EVENT CENTER LIVESTOCK BUILDING TIME LINE AND COMMENTS

June 17, 2014

May 2013

A Request for Proposal (RFP) was requested by Tourism and Cultural Affairs (TCA) for a Clackamas County Event Center Fair Board Visioning and Asset Assessment.

A contract was awarded to Swanson Partners LLC. Scope of work included a review of the Event Center buildings to evaluate usage, major capital repairs needed and historic import. The evaluation was not intended to be a full structural analysis of each building. Swanson contracted with Jay Raskin (Architect) and Associated Consultants Inc. (Structural Engineers).

The report was issued to TCA. The report identified that the livestock building required structural improvements. The report further stated that due to the deteriorated condition of the roof and supporting structure that the building should be closed when ground snow exceeds 6".

February 2014

At the request of the Fair Board, Associated Consultants Inc. conducted a follow up evaluation of the building after the 2013/2014 snow fall events. The report indicated that the roof joists and beams deflected excessively under the weight of the snow and once the snow melted the water had no way of draining and created large ponds at the low ends of the roof joists.

May 2014

Based on the reported concern about snow loading impacts on livestock building the County Fair determined that an updated evaluation would be prudent. The Fair Board contracted with Jay Raskin and Associated Consultants LLC. To provide an updated review of the building to determine if the structure was safe for public use during scheduled events.

The report identified that the winter snow events had significant detrimental impact on the roof and its supporting structure. The report further recommended that the building be closed and that a 20 foot safety perimeter outside the building footprint be established.

The County contracted with Jay Raskin and Associated Consultants Inc. to provide additional information and analysis of options for the building. The report looked at a number of options for the building based on the previous reviews and some new information. The report concluded that, while stabilizing the building is a necessary first step, unless the roof and its supporting structure is replaced public safety concerns remain. The report also stated that the increased deterioration of the posts, beams, and sheathing carries the risk of localized collapse.

Staff was given direction to develop scope of work for a demolition option and an additional engineering analysis.

Demolition Option:

May 19, 2014: The Invitation to Bid for Demolition was advertised. Seventeen potential bidders requested the Bid Documents. Bid Documents were sent to seven plan centers in the area.

May 28, 2014: Twelve potential Bidders attended the Mandatory Pre-Bid meeting on.

June 5, 2014: Four bids were received:

3 Kings Environmental	$ 97,333.33
Konell Demolition	$112,717.00
Duke Construction	$145,000.00
Matton Utility	$224,000.00

Demolition Scope of Work:

Abate any hazardous materials. Demolish structure and haul material to appropriate disposal facility. Remove concrete slab and grind on site for fill and base layer to place 4" ¾ minus compacted gravel. Slope the site to the existing drainage. Top with 4" compacted ¼ minus gravel to provide durable pervious surface. Modify existing water system for reuse. Abandon all other existing utilities. Provide project fencing for the work site and maintain safe and controlled work site at all times.

Work to commence on June 25, 2014 to be completed no later than July 15, 2014.

Subsequent to the bids it was determined that weekend work would be allowed in an effort to finish ahead of the July 15, 2014 completion date. The demolition contractor has not been asked to work on the weekends, however there may be an impact on cost due to potential overtime by the contractor. Conversely there may be an opportunity a cost reduction.

Also, after the demolition scope of work was developed an interest in retaining the concrete slab was discussed. A conversation will need to be initiated to determine if it is possible to safely remove the concrete walls attached to the slab and determine how to prepare the slab for future use.

The livestock Barn was originally a dirt floor throughout the building. Concrete was poured in the late 80's in stages by volunteers, not by licensed contractors. There are several different depths and elevations of cement depending on the volunteers that did the job.

As stated in the last engineers report the cement was poured around the posts thus creating, more of the deterioration. The cement would likely break during demolition. The cement, would have to be patched where it broke and where the post have been removed.

