
Subject	Segment 1 Routing Alternatives Evaluation
Project Name	Tri-City WRRF Willamette River Outfall
Jacobs PN	D3218600
To	Jeff Stallard/WES Lynne Chicoine/WES
From	Jamie Dooley/Jacobs Rick Attanasio/Jacobs Dave Wilson/Jacobs
Reviewed by	Quitterie Cotten/Jacobs
Date	October 25, 2019
Copies to	File

1. Introduction and Scope of Technical Memorandum

This Technical Memorandum (TM) is submitted pursuant to Task 3.4.1.1, Segment 1 Routing Alternatives Evaluation, of the Jacobs contract for engineering services for the Tri City Water Resource Recovery Facility (WRRF) Willamette River Outfall with Water Environment Services (WES). The Segment 1 route is from the WRRF effluent mixing box to the vicinity of the existing diversion structure.

This preliminary analysis is to compare up to four alternative Segment 1 pipeline alignments. Under a previous construction contract, a 72-inch-diameter reinforced concrete pipe (RCP) was stubbed out to the south 175 feet from the effluent mixing box for the new outfall (MWH, Sheet 70-C-39). Invert for the previously installed stub pipe for the new outfall is 30.50 (National Geodetic Vertical Datum of 29/47 [NGVD'29] or 33.97 (North American Vertical Datum of 1988 [NAVD'88]) {MWH, Sheet 10-G-12}. The terminus of this 175-foot pipe is considered the point of beginning for Segment 1.

2. Basis of Design

2.1 Data Utilized in Analysis

This analysis utilized data provided by WES and the Oregon Department of Transportation (ODOT). Topography was based on the LIDAR "dtm" developed by the Oregon Department of Geology and Mineral Industries (DOGAMI) and converted to "dgn" format by ODOT. The primary record drawings and sources of information used in this analysis were as follows:

- *Willamette Interceptor 1A Outfall Oregon City Interceptor River Crossing* (B&C, 1984) [Note: many sections of the drawings are unreadable as a result of scan.]
- *The Cove Waterfront-DDP Set* (DOWL, February 8, 2019)
- *Geotechnical Assessment Cove Waterfront (APEX, December 2017)*
- *Unpermitted Rossman Landfill Waste Relocation and Final Closure* (URS, 2008)
- Excerpts - Expanded Environmental Site Assessment (Agra, July 1998)
- *Tri-City WPCP Final Design Services Agnes Road Exploration* (MWH, 2007)
- Tax Lot Information (WES, 2019)
- *Record Drawing Tri-City Phase 1 Expansion* (MWH, 2012)

- *Required Effluent Flow Capacity* (WES, August 5, 2019)
- WRRF effluent flow values from *Request for Proposals for the WES Facility Plan Update* (WES)
- *WES Master Plan Tri-City Cost Basis* updated in August 2019 to 2022

2.2 Design Assumptions

Based on preliminary hydraulic analysis, this alternatives evaluation assumes an 84-inch-diameter gravity pipeline for the new outfall (Jacobs Preliminary Outfall Hydraulic Analysis Memorandum, August 2019). The capacity for the new outfall is 101 million gallons per day (mgd) (WES, August 5, 2019). WES has determined that the outfall should be by gravity discharge and pumped discharge should not be considered at this time (Kick-Off Meeting, July 8, 2019).

A preliminary decision was made to base the design drawings on the NAVD 88 vertical datum (email, July 31, 2019). The WRRF plans and record drawings for the existing outfall and Willamette Interceptor are based on NGVD 27; however, the ODOT drawing, DOGAMI LIDAR, and Flood Insurance Study are all based on NAVD 88. Since the majority of this work will not be at the WRRF, it was considered judicious to base the alignment work on NAVD 88 to minimize conflicts and confusion with adjacent facilities.

2.3 Design Review Criteria

Draft design review criteria were submitted to WES on June 11, 2019, for District review. The accepted Segment 1 Outfall Routing criteria are as follows:

- Capital Construction Cost
- Operations and Maintenance Costs
- Constructability
- Schedule Compatibility
- Geotechnical Stability
- Hazardous Materials
- Permitting
- Utility Conflicts
- Property Ownership
- Right-of-Way (ROW) Encroachment
- Public Impacts and Public Perception

The alternatives were evaluated based on these criteria. However, if, in the course of the evaluation, the alternative was found to be fatally flawed, then the analysis was limited with regard to the remaining criteria because they were no longer relevant. In depth discussions about the criteria for the Segment 1 alternatives are provided in Attachment 1.

3. Alternatives Analysis

The following section presents the salient aspects of each Segment 1 alternative. These alternatives extend from the existing WRRF 72" stub from the effluent mixing box to the proximity of the diversion box. All the alternatives are for an 84-inch-diameter outfall pipeline. Attachment 2 contains a graphical overview of the four alignments under consideration.

3.1 Alternative 1 – Old Agnes Avenue

The Alternative 1 alignment follows Old Agnes Avenue to the west of the existing outfall and Willamette Interceptor. It is 2,475 feet long. The preliminary alignment is approximately 13 feet centerline-to-centerline west of the existing 72-inch-diameter outfall, resulting in approximately a 5-foot clearance from edge of new trench to skin of the existing outfall pipe. The pipeline is designed to pass over the existing outfall line at the south end of the alignment.

Old Agnes Avenue is owned by Clackamas County and there are no known land use restrictions. Both construction and maintenance access are excellent. There are no known permitting or coordination requirements. There should be no public disruption or negative perceptions resulting from construction.

Constructability is considered good; pipe depth is on the order of 15 feet with good construction access. The alignment may conflict with an existing gas line and a 10-inch-diameter waterline. Field survey will be required to definitively assess the extent of any conflicts, and research into existing utility easements will be required to determine responsibility for any potential relocations.

Groundwater, as reported in 1998, is approximately 15 feet below bottom of pipe (Agra, 1998). The midsegment of the alignment, approximate STAs 13+50 to 26+00, appears to be within the refuse layer (URS, 2008). The 2007 exploration on Agnes Road (MWH) reported settlement in the south section of road adjacent to the landfill with “garbage” encountered in the test pit. Depth of refuse below the pipe appears to vary from 2 feet to a maximum of 7 feet. There appears to be no landfill cap in this area.

Prior to final design, test pits should be dug in Old Agnes Avenue to accurately determine the extent and character of refuse in the alignment. Over-excavation with stabilization, total removal of the refuse below the pipe, or over-excavation with layered geogrids should be considered for stabilization, depending on the results from the test pits. Stabilization of pipe bedding appears to be manageable at a reasonable cost.

In June of 2000, WES signed a Prospective Purchaser Agreement with Oregon Department of Environmental Quality (ODEQ) (DEQ No. 00-05) regarding their rights and responsibilities upon purchase of the landfill. Preliminary discussion with ODEQ were held on September 19, 2019 with Tim Spencer (ODEQ) and on October 17, 2019, with Bob Schwarz (ODEQ). Discussions at both meetings indicated that there is little concern that the remaining refuse under Old Agnes would hinder the ability to construct the outfall in this corridor. Ongoing coordination with ODEQ will be required during final design and exploration to ensure compliance with building the effluent pipeline through the landfill. ODEQ requested a work plan be submitted for review prior to any geotechnical investigations within the landfill proper. Previous test pits completed in the alignment have been summarized and shown on the Profile included in Figure 1 in Attachment 3.

Construction cost is estimated as \$7,032,000; this includes allowances for over-excavation and stabilization in the area of existing refuse, utility relocation, and connection to existing system. Figure 1 in Attachment 3 contains plan and profile for Alternative 1. Attachment 3 also contains cost estimate details.

3.2 Alternative 2 – New Agnes Avenue

Alternative 2 follows the new Agnes Avenue to be constructed by the Cove Development. The anticipated length is approximately 2,725 feet. The proposed alignment would follow the centerline of the new roadway. Trench excavation depth from existing ground varies from approximately 24 to 21 feet along the majority of the alignment. Grading for the new road will raise surface elevation from 2 to 4 feet along most of the alignment. The outfall pipeline will be deep enough to avoid conflicts with the new water, storm, and sanitary utilities to be installed with the development. Grading for the new road and development is anticipated to begin on May 2020. Grading plans and approximate profile of the new outfall for the new Agnes Avenue are contained in Attachment 4.

The land is currently owned by Oregon City Urban Renewal Agency. The pipeline will require easements from the future owners. Future maintenance of the pipeline will require traffic control for new Agnes Avenue and would cause disruption to the property owners.

The Cove Waterfront geotechnical Assessment reports the potential for organic fills, concrete debris, remnants of track and ties, as well as other unsuitable fill materials. Settlement issues are expected; stabilization techniques would be similar to those used in Alternative 1.

Alternative 2 offers no advantages over Alternative 1 and has several disadvantages such as greater length, deeper excavation, greater landfill impact, inadequate cover at the south end (STA 11+00 to 11+75), and would require WES to obtain additional easements.

