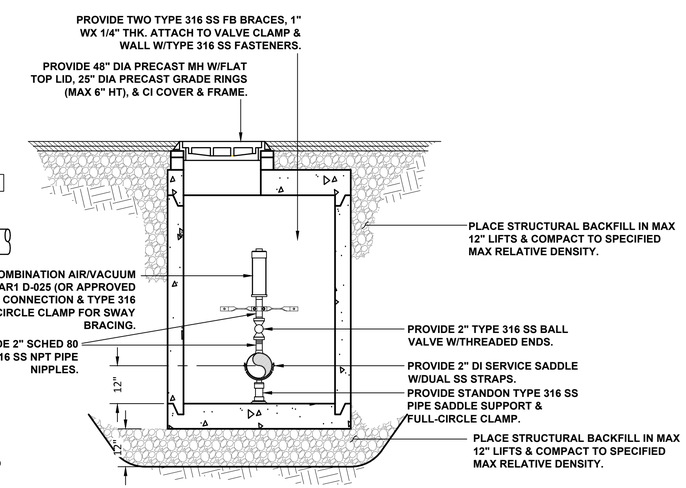
PLAN

NOTE: PROVIDE PIPE COATING FOR EXPOSED PIPE AND FITTINGS WITHIN MANHOLE

2" AIR RELEASE / VACUUM VALVE DETAIL

NTS

1 / 15.3



SECTION

NTS

A / 15.6

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PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
DEVELOPMENT SERVICES BLDG.
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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REGISTERED PROFESSIONAL ENGINEER 86,200 OREGON JAN. 10, 2017 JAMES S. HOUF
EXPIRES: 6/30/23

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SANITARY DETAILS

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 15.6

JOB NO. CLA-93

LEGEND

RIGHT-OF-WAY (ROW) ACQUISITION AREA

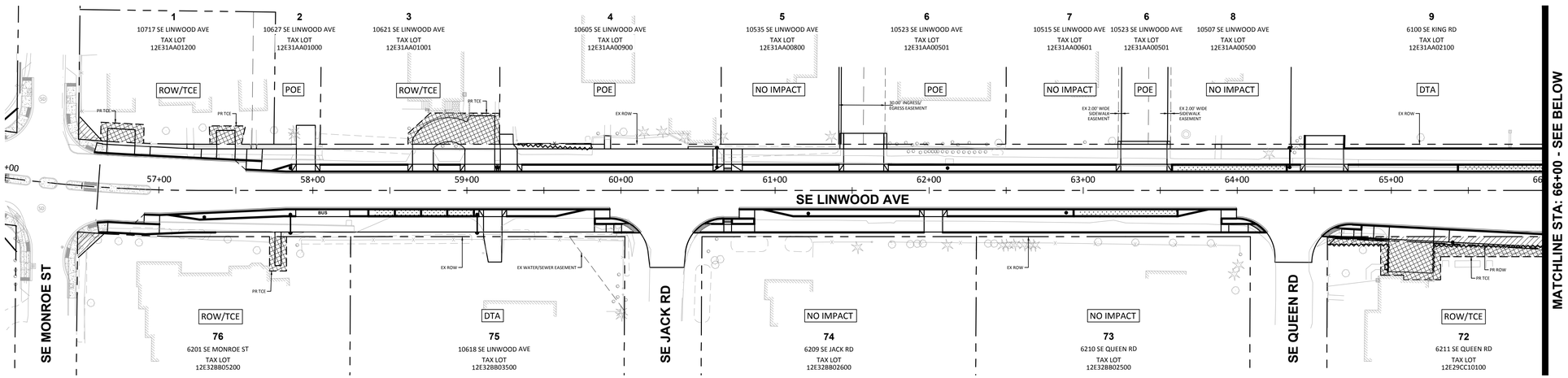
TEMPORARY CONSTRUCTION EASEMENT (TCE) ACQUISITION AREA

ABBREVIATIONS:

ROW	RIGHT-OF-WAY
TCE	TEMPORARY CONSTRUCTION EASEMENT
DTA	DRIVEWAY TRANSITION ACQUISITION
POE	PERMIT OF ENTRY

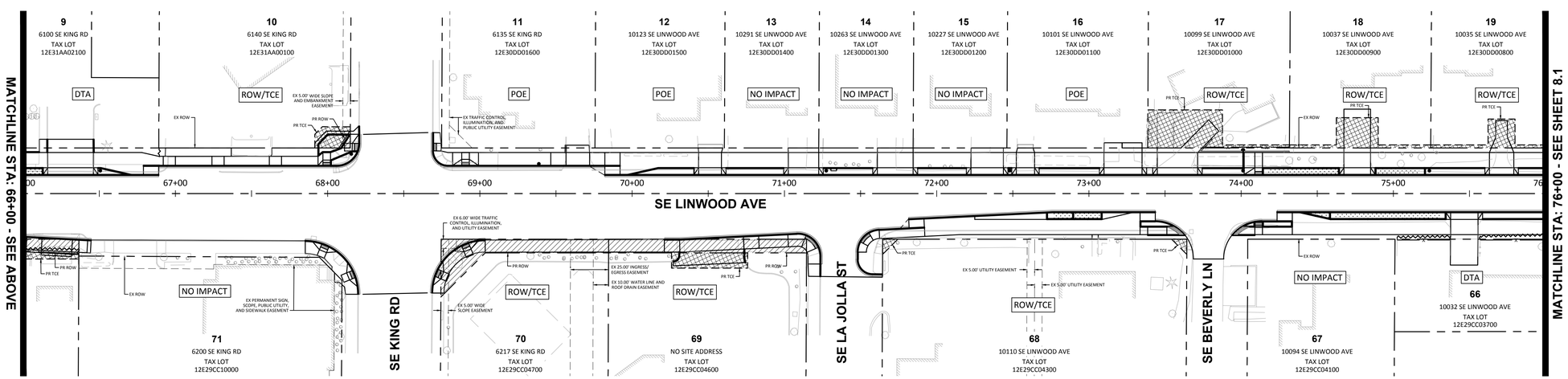
0 20 40 80

SCALE: 1" = 40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
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150 BEAVERCREEK ROAD
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ROW ACQUISITION PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 16.0

JOB NO. CLA-93

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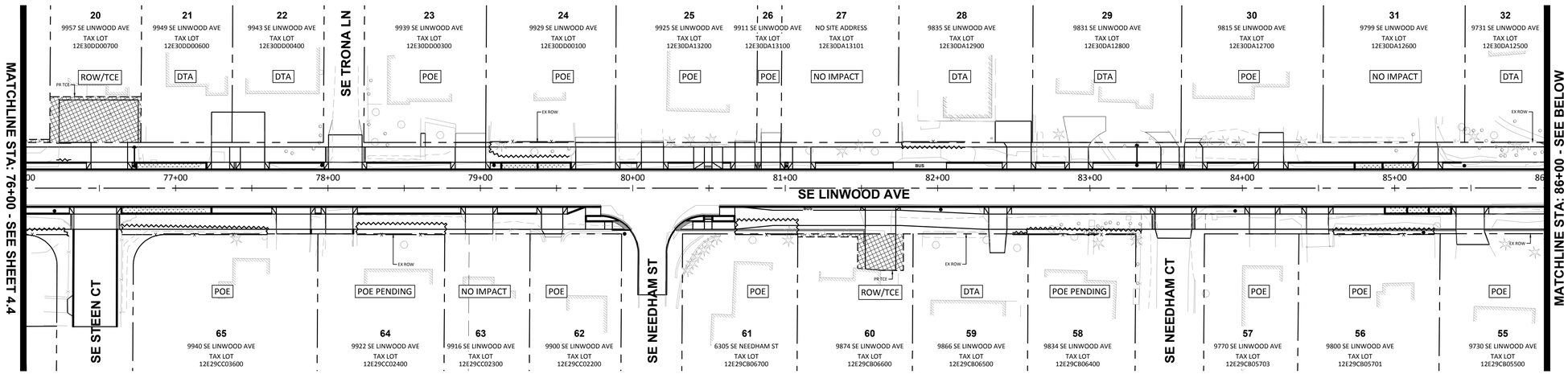
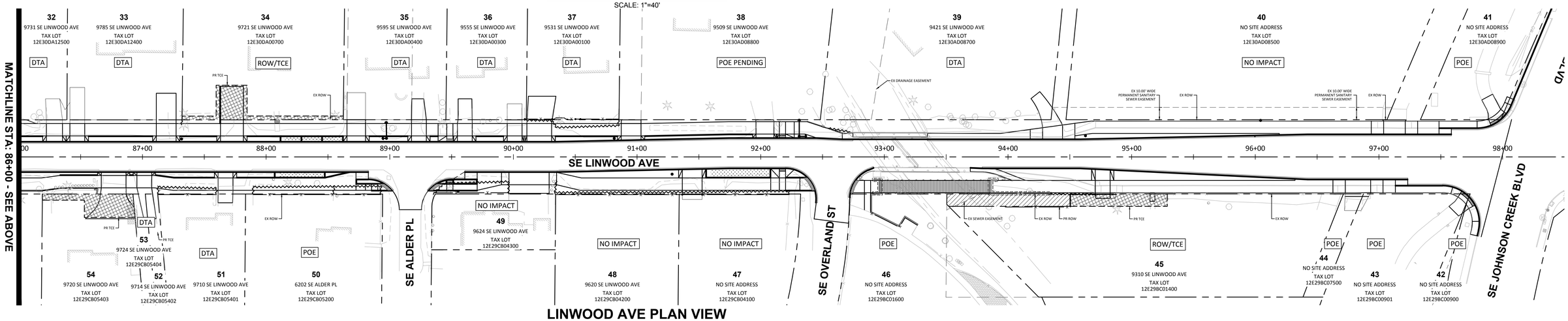