The bid requires for the temporary surface to be sloped towards the drains. This would eliminate the water build up on the road on the north side of the area during the fall and winter and spring.

Beef and Dairy Cattle cannot stand on concrete or loose gravel therefore a bed surface of 12" to 18" would need to be layered over any surface. This is similar to the use of the Ely barn for equestrian events. During the Fair the dirt becomes a hard packed surface. Fair animals are bedded with shavings, when change over occurs the shavings are removed from the hard packed dirt floor and replaced with fresh shavings. The temporary compacted gravel surface surface would be cleaned in the same manner. Additionally exhibitors are required to keep the stalls clean. Shavings are hauled out daily in 30 yard dumpsters.

Without prior conversation the contractor the estimated savings of not grinding the slab could be in the 5% to 10% range.

Negotiations for changes to the scope of work are not allowed prior to issuing a Notice of Intent to Award per ORS 279C.340.

Award of the demolition contract is pending the decision to exercise the demolition option. To meet the anticipated project schedule the decision to move forward will need to be made as soon as possible to allow the sufficient contractor to mobilize for the project.

Additional Engineering Analysis

May 15, 2014: Proposals were solicited from four engineering firms based on their capacity to deliver the work in a short timeline.
WDY Inc.
Harper Houf Peterson Reghellis (HHPR)
Pace Engineers
KPFF Engineering

May 19, 2014: Two proposers attended the mandatory pre-proposal walk through.
WDY Inc.
HHPR

May 27, 2014: Two proposals were received from WDY Inc. and HHPR. Proposals were reviewed by an evaluation committee resulting in a recommendation to award the contract to WDY Inc.

Scope of Work Engineering Analysis:

A: 1. Review existing reports
2. Provide a full structural analysis of the building.
3. Provide options and recommendations for short term remediation to allow for safe public use and meet code. Provide opinion as the usable life of remediation options. Provide estimated project cost for options, include all soft and hard costs
4. Provide options and recommendations for full rehabilitation of the building. Provide estimated project cost for options, include all soft and hard costs. Provide duration of options.

Estimated project/options cost and duration may be "scale of magnitude" estimates.

B. Task A to be accomplished no later than June 12, 2014.

Engineering Analysis Report Summary: (full report attached)

"The opinions within this report are based on the observable structural elements. The majority of the perimeter walls have finish materials each side and structural elements within these walls were not observable. Similarly, the post bases at the columns on the clerestory lines from the north lean-to area to the line south of Entry 6 had partial height walls with boards each side generally obscuring our ability to evaluate the condition of the post."

Additional damage maybe discovered if and when obstructions are removed. The Engineer was not tasked with destructive investigation of the building.

"1. There is significant water intrusion in several locations from inadequate flashing or from excessive deflections and settlement preventing proper drainage.

2. There are numerous locations where the bases of posts have deteriorated due to excessive water. Most of the damage is due to the concrete slab having been poured around wood posts. Other locations are due to direct contact from roof and wall leaks.

3. In addition to excessive deflections from damaged columns, several beams on both the clerestory wall lines and intermediate support lines have significant mid-span deflection.

4. Some partial height walls on column lines have debris in between stud spaces and do not allow water to disperse. There is noticeable deterioration of both the wood cladding and sole plates at these walls in numerous locations.

5. Most wood framing members are overstressed for current code required loads.

6. There are numerous issues with the building that are non-compliant with ASCE-31 seismic evaluation checks."

OPINIONS OF STRUCTURAL DEFICIENCIES:

"Gravity Support:
1. The existing rafters are overstressed for current code roof loads for spans over 16 feet using a minimal dead load of 8 psf.

2. The existing 6x8 support beams are overstressed for current code roof loads. Considering added support of the knee braces, the beams can support approximately 60% of the required 25 psf roof snow load. The existing attachments of the knee braces are inadequate for the reactions of full load using this methodology. Without consideration of the contribution of the knee braces, beams have only 5 psf of live load capacity (20% of required).