3.3 Alternative 3 – Cove Esplanade

Alternative 3 follows the new Esplanade to be constructed by the Cove Development. The anticipated length is approximately 3,350 feet. The proposed alignment would follow the centerline of the new Esplanade. Grading for the new Esplanade and development is anticipated to begin on May 2020. Grading for the Esplanade will not accommodate the outfall pipeline. Grading plans for the new Esplanade and approximate profile of new outfall are contained in Attachment 5.

The land is currently owned by Oregon City Urban Renewal Agency. The pipeline will require easements from the future owners. Future maintenance of the pipeline will require coordination with the property owners and access to the pipe would be hindered by the location between housing properties and the cove waterfront.

Alternative 3 is fatally flawed because the proposed grading will leave the pipeline above grade in the lower 800 feet and the upper 950 feet of the Esplanade. No Further Evaluation was completed.

3.4 Alternative 4 – ODOT I-205 Right-of-Way

Alternative 4 follows the southbound ROW of I-205 between the shoulder of I-205 and the ROW line. It is 2,699 feet long. The required trench width is 11.25 to 11.50 feet, exclusive of shoring width. Trench excavation depths along I-205 are on the order of 30 feet. The ROW between the shoulder of I-205 and the edge of ROW is a fill slope with slopes varying from 1 horizontal to 1 vertical (1H:1V) to 2H:1V. Fill slope heights above Old Agnes Avenue are from 10 to 15 feet. About 1,100 feet of the alignment contains mature evergreen trees with heights approaching 100 feet that would require removal.

The ROW is owned by ODOT. Construction would be subject to ODOT restrictions and traffic management requirements. Maintenance access would also be subject to ODOT restrictions.

Excavating a 30-foot-deep trench along I-205 would potentially destabilize I-205. At a minimum, a soldier pile trench wall would be necessary to support I-205; with potential ground improvements necessary to further control the fill slope. Alternative 4 would also require removal of approximately 100 mature trees along I-205. Trenchless installation for this alignment could potentially save the majority of the trees; however, constructing launch and receiving pits would be problematic given the side slopes. Trenchless construction would be abnormally expensive due to the topography and access; and could also destabilize I205. Figure 2 in Attachment 6 contains plan and profile for Alternative 4.

Preliminary discussion with ODOT revealed that this alignment would probably not be permitted by ODOT. Without ODOT's approval, Alternative 4 is not constructible and should be considered fatally flawed.

3.5 Alternative Comparison Table

The Alternative Comparison Table is contained in Attachment 1. Routing criteria are qualitative only. Cost was not included in the Table for Segment 1 because the non-cost criteria were sufficient to clearly identify a preferred alternative.

4. Recommended Alternative

Alternative 1 is recommended as the preferred alignment. Alternative 2 offers no benefits over Alternative 1 and has several disadvantages; it would be require obtaining easements and coordination with the planned construction of the Cove Development which at this time is targeting a May 2020 start date. Alternative 3 is fatally flawed because the proposed grading of the Esplanade would expose the pipeline for approximately 1,750 feet. Alternative 4 is not constructible because of its proximity to the I-205 roadway fill and the necessity for ODOT permits.

Before final design commences, geotechnical investigations should be conducted in Old Agnes Avenue to accurately determine the extent and character of refuse in the alignment. Over-excavation with stabilization, total removal of the refuse below the pipe, or over-excavation with layered geogrids should be considered for stabilization, depending on the results from the test pits. Prior to any geotechnical investigations in the landfill proper ODEQ requested a workplan be submitted prior to any investigation.

Field survey is required before design to tie existing alignments and to accurately determine the depths of existing utilities. Regarding archaeological and cultural surveys; the area proximal to Alternative 1 was previously surveyed and disturbed during the construction of I205. We recommend that field surveys be conducted to identify and document any cultural materials that may be present.

Jacobs suggests that the design plans use NAVD 88 as a vertical datum since all the adjacent facilities are on NAVD 88 with the exception of the WRRF. Connections to the WRRF are limited in area and can be accommodated in the design plans.

Attachment 1
Segment 1 Alternative Comparison Table

Tri-City Outfall-Segment #1 Outfall Alternative Comparison

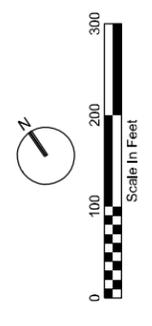
Alt No.	Alternative Alignment/ Description	Capital Cost	O&M Costs	Constructability	Schedule	Geotechnical Stability	Hazardous Materials	Permitting	Utility Conflicts	Property Ownership	ROW Encroachment	Public Impacts & Perception
		Initial Capital Construction Costs	Relative annual cost to maintain, inclusive of maintenance access issues	Construction risk and construction access considerations	Meets 2021 timeframe and impacts from other development along route (Cove development, ODOT Widening, etc.).	Long term stability of pipeline and seismic considerations	Encounter buried hazardous materials or landfill wastes that require special handling during pipeline construction (impact is also reflected in construction cost and schedule)	Complexity and cost of permitting for environmental and land use, inclusive of anticipated timeframe and diffuser placement	Construction risk to adjacent utilities and potential need to move utilities	Requirements to purchase easements or ROW, inclusive of potential condemnation	Potential encroachments into non-WES ROW	Perceived impacts by the public and/or other potential negative impacts; inclusive of diffuser placement
1	Alternative 1: 84" pipeline along Old Agnes Rd. Parallel to and west of the existing outfall.		Easy construction access along Old Agnes Rd.	Good Access may intercept landfill in limited areas.	Construction is independent of Cove Development and ODOT widening.	May require some stabilization in potential landfill area.	Potential to impact hazardous material if within landfill.	Minimal permitting required.	Near existing outfall pipeline, Willamette Interceptor, 10" waterline, and NWN gas line in vicinity.	No easement acquisition anticipated, at this time.	None anticipated, at this time.	Construction is contained on WES ROW, no public impact or negative perceptions anticipated.
2	Alternative 2: 84" Pipeline along new Agnes Road within the Cove Development.		Access requires traffic control on new Agnes Rd within the Cove Developments main residential access.	Construction after spring 2020 will conflict with Cove construction.	Construction after spring 2020 will conflict with Cove construction.	Geotechnical conditions unknown, at this time.	Geotechnical conditions unknown, at this time.	Minimal permitting required.	Construction will need to coordinate with Cove's new storm, sanitary, and water systems in new Agnes Road.	Easement required from COVE Development.	Easement required from COVE Development.	Minimal public impact or negative perceptions anticipated.
3	Alternative 3: 84" Pipeline along new Esplanade within the Cove Development.		Requires coordination with Cove Development on the Esplanade.	Esplanade grading is inconsistent with new outfall pipe grade.	Construction after spring 2020 will conflict with Cove construction.	Geotechnical conditions unknown, at this time.	Geotechnical conditions unknown, at this time.	Minimal permitting required.	Minimal utility conflicts.	Requires easement that would force Cove to regrade the Esplanade.	Requires easement that would force Cove to regrade the Esplanade.	Minimal public impact or negative perceptions anticipated.
4	Alternative 4: 84" Pipeline along west 1205 ROW		Require ODOT approval to enter ROW	Side slopes of are 1:1 to 2:1; with an approximately 10-foot of additional excavation depth.	Construction needs to be coordinated with ODOT 1205 work.	Geotechnical conditions unknown, at this time.	Geotechnical conditions unknown, at this time.	Minimal permitting required.	Construction needs to protect the integrity of 1205 roadway. Potential conflicts with ODOT storm systems.	Requires easement from ODOT.	Requires construction coordination and easements from ODOT.	Highly visible construction along 1205; potential for citizens complaints regarding construction practices.

Attachment 2
Graphical Overview of Four Segment 1
Alignment Alternatives



-  Segment 1 - Alternative 1
-  Segment 1 - Alternative 2
-  Segment 1 - Alternative 3
-  Segment 1 - Alternative 4

ROUTE OVERVIEW
SEGMENT 1
ALIGNMENT ALTERNATIVES
TRI CITY WWRF OUTFALL



Attachment 3
Alignment 1 Plan & Profile and Cost
Estimate Details

WATER ENVIRONMENT SERVICES
CONCEPTUAL COST ANALYSIS
SEGMENT #1 - ALTERNATIVE #1

Segment	From MH	To MH	Length (ft)	Avg. Depth (ft)	\$/LF (w/ Indirects)	Supplemental MH Cost (\$)	Over Exc. Cost (\$)	Additional Inc. Cost (\$)	Segment Cost (\$)
1	1	2	76	10	\$2,488	\$16,500	\$0	\$0	\$205,581
2	2	3	202	13	\$2,614	\$17,000	\$0	\$0	\$544,971
3	3	4	500	15	\$2,614	\$17,000	\$0	\$0	\$1,323,860
4	4	5	425	15	\$2,614	\$17,000	\$34,700	\$0	\$1,162,531
5	5	6	274	15	\$2,614	\$17,000	\$19,800	\$0	\$752,959
6	6	7	265	14	\$2,614	\$17,000	\$19,150	\$0	\$728,786
7	7	8	249	14	\$2,614	\$17,000	\$14,400	\$0	\$682,216
8	8	9	312	14	\$2,614	\$17,000	\$2,200	\$0	\$834,681
9	9	10	127	17	\$2,822	\$17,500	\$0	\$0	\$375,853
10	10	11	52	19	\$2,822	\$17,500	\$0	\$20,000	\$184,227
Costs based on Updated WES Tri-City Cost Basis Over Excavation & Rock Fill at \$30 CY									\$6,611,439
Potential Relocation of Gas Line and 10" Water Line:									\$150,000
4% Inflation to 2022:									\$6,761,439
Segment Total (\$):									\$7,031,897