LINWOOD AVE PLAN VIEW

SCALE: 1"=40'



LINWOOD AVE PLAN VIEW

SCALE: 1"=40'

0 20 40 80

SCALE: 1" = 40'

LEGEND

RIGHT-OF-WAY (ROW) ACQUISITION AREA

TEMPORARY CONSTRUCTION EASEMENT (TCE) ACQUISITION AREA

ABBREVIATIONS:

ROW	RIGHT-OF-WAY
TCE	TEMPORARY CONSTRUCTION EASEMENT
DTA	DRIVEWAY TRANSITION ACQUISITION
POE	PERMIT OF ENTRY

P:\CLA (Clackamas County)\CLA-93 (Linwood Ave)\CLA93-DW\GS\SHEETS\ CLA93-16.0 ROW ACQUISITION PLAN.dwg

PREPARED FOR

CLACKAMAS COUNTY
DEVELOPMENT AGENCY
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150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE	NO.	DESCRIPTION

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EXPIRES: 6/30/23

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ROW ACQUISITION PLAN

LINWOOD AVENUE IMPROVEMENTS

CLACKAMAS COUNTY, OREGON

SHEET NO. 16.1

JOB NO. CLA-93

Storm Sewer Engineering Agreement

By this agreement, required by Clackamas County Service District No. 1 (CCSD #1) in accordance with the Stormwater Design Standards and Regulations, [redacted] proposes to provide professional engineering, surveying, and inspection services for the proposed project, [redacted] as follows:

1. Provide field surveying, engineering, design, and drafting to prepare the necessary construction plans for the proposed storm sewer collection system. Submit plans for approval by all concerned governing agencies.

2. Provide field inspection to the extent required to ensure that construction is performed according to the approved plans and meets CCSD #1 requirements. The engineer shall ensure that all publicly and privately maintained storm lines will be cleaned, flushed and video inspected at the owners expense.

3. On completion of construction, certify that CCSD #1 requirements have been met by means of a licensed engineer's stamp on the Asbuilts as described below. As-built information shall include actual surveyed data for invert elevations at all catch basins, manholes, and control structures accurate to the nearest 0.10 ft. The accuracy of the plans will be thus certified: "I hereby certify that to the best of my knowledge the final construction of the storm sewer system shown here has met the requirements of CCSD #1, and that these drawings accurately represent the storm system as actually constructed."

4. If the site is within 1/2 mile of an established and recorded bench mark, certify the Asbuilts with the following statement stamped by a licensed surveyor or engineer: "I certify that the elevations shown on this As-Built drawing are based on the best available bench mark based on the North American Vertical Datum (NAVD) datum and are accurate to the nearest 0.10 ft".

5. Provide an Asbuilt drawing of any flow control structure(s) and show the surveyed overflow riser pipe elevation and location, orifice size, elevation, and location, size and location of pipes connected to the structure, sump elevation, and any other pertinent information. Include a statement certifying the actual detention volume between the outflow elevation and the overflow elevation.

6. Prepare "Asbuilt" plans for the constructed storm sewer system, including a certificate of completion. Asbuilts shall be submitted both as mylar copies, and in an electronic disk in AutoCAD format. The electronic disk and contents shall become the property of the District. The Engineer and Owner have a full understanding that Release of Public Records of said Asbuilt drawings and electronic data is subject to public records information, and the release of public records is standard practice.

Engineer _____ Date [redacted]

by [redacted]

Owner [redacted]

by_____