3. The added concrete slab has created water intrusion problems at the post bases. Several are in a dangerous condition (less than 50% capacity). Numerous other show signs of minor to moderate decay.

4. Water intrusion at the clerestory wall is a major problem. Long term deflection of the beams and the added issue of loss of column support at some interior posts has led to an inability of the roof to freely drain to the original overflows at the east wall. A majority of the beams supporting clerestory walls show some signs of water damage. Some are severe (Photo 3, 4).

5. Interior partial height walls at column lines do not allow debris or water to freely escape at plates and columns. This creates conditions where dry rot is likely and was observed (Photo 5).

6. The knee brace design assumes a generally balanced loading condition. Unbalanced loads and posts with knee brace one side only (side walls) can induce a horizontal load into the wood columns which may overstress the column.

7. There is no positive attachment of beams to columns other than toenails.

Lateral Loads:

8. There is a complete lack of lateral load resisting elements in the east-west direction except for the end wall at the south. There clerestory roof configuration disrupts the roof diaphragm so there is no ability to transfer roof shear to any vertical elements.

9. There is no transfer of diaphragm loads to the perimeter side walls except through the inadequately nailed 2x ledger.

10. There is no of diaphragm loads to the beam lines or through the vertical wall elements to complete a load path.

11. There are no diaphragm chord elements in either principal direction.

12. There is no capacity for the roof elements to resist uplift loads from high winds."

RECOMMENDED REPAIRS:

"For a structure of this age and in this condition, rehabilitation to meet current code requirements would be extensive. Therefore, for the short term recommendations, we considered repair work that would

return the building to its original as-constructed condition with minor improvements for public safety. Repairs and maintenance to this level would require approval from the building official. It is likely that they may consider the required repairs too extensive and recommend that the current code rehabilitation items be completed."

The viability of the recommended repairs is subject to approval of the Building Official. This will require contracting for the development of plans and drawings of the anticipated work for review and permitting by the Building Official. It is likely that additional remediation work would be required to "meet code". The additional work could have a significant impact to the project cost. This concept would apply to both of the repair options.

SHORT TERM REPAIRS:

"We agree with previous reports that the building in its current state should be considered a hazardous structure and should not be occupied.

Completing the Short Term Repair recommendations would make the building occupiable but would not meet current code requirements.

Short term repairs would also come with occupancy restrictions such as no occupancy with roof snow in excess of 4", during any icing event where ice or water may accumulate, no occupancy when winds are expected to exceed 40 mph, etc.

Owner would also be expected to continue to monitor those framing elements not repaired for any signs of additional deterioration and repair or replace newly identified damage.

Because of the probable extent of existing (minor) deterioration, short term repairs should be considered to extend the useful life of the structure by only two to five years.

LONG TERM REPAIRS:

"Rehabilitation noted under Long Term would increase the useful life up to possibly 20 years.

Recommended seismic improvements are based on an assumed Occupancy Category of II and a Life Safety Building Performance level. The purpose of the seismic strengthening recommended in this report is to safeguard against major structural failures and loss of life, not to limit damage or maintain function.

A seismic risk reduction program would be designed to comply with the current code loading and detailing requirements, where reasonably practical, while maintaining as many original materials as possible.

When retaining existing materials, compromises will be made with code requirements and current practices. The owner will be accepting higher risks than would be normal in new construction.

The basic intent of an upgrade project would be to extend the useful life of the existing building and decrease life-safety risks that may currently exist. However, existing parts of the structure may suffer damage during an earthquake."

"The above recommendations are for structural elements only and do not include upgrades that may be required for fire and life safety, accessibility, energy or historical preservation. Additional costs should be considered for these issues as well."

ESTIMATED RENOVATION PROJECT COSTS:

The cost provided in the Engineering Analysis Report are "construction only".

The cost does not include values for engineering services to prepare bid and construction plans and specifications, permits and fees, project management or project contingency (soft costs).