Attachment 4
Grading Plans for the New Agnes Avenue

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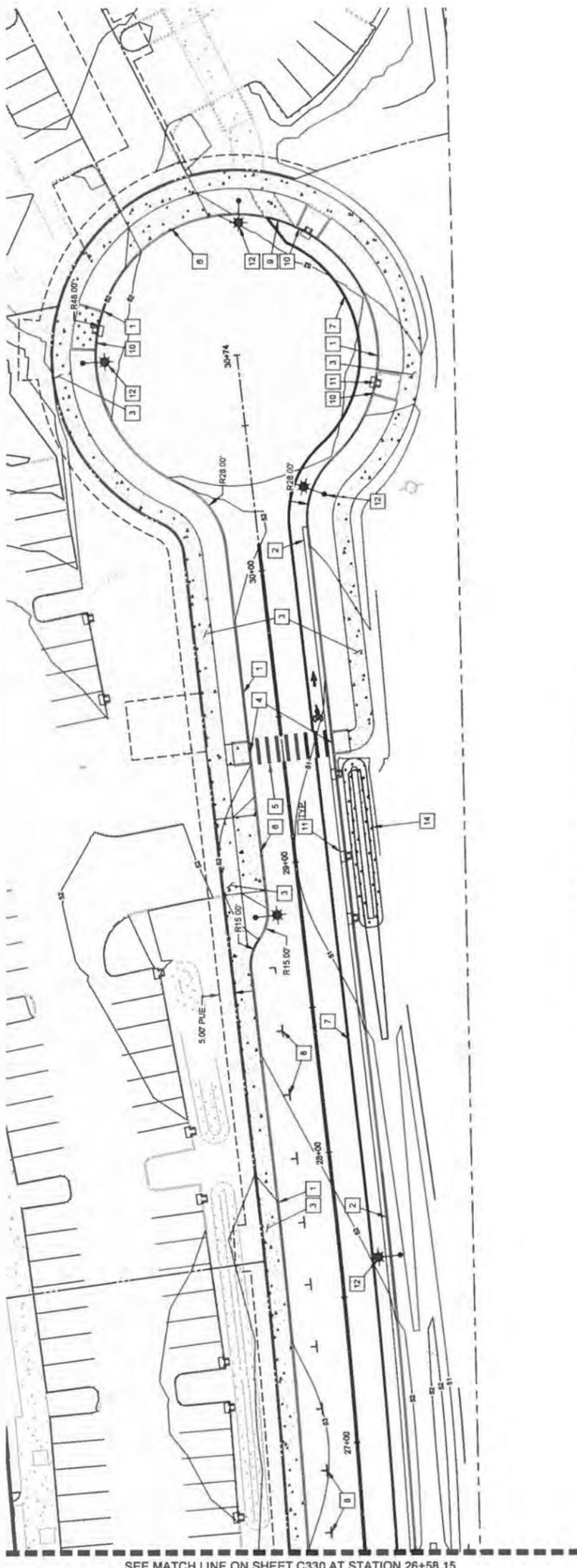
DOWL
 720 SW Washington Street, #750
 Portland, Oregon 97205
 971-280-8641
 WWW.DOWL.COM
 EXPIRATION DATE: 06/28/2018

COVE WATERFRONT RESIDENCES
 DESIGN DEVELOPMENT PLANS
STREET PLAN AND PROFILE - NORTH

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 OREGON CITY, OREGON
 PROJECT: 14307.01
 DATE: 2/9/2019
 SHEET: C340
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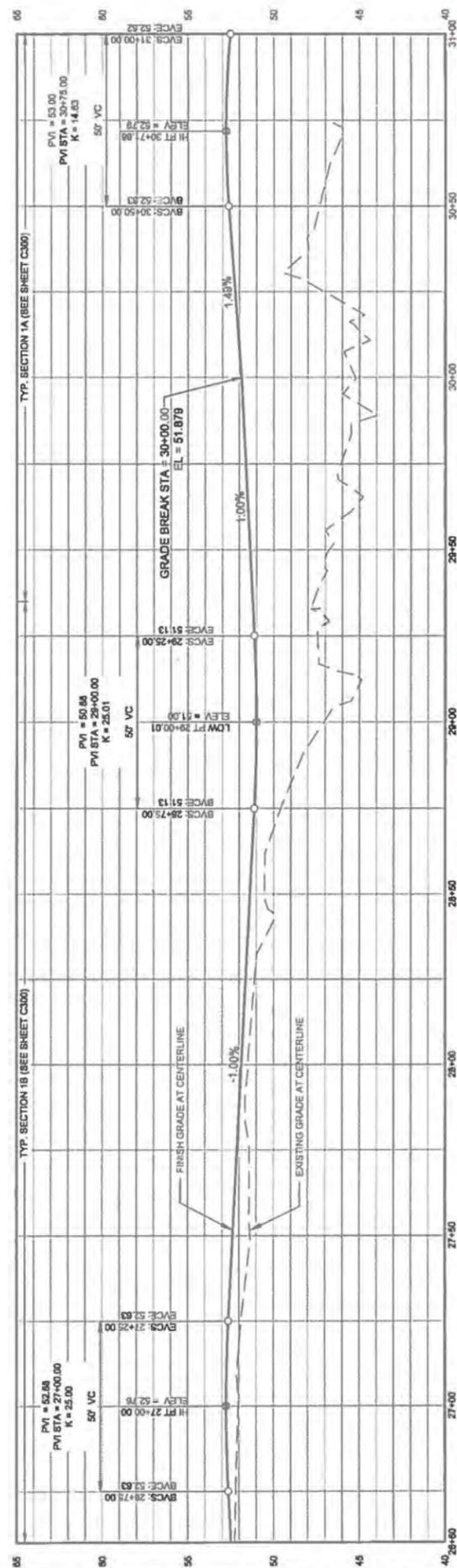
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 - CURB AND GUTTER
 - STREET/BIKE LANE STRIPING
 - ROAD CENTER LINE ALIGNMENT
 - CONCRETE SURFACE
 - RAIN GARDEN
 - BIKE LANE STRIPING
 - CURB CUT
 - CONCRETE BOLLARD
 - MAJOR CONTOUR LINE
 - MINOR CONTOUR LINE

- CONSTRUCTION NOTES**
- 1 PROPOSED STANDARD CURB (TYPICAL)
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 - 3 PROPOSED CONCRETE SIDEWALK (TYPICAL)
 - 4 PROPOSED ADA ACCESSIBLE RAMP
 - 5 PROPOSED CROSSWALK STRIPING
 - 6 PROPOSED COMMERCIAL DRIVEWAY APPROACH
 - 7 PROPOSED BIKE LANE
 - 8 PROPOSED PUBLIC PARKING STRIPING
 - 9 PROPOSED BIKE RAMP
 - 10 PROPOSED ROADSIDE PLANTER
 - 11 PROPOSED CURB CUT
 - 12 PROPOSED STREET LIGHTS
 - 13 PROPOSED FLUSH CURB
 - 14 PROPOSED ROADSIDE RAINGARDEN



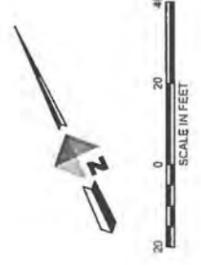
AGNES AVENUE PLAN - STA 26+50 TO STA 30+74
 SCALE 1" = 20'

SEE MATCH LINE ON SHEET C330 AT STATION 26+58.15



AGNES AVENUE PROFILE - STA 26+50 TO STA 30+74
 HORIZONTAL SCALE 1" = 20'
 VERTICAL SCALE 1" = 4'

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 31'
 30'
 25'



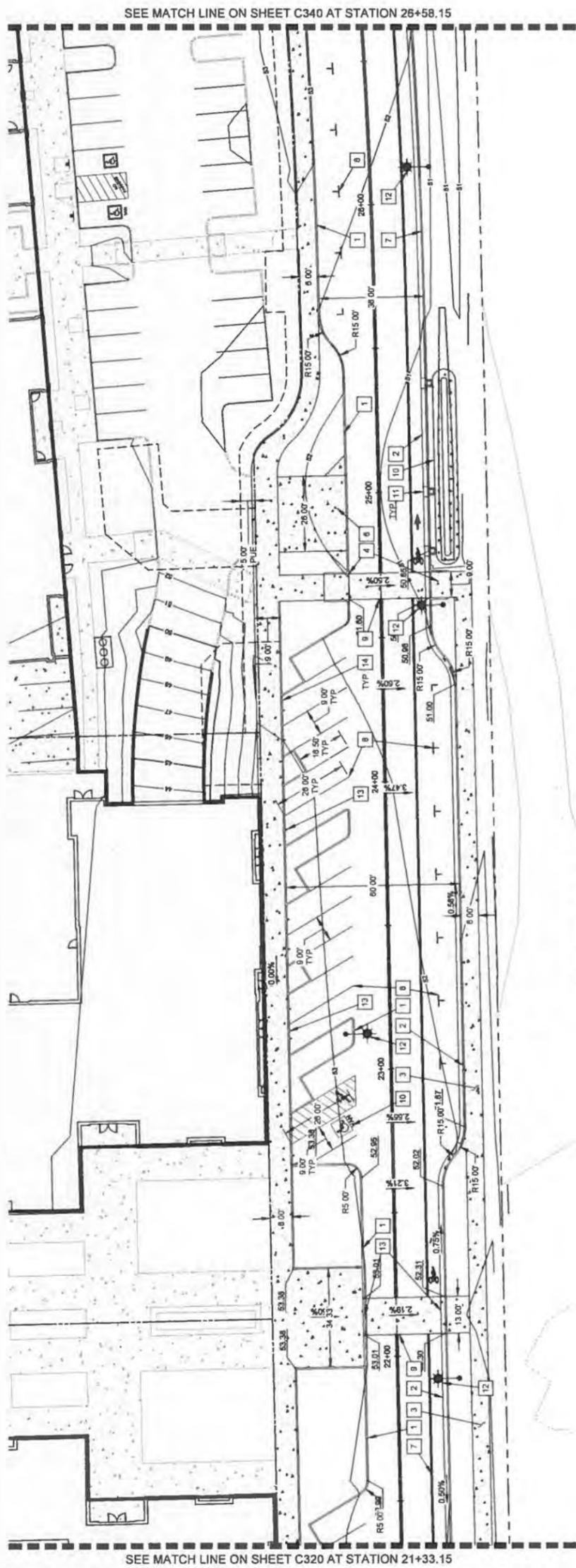
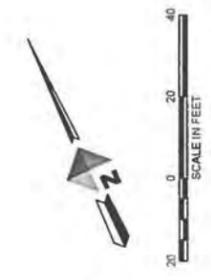
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 - 12 PROPOSED STREET LIGHTS
 - 13 PROPOSED FLUSH CURB
 - 14 PROPOSED BOLLARD



AGNES AVENUE PLAN - STA 21+35 TO STA 26+50
 SCALE: 1" = 20'

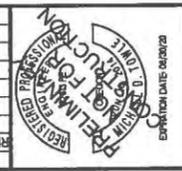


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 VERTICAL SCALE: 1" = 4'

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Handwritten numbers: 40, 35, 30, 25

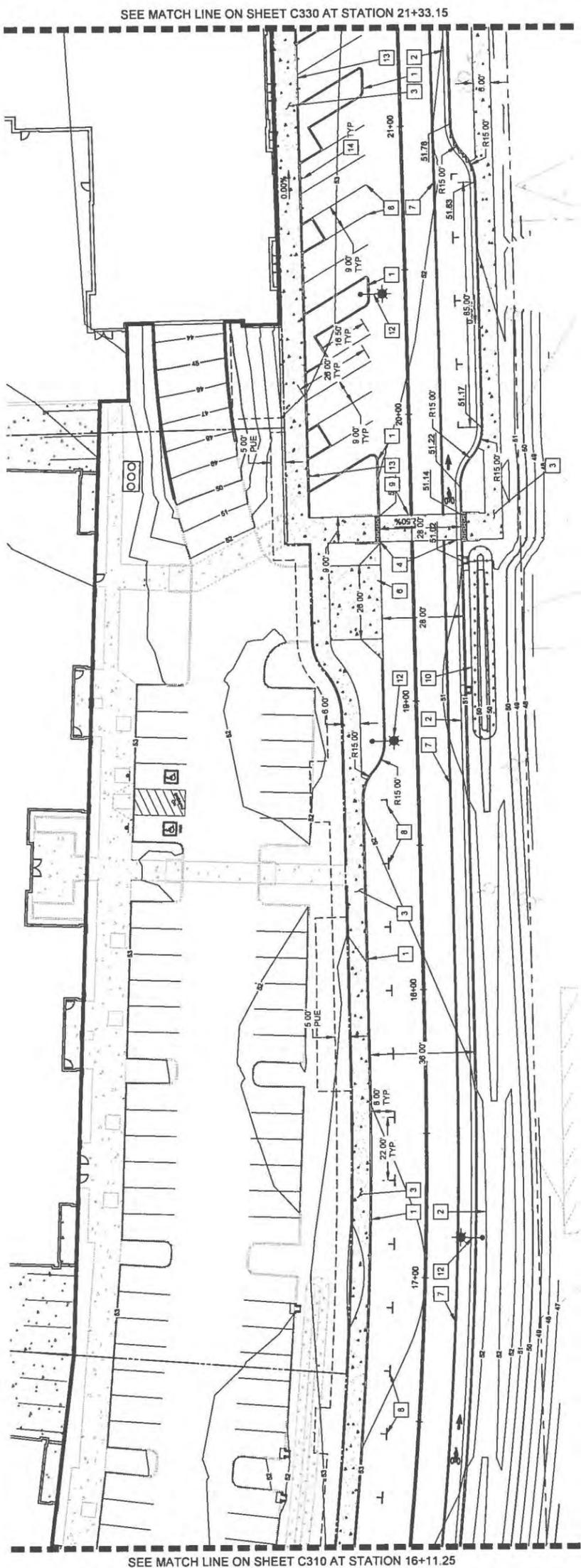
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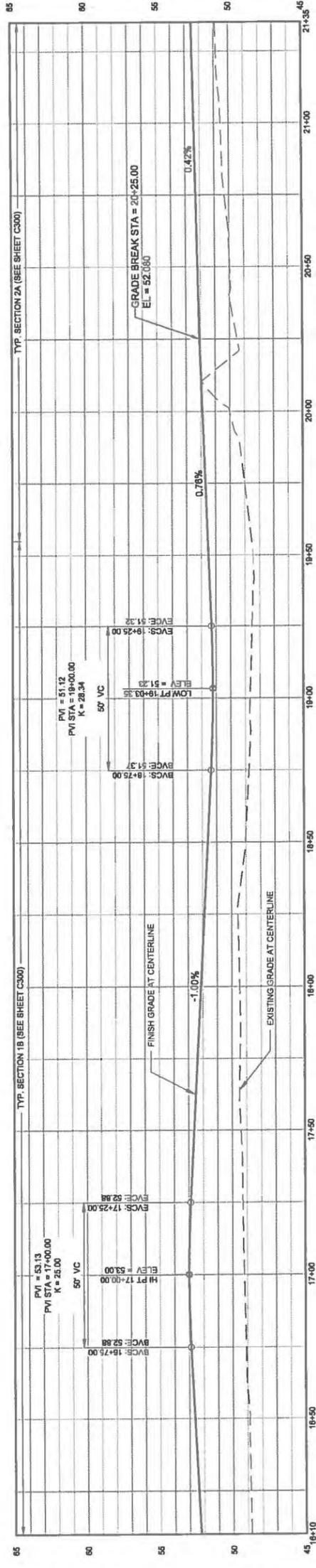
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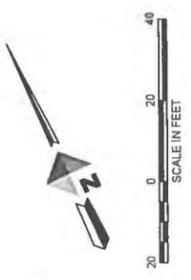
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AGNES AVENUE PLAN - STA 16+10 TO STA 21+35
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AGNES AVENUE PROFILE - STA 16+10 TO STA 21+35
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 VERTICAL SCALE 1" = 4'



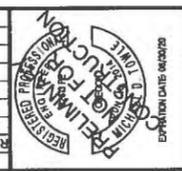
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84" $S = 0.0023$