Both options will require additional bracing and security fencing for the time needed to conduct design and construction activities. Estimate $28,000 for short term option and $34,000 for the long term option.

Short Term: (2 months construction)

$468,654.00 estimated construction
$ 93,730.00 estimated soft cost (20%)
$ 28,000.00 estimated bracing/fencing
$592,384.00

Long Term: (12 months construction)

$2,192,400.00 estimated construction
$ 657,720.00 estimated soft cost (30%)
$ 34,000.00 estimated bracing/fencing
$2,884,120.00

The estimated cost does not include repairs that may be found in areas obstructed by wall systems. Does not include cost of work necessary to observe and evaluate hidden conditions. Estimate that 30% of the posts may be in the wall systems. Current investigation shows that approximately 30% of the observed posts require repair or replacement.

Next steps:

Acquire Engineering services and develop plans and specifications.	3 to 6 months
Solicit Bids for work	1.5 to 2 months
Construction Period based on estimate	2 to 12 months

The estimated project cost does not identify the impacts on the event centers activities or need to provide alternate venues for the estimated 2 to 12 month construction period.

It is anticipated that the Fair budget has the resources necessary to acquire temporary structures to meet its short term need through the end of this year's County Fair, on a rental basis. If the structures prove to be adequate for the purpose the Fair would likely look to purchase the structures to provide venue for activities during for the next two to five years. The anticipated life span of the temporary structures is 6 to 10 years.

The rental cost is estimated to range from $21,000 to $50,000 per month depending on final configuration.

If purchased the estimate would be $150,000 (100 x 100 sq/ft) to $300,000 (100 x 200 sq/ft) depending on final configuration.

Estimate for two new barn type open span permanent structures in the same sizes is $575,000 to $805,000.

Hill, Caroline

From: Krupp, Don
Sent: Saturday, June 14, 2014 10:23 AM
To: BCC - All County Administration Staff
Cc: Miller, Lane; Gonzales, Marc; Barth, Gary; Cowan, Danielle; Jorgensen, Jeff; Robertson, Daniel
Subject: Livestock Barn
Attachments: bid.pdf; 2nd opinion.pdf

Commissioners,

Attached are two documents relating to the Livestock Barn that will be discussed in study session this Tuesday at 2:30 pm.

The first is the bid response for demolition. Low bid is $97,333.33. These figures presume grinding up the concrete floor and using the ground mix to surface the area. We're currently looking into the option that this surface concrete be retained and worked to make safe for continued use as a display surface.

The second pdf is the Second Opinion analysis of the current condition building and estimates for repair and restoration. The analysis affirms the unsafe condition the building and attributes this to basic flaws in the building's construction. The report states that a short term fix would cost $468,654 but would have certain occupancy limitations. More importantly, it states that this work would only extend the useful life of the building to between two to five years.

Full repair and restoration would cost around $2.2 million and extend the useful life of the building by about twenty years.

These are hard construction estimates only. Count on a 20 – 30% mark-up for additional soft costs.

I am meeting with staff Monday afternoon to develop a recommendation to present to the BCC Tuesday afternoon. Lane Miller is putting this material together. *I should note that we are on a very tight timeline in order to ensure that any work involving the building does not interfere with Fair operations and events.*

In the meantime I will ask Caroline Hill to post this email and its attachments online first thing Monday morning.

Don

BID
DEMOLITION OF THE CLACKAMAS COUNTY FAIRGOURNDS LIVESTOCK BARN
LOCATED AT 694 NE 4TH AVENUE, CANBY, OR
June 5th, 2014, 11 AM
1 Addendum

BID CLOSING	SUBS DUE	BID OPENING
TIME: 2:00 P.M.	4:00 P.M.	2:00 P.M.
BIDDER	SUBCONTRACTOR LIST	BID AMOUNT
Mattson Utility Inc.	YES NO NO SUBS	224,537.00
Duke Construction	(YES) NO NO SUBS	145,000.00
3 Kings Environmental	(YES) NO NO SUBS	97,333.33
Kenell Construction, Co Inc	YES NO NO SUBS	112,717.00
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	
	YES NO NO SUBS	