REV	DATE	DESCRIPTION	BY



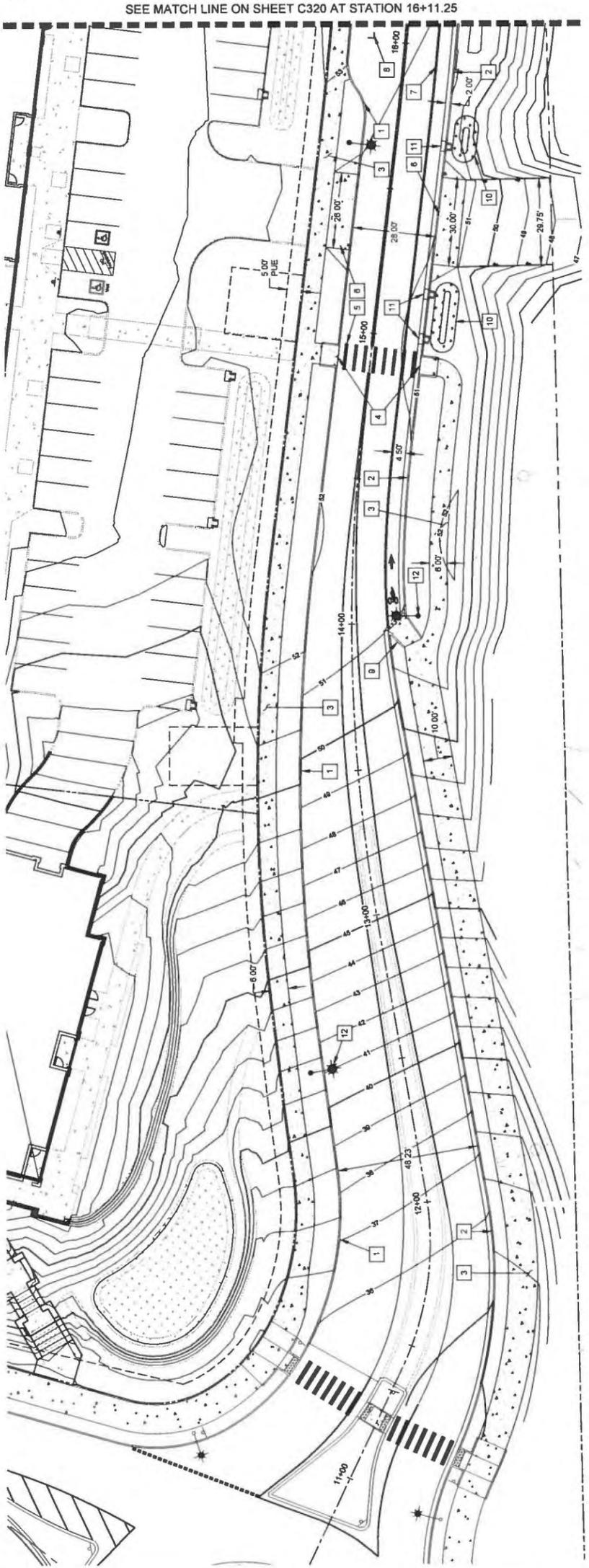
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COVE WATERFRONT RESIDENCES
 DESIGN DEVELOPMENT PLANS
 STREET PLAN AND PROFILE - SOUTH

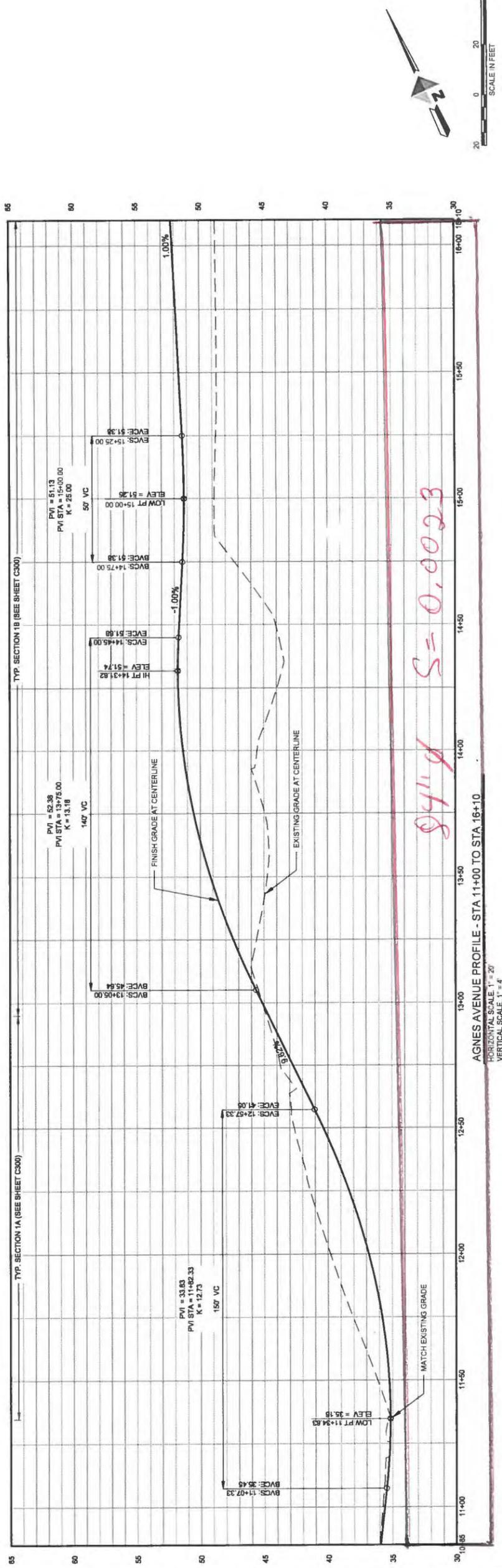
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 OREGON CITY, OREGON
 PROJECT 14307-01
 DATE 2/8/2019
 SHEET C310

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 - PROPOSED CURB CUT
 - PROPOSED STREET LIGHTS



AGNES AVENUE PLAN - STA 11+00 TO STA 16+10
 SCALE 1" = 20'



AGNES AVENUE PROFILE - STA 11+00 TO STA 16+10
 HORIZONTAL SCALE 1" = 20'
 VERTICAL SCALE 1" = 4'



Attachment 5
Grading Plans for the New Esplanade

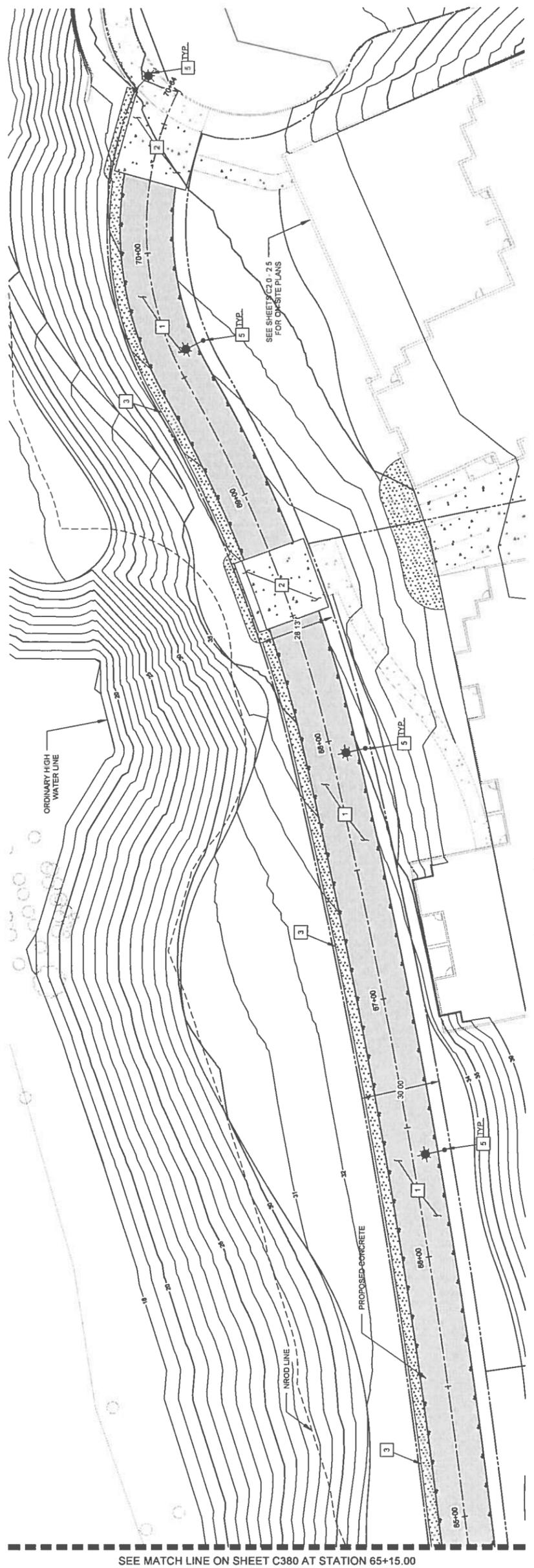
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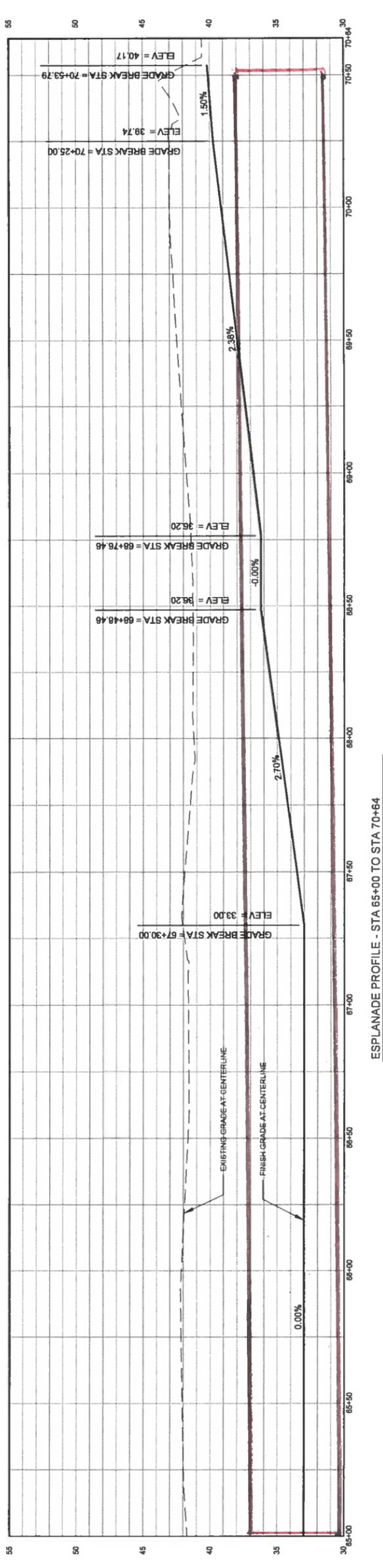
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 Portland, Oregon 97205
 971-280-8641
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COVE WATERFRONT RESIDENCES
 DESIGN DEVELOPMENT PLANS
ESPLANADE PLAN & PROFILE - NORTH