APPARENT LOW BIDDER: 3 Kings Environmental

AMOUNT: 97,333.33

WDY Structural • Civil Engineers

10 June 2014

Clackamas County Purchasing Division
2051 Kaen Road
Oregon City, OR 97045

Attn: Lane Miller

Re: Clackamas County Events Center Livestock Barn - Canby, Oregon
Structural Evaluation

Dear Mr. Miller:

At your request, WDY, Inc. has completed a cursory review of the existing wood framed Livestock Barn at the fairgrounds. The purpose of this investigation was to determine the safety of the existing structure for occupancy and to provide an opinion on the necessary short term and long term repairs required to make the building occupiable for public use and to bring the structure up to current code for structural elements. There is a concern by the County that the rate of deterioration of some elements has greatly increased in recent time and this has led to additional water intrusion issues.

We provided an on-site review of the exposed to view structural elements on June 4, 2014. During this investigation we used a laser level to measure the relative height variance in each column line under the clerestory walls. We also used a bore scope to determine the column base conditions at the perimeter walls. The opinions within this report are based on the observable structural elements. The majority of the perimeter walls have finish materials each side and structural elements within these walls were not observable. Similarly, the post bases at the columns on the clerestory lines from the north lean-to area to the line south of Entry 6 had partial height walls with boards each side generally obscuring our ability to evaluate the condition of the post.

Our opinions are based on our experience with similar structures constructed about the same period. Preliminary hand calculations were performed using International Building Code (IBC) force levels and wood properties typical for construction in the 1920s to evaluate existing building capacities. Capacity analysis was based on field observation and measurement of existing materials open to view. Removal of existing finishes to observe hidden conditions and destructive testing to determine existing material strengths are not part of this scope of services, and therefore material strengths used in calculating the building capacity were assumed using current guidelines for buildings of this type and era. No existing construction drawings were available to review for this audit.

SUMMARY

1. There is significant water intrusion in several locations from inadequate flashing or from excessive deflections and settlement preventing proper drainage.
2. There are numerous locations where the bases of posts have deteriorated due to excessive water. Most of the damage is due to the concrete slab having been poured around wood posts. Other locations are due to direct contact from roof and wall leaks.

3. In addition to excessive deflections from damaged columns, several beams on both the clerestory wall lines and intermediate support lines have significant mid-span deflection.

4. Some partial height walls on column lines have debris in between stud spaces and do not allow water to disperse. There is noticeable deterioration of both the wood cladding and sole plates at these walls in numerous locations.

5. Most wood framing members are overstressed for current code required loads.

6. There are numerous issues with the building that are non-compliant with ASCE-31 seismic evaluation checks.

BUILDING CONSTRUCTION

The existing structure is a single story wood framed building in which periodic public events have been held. The roof construction is of saw-tooth type, with clerestory window walls every other column line at approximately 32 feet on center. Typical column spacing in the east-west direction is approximately 16 feet except for the center and edge aisles which are just less than 12 feet. 2x8 rafters at 24" o.c. spacing span from an upper beam line at the top of the clerestory wall to a lower beam on the adjacent wall line creating the saw-tooth roof system (Photo 1, Appendix B). There is an intermediate beam line in each bay. Spacing of this support line varies with a maximum rafter span of nearly 19 feet. Both the clerestory wall and intermediate beam lines have secondary 4x6 knee brace elements supporting the wood beams. The clerestory lines also have braces perpendicular to the framing attached to double 2x lateral bracing (Photo 2). Support posts are uniformly 6x6 wood posts throughout. Roof sheathing varies in bays. The majority of the roof is straight board sheathing with other areas plywood. There are several patched sections where boards were replaced with oriented strand board (OSB).

Exterior walls are wood studs above an added concrete stem wall. Walls have partial height board sheathing on the interior face and metal siding over full height horizontal board sheathing at the exterior. There are lean-to structures at the north and west sides of the main structure. Interior floors are concrete slab on grade except for the south bay at the horse stalls which is earth.

OPINIONS OF STRUCTURAL DEFICIENCIES

Gravity Support:

1. The existing rafters are overstressed for current code roof loads for spans over 16 feet using a minimal dead load of 8 psf.

2. The existing 6x8 support beams are overstressed for current code roof loads. Considering added support of the knee braces, the beams can support approximately 60% of the required 25 psf roof snow load. The existing attachments of the knee braces are inadequate for the reactions of full load using this methodology. Without consideration of the contribution of the knee braces, beams have only 5 psf of live load capacity (20% of required).

3. The added concrete slab has created water intrusion problems at the post bases. Several are in a dangerous condition (less than 50% capacity). Numerous other show signs of minor to moderate decay.

4. Water intrusion at the clerestory wall is a major problem. Long term deflection of the beams and the added issue of loss of column support at some interior posts has led to an inability of the roof to freely drain to the original overflows at the east wall. A majority of the beams supporting clerestory walls show some signs of water damage. Some are severe (Photo 3, 4).

5. Interior partial height walls at column lines do not allow debris or water to freely escape at plates and columns. This creates conditions where dryrot is likely and was observed (Photo 5).

6. The knee brace design assumes a generally balanced loading condition. Unbalanced loads and posts with knee brace one side only (side walls) can induce a horizontal load into the wood columns which may overstress the column.

7. There is no positive attachment of beams to columns other than toenails.

Lateral Loads:

8. There is a complete lack of lateral load resisting elements in the east-west direction except for the end wall at the south. There clerestory roof configuration disrupts the roof diaphragm so there is no ability to transfer roof shear to any vertical elements.

9. There is no transfer of diaphragm loads to the perimeter side walls except through the inadequately nailed 2x ledger.

10. There is no of diaphragm loads to the beam lines or through the vertical wall elements to complete a load path.

11. There are no diaphragm chord elements in either principal direction.

12. There is no capacity for the roof elements to resist uplift loads from high winds.

RECOMMENDED REPAIRS

The County requested we identify short term remediation and long term rehabilitation. Both options requested we "meet code". For a structure of this age and in this condition, rehabilitation to meet current code requirements would be extensive. Therefore, for the short term recommendations, we considered repair work that would return the building to its original as-constructed condition with minor improvements for public safety. Repairs and maintenance to this level would require approval from the building official. It is likely that they may consider the required repairs too extensive and recommend that the current code rehabilitation items be completed.

We agree with previous reports that the building in its current state should be considered a hazardous structure and should not be occupied. Completing the Short Term Repair recommendations would make the building occupiable but would not meet current code requirements. Short term repairs would also come with occupancy restrictions such as no occupancy with roof snow in excess of 4", during any icing event where ice or water may accumulate, no occupancy when winds are expected to exceed 40 mph, etc. Owner would also be expected to continue to monitor those framing elements not repaired for any signs of additional deterioration and repair or replace newly identified damage. Because of the probable extent of existing (minor) deterioration, short term repairs should be considered to extend the useful life of the structure by only two to five years.

Rehabilitation noted under Long Term would increase the useful life up to possibly 20 years. Recommended seismic improvements are based on an assumed Occupancy Category of II and a Life Safety Building Performance level. The purpose of the seismic strengthening recommended in this report is to safeguard against major structural failures and loss of life, not to limit damage or maintain function. A seismic risk reduction program would be designed to comply with the current code loading and detailing requirements, where reasonably practical, while maintaining as many original materials as possible. When retaining existing materials, compromises will be made with code requirements and current practices. The owner will be accepting higher risks than would be normal in new construction. The basic intent of an upgrade project would be to extend the useful life of the existing building and decrease life-safety risks that may currently exist. However, existing parts of the structure may suffer damage during an earthquake

SHORT TERM REPAIR RECOMMENDATIONS

1. Complete repair or replacement of wood columns with less than 80% sound wood. Sheet S-1 of Appendix A notes location and type of repair expected.