SECTION 29 T2S R2E W4
 OREGON CITY, OREGON
 PROJECT: 14307-01
 DATE: 2/6/2019
 SHEET: C390
 © DOWL, 2019



ESPLANADE PLAN - STA 65+00 TO STA 70+64
 SCALE 1" = 20'



ESPLANADE PROFILE - STA 65+00 TO STA 70+64
 HORIZONTAL SCALE 1" = 20'
 VERTICAL SCALE 1" = 4'

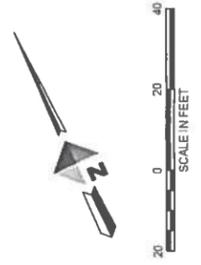
LEGEND

	PROPERTY LINE
	CENTERLINE ALIGNMENT
	EDGE OF CONCRETE
	WALL
	EDGE OF ESPLANADE PAVEMENT
	SHORELINE
	ORDINARY HIGH WATER LINE
	ROAD LINE
	MAJOR CONTOUR LINE
	MINOR CONTOUR LINE
	CONCRETE SURFACE
	LANDSCAPE FILTER STRIP
	ASPHALT SURFACE
	STREET LIGHTS

- CONSTRUCTION NOTES**
- PROPOSED ASPHALT ESPLANADE ASPHALT PAVEMENT (TYPICAL)
 - PROPOSED CONCRETE PAVEMENT (TYPICAL)
 - PROPOSED VEGETATED FILTER STRIP
 - PROPOSED WALL SEE GRADING PLANS FOR FURTHER DETAILS
 - PROPOSED STREET LIGHTS

BENCHMARK
 OREGON STATE HIGHWAY VERTICAL CONTROL RECEIVED FROM CLACKAMAS COUNTY ENGINEERING DEPARTMENT
 "A STANDARD OSHD DISK STAMPED '56 G 230 1934' LOCATED IN THE NORTHEAST CORNER OF THE JOHN McLOUGHLIN BRIDGE OVER THE CLACKAMAS RIVER
 PUBLISHED NGVD 28 ELEV = 56.117 FEET
 CONVERTED TO NAVD 88 ELEV = 56.567 FEET

BASIS OF BEARINGS
 THE BASIS OF BEARINGS OF N23°44'20"E WAS DETERMINED BY HOLDING MONUMENTS AND RECORD INFORMATION PER SURVEY NO. 2009-179, CLACKAMAS COUNTY SURVEY RECORDS



REV	DATE	DESCRIPTION	BY



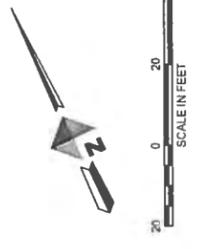
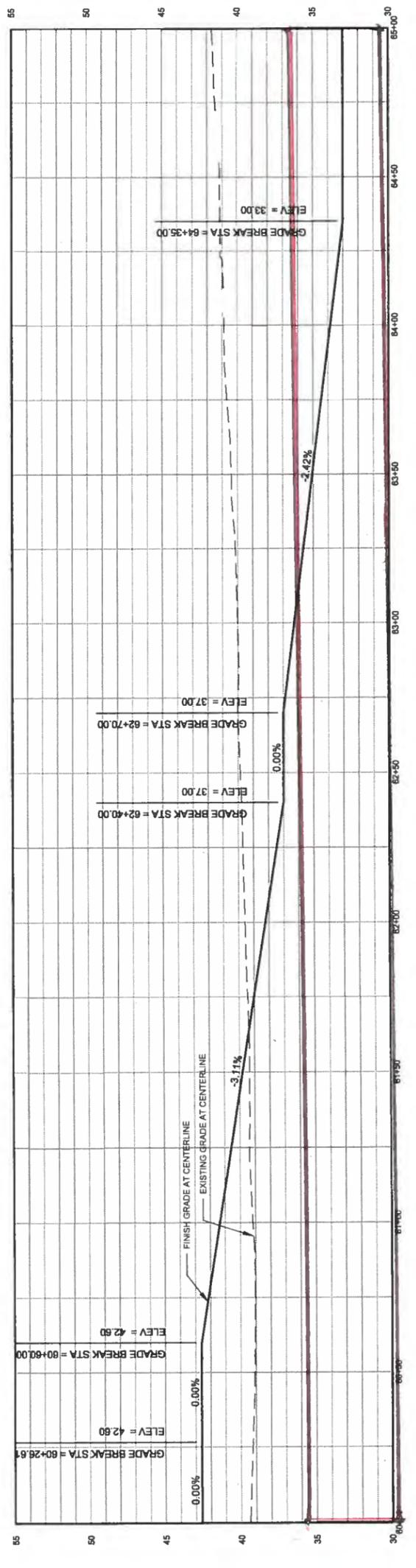
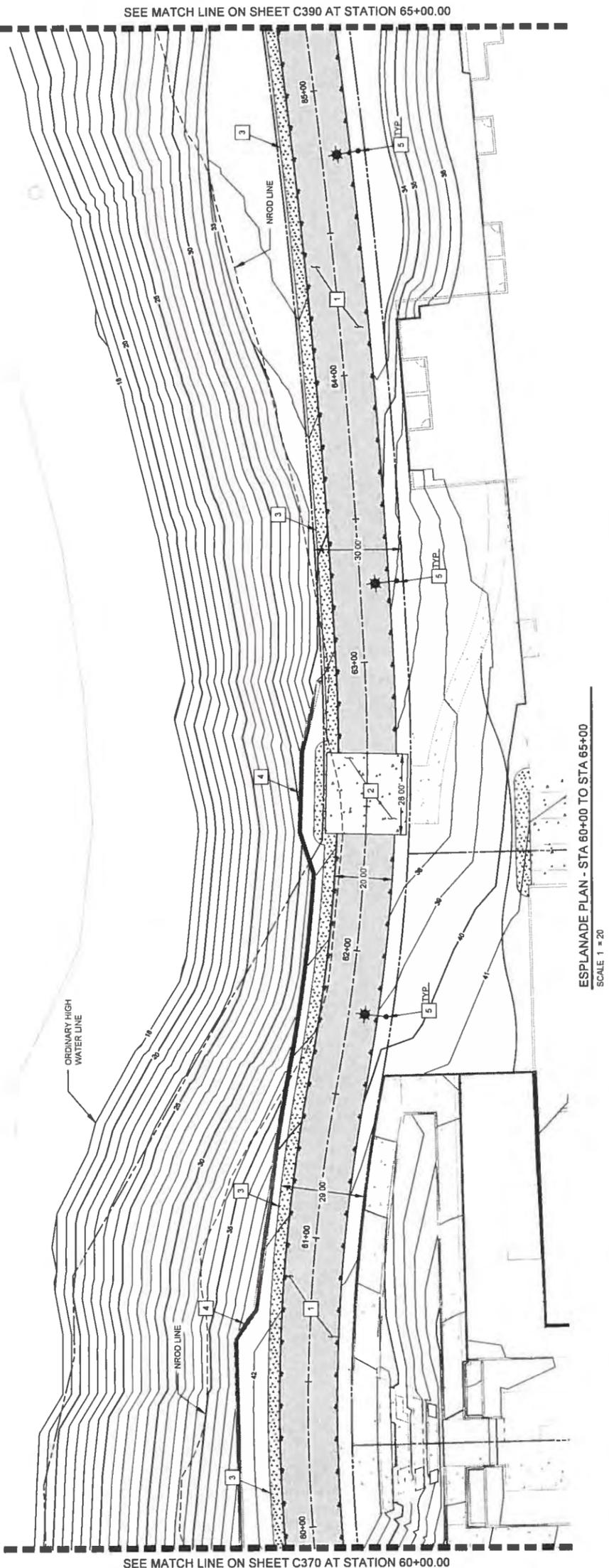
DOWL
 720 SW Washington Street, #750
 Portland, Oregon 97205
 971-280-0841
 WWW.DOWL.COM
 EXPIRES DATE: 02/28/2020

- LEGEND**
- PROPERTY LINE
 - CENTERLINE ALIGNMENT
 - EDGE OF CONCRETE
 - WALL
 - EDGE OF ESPLANADE PAVEMENT
 - SHORELINE
 - ORDINARY HIGH WATER LINE
 - NRDD LINE
 - MAJOR CONTOUR LINE
 - MINOR CONTOUR LINE
 - CONCRETE SURFACE
 - LANDSCAPE FILTER STRIP
 - ASPHALT SURFACE
 - STREET LIGHTS

- CONSTRUCTION NOTES**
- 1 PROPOSED ASPHALT ESPLANADE ASPHALT PAVEMENT (TYPICAL).
 - 2 PROPOSED CONCRETE PAVEMENT (TYPICAL)
 - 3 PROPOSED VEGETATED FILTER STRIP
 - 4 PROPOSED WALL SEE GRADING PLANS FOR FURTHER DETAILS.
 - 5 PROPOSED STREET LIGHTS

BENCHMARK
 OREGON STATE HIGHWAY VERTICAL CONTROL RECEIVED FROM CLATSOP COUNTY ENGINEERING DEPARTMENT
 "A STANDARD OSHD DISK STAMPED '56 G 220 1834' LOCATED IN THE NORTHEAST CORNER OF THE JOHN MCLOUGHLIN BRIDGE OVER THE CLATSOP RIVER
 PUBLISHED NGVD 29 ELEV = 56.117 FEET
 CONVERTED TO NAVD 88 ELEV = 59.597 FEET

BASIS OF BEARINGS
 THE BASIS OF BEARINGS OF N23°44'20"E WAS DETERMINED BY PLUMB MONUMENTS AND INFORMATION PER SURVEY NO. 288-178 CLATSOP COUNTY SURVEY RECORDS



REV	DATE	DESCRIPTION	BY



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COVE WATERFRONT RESIDENCES
 DESIGN DEVELOPMENT PLANS
ESPLANADE PLAN & PROFILE - SOUTH CENTER
 SECTION 29 T2S R2E W.M.
 OREGON CITY, OREGON

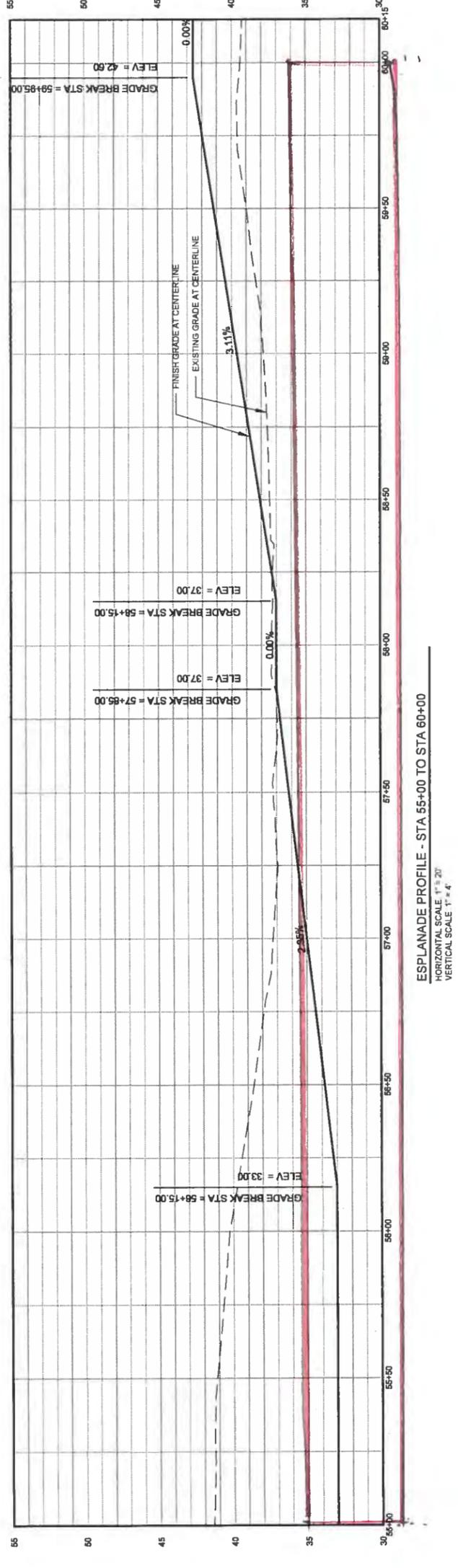
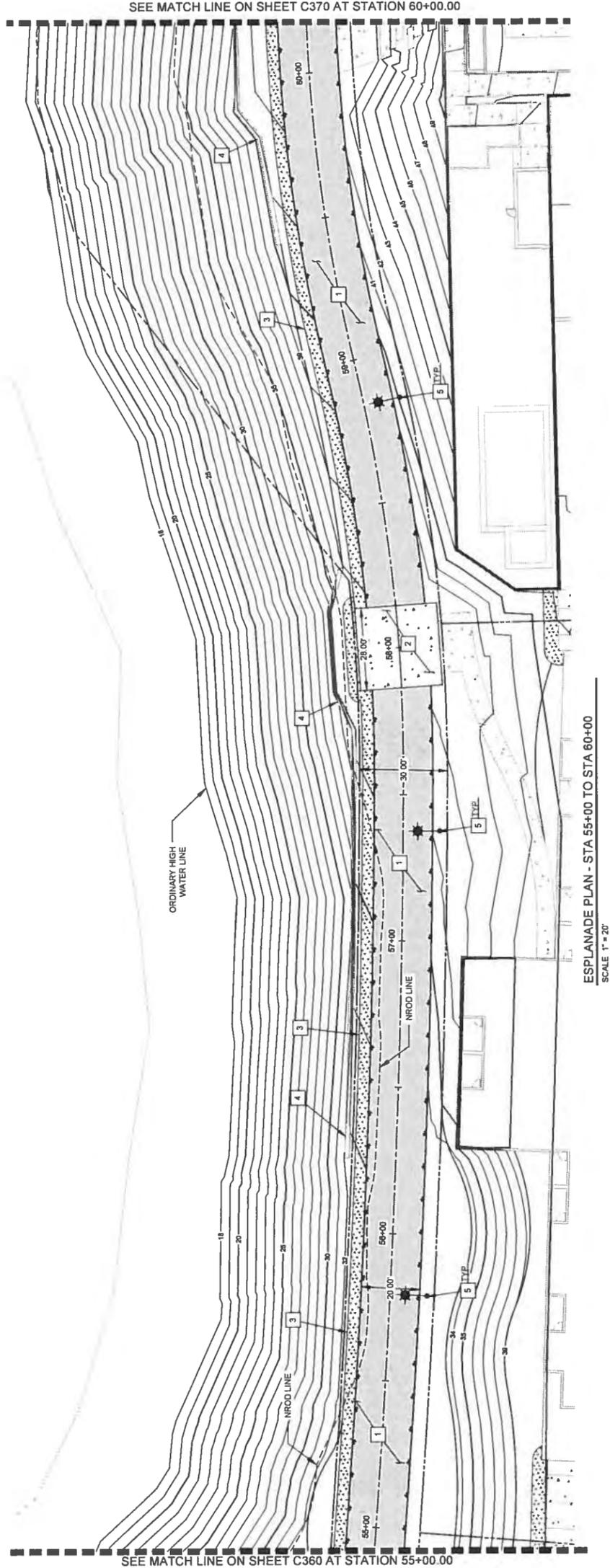
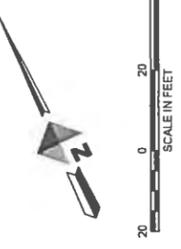
PROJECT	14307.01
DATE	2/6/2019
© DOM, 2019	
SHEET	
C370	

- LEGEND**
- PROPERTY LINE
 - CENTERLINE ALIGNMENT
 - WALL
 - EDGE OF CONCRETE
 - EDGE OF ESPLANADE PAVEMENT
 - FINISH GRADE AT CENTERLINE
 - FINISH GRADE AT CURBLINE
 - PRIMARY HIGH WATER LINE
 - NR200 LINE
 - MAJOR CONTOUR LINE
 - MINOR CONTOUR LINE
 - CONCRETE SURFACE
 - LANDSCAPE FILTER STRIP
 - ASPHALT SURFACE
 - STREET LIGHTS

- CONSTRUCTION NOTES**
- 1 PROPOSED ASPHALT ESPLANADE ASPHALT PAVEMENT (TYPICAL)
 - 2 PROPOSED CONCRETE PAVEMENT (TYPICAL)
 - 3 PROPOSED VEGETATED FILTER STRIP
 - 4 PROPOSED WALL. SEE GRADING PLANS FOR FURTHER DETAILS
 - 5 PROPOSED STREET LIGHT

BENCHMARK
 OREGON STATE HIGHWAY VERTICAL CONTROL RECEIVED FROM CLACKAMAS COUNTY ENGINEERING DEPARTMENT
 *A STANDARD ORNDISK STAMPED "58 G 230 1834" LOCATED IN THE NORTHEAST CORNER OF THE JOHN MCLOUGHLIN BRIDGE OVER THE CLACKAMAS RIVER
 PUBLISHED NGVD 29 ELEV = 56 117 FEET
 CONVERTED TO NAVD 88 ELEV = 59 597 FEET

BASIS OF BEARINGS
 THE BASIS OF BEARINGS OF N23°41'20"E WAS DETERMINED BY HOLDING MONUMENTS AND RECORD INFORMATION PER SURVEY NO. 2008-178 CLACKAMAS COUNTY SURVEY RECORDS



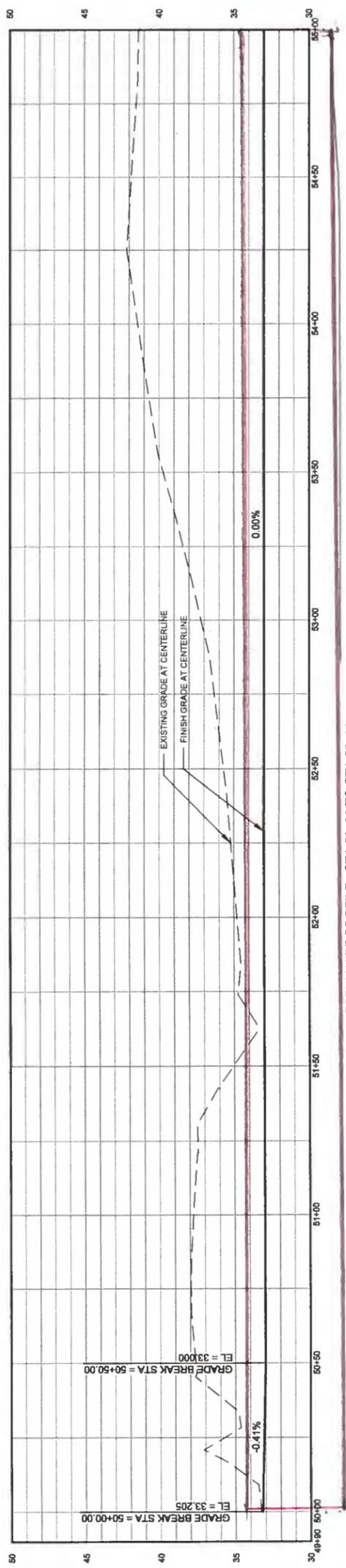
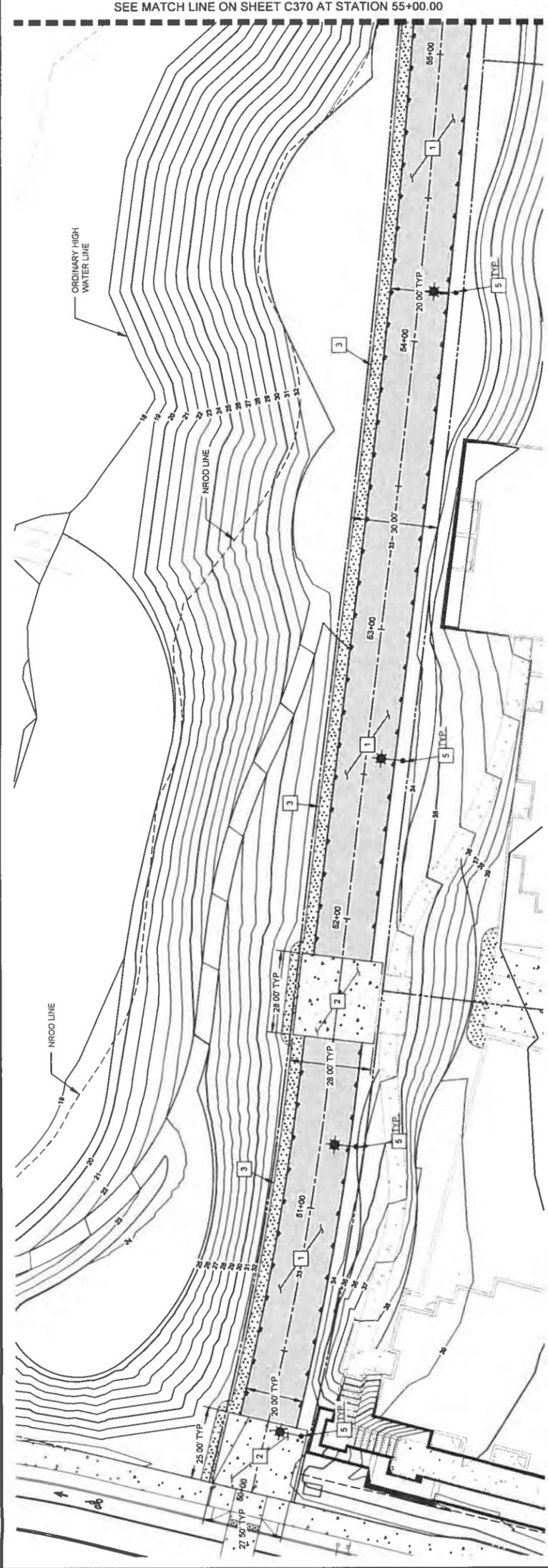
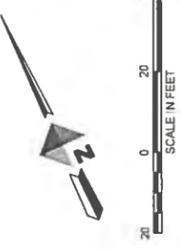
COVE WATERFRONT RESIDENCES
DESIGN DEVELOPMENT PLANS
ESPLANADE PLAN & PROFILE - SOUTH

SECTION 29 T2S R2E W4M
OREGON CITY, OREGON

720 SW Washington Street, #750
Portland, Oregon 97205
971-280-8641
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REV	DATE	DESCRIPTION	BY



- LEGEND**
- PROPERTY LINE
 - CENTERLINE ALIGNMENT
 - EDGE OF CONCRETE WALL
 - EDGE OF ESPALNADE PAVEMENT
 - SHORELINE
 - ORDINARY-HIGH WATER LINE
 - MAJOR CONTOUR LINE
 - MINOR CONTOUR LINE
 - CONCRETE SURFACE
 - LANDSCAPE FILTER STRIP
 - ASPHALT SURFACE
 - STREET LIGHTS

- CONSTRUCTION NOTES**
- 1 PROPOSED ASPHALT ESPALNADE ASPHALT PAVEMENT (TYPICAL)
 - 2 PROPOSED CONCRETE PAVEMENT (TYPICAL)
 - 3 PROPOSED VEGETATED FILTER STRIP
 - 4 PROPOSED SEE GRADING PLANS FOR FURTHER DETAILS
 - 5 PROPOSED STREET LIGHT

BENCHMARK
OREGON STATE HIGHWAY VERTICAL CONTROL RECEIVED FROM CLACKAMAS COUNTY ENGINEERING DEPARTMENT
*A STANDARD OSHD DISK STAMPED "56 G 720 1834" LOCATED IN THE NORTHEAST CORNER OF THE JOHN M'LOUGHLIN BRIDGE OVER THE CLACKAMAS RIVER
PUBLISHED NGVD 29 ELEV = 56 117 FEET
CONVERTED TO NAVD 88 ELEV = 56 587 FEET

BASIS OF BEARINGS
THE BASIS OF BEARINGS OF N23°44'20"E WAS DETERMINED BY HOLDING MONUMENTS AND RECORD INFORMATION PER SURVEY NO. 2008-176, CLACKAMAS COUNTY SURVEY RECORDS

Attachment 6
Alignment 4 Plan & Profile

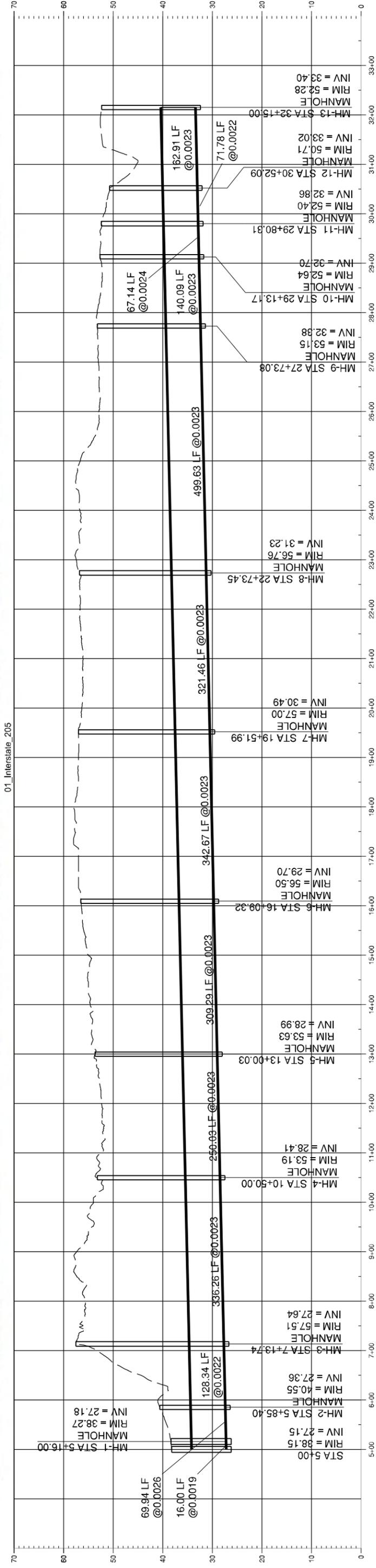


FIGURE 2
I-205 ALIGNMENT #4
PLAN AND PROFILE
TRI CITY WWRF OUTFALL