2. Complete replacement or strengthening of support beams with less than 90% sound wood. Sheet S-2 Appendix A notes location and type of repair expected.

3. Complete replacement or strengthening of roof framing (2x rafters) with damage or end bearing dryrot in excess of 15% of depth. Sheet S-3 Appendix A notes location and type of repair expected.

4. Complete sheathing replacement as noted on Sheet S-2 Appendix A.

5. Repair crickets and drainage path at base of all sloped roofs to provide weather tight system with positive, free flowing drainage. This assumes that the beam and column repairs would bring the support lines back to a near level, even and slightly sloping condition.

6. Repair overflows at each roof to deliver drained water direct to low roof with full height sheet metal scupper or downspout.

7. Replace water damaged wall boards at exterior face of west wall.

8. Provide temporary lateral bracing in the east-west direction consisting of pipe bracing in a chevron pattern at the beam lines south of Entries 2, 4, 6 and 8. Braces to be bolted to support beam and epoxy anchored to concrete slab.

LONG TERM REPAIR RECOMMENDATIONS

1. Repair all column bases with added concrete pier and CBSQ base. Replace columns with dry-rot extending further than 12 inches above floor slab.

2. Strengthen all beam lines with LVL lumber each side or replace with glue-laminated beams. Provide positive connection with T-strap of column cap beam to column.

3. Re-roof and re-sheath existing board sheathed areas with plywood overlay.

4. Add blocking every other space between rafter bearing. Re-nail roof diaphragm to blocking and provide framing anchor blocking to beams.

5. Add 2x8 rafters between existing rafters at spans exceeding 16 feet.

6. Add rafter tie framing anchors at maximum 4'-0" o.c. for wind uplift resistance.

7. Replace non-bearing partition framing with dry rot. Provide clean out separation at base. Use pressure treated materials where in contact with concrete or exposed to frequent wash down.

8. Re-side clerestory walls with plywood sheathing. Provide flashing and sealant at windows and roof intersection.

9. Replace drip edges and flashings at roof edges.

10. Re-side one face of the existing perimeter walls with plywood. Add holdowns to post bases as required by detailed analysis.

11. Provide a shear wall element at the north wall of the original structure. Shear wall will likely require plywood sheathing, posts with holdowns, additional foundation and collector ties from adjacent beam line to wall.

12. To account for diaphragm disruption, provide a double sheathed section of wall approximately eight feet wide each side of the building at all vertical walls above roof. Add wood post each end and strap to support beams. Add a 6x collector in the rafter space aligning with wall edge to provide chord element. Provide ties from collector to wall posts.

13. Intermediate shear resisting elements may be required in the east-west direction. This may be done with plywood shear walls, small steel frames or rod or pipe diagonal bracing. We have assumed two locations for cost estimating purposes.

14. Similar upgrades should be anticipated for the lean-to structure posts and framing.

The above recommendations are for structural elements only and do include upgrades that may be required for fire and life safety, accessibility, energy or historical preservation. Additional costs should be considered for these issues as well.

LIMITATIONS

This letter is not intended to identify all defects in existing workmanship or material capacities. It is intended to identify possible structural conditions within the scope that may be deficient and potential safety hazards. This report is based on our site observations of exposed-to-view structural members. Implementation of the above recommendations will not eliminate all life/safety or building damage risk. Damage to the building or contents during a seismic or high wind event will still be possible and may or may not be repairable.

This letter is not a design for mitigating noted hazards, but is a guide to assist the owner in identifying possible improvement requirements. WDY, Inc. provides no warranty or guarantee either expressed or implied. This letter is an instrument of service and shall not be copied or distributed to others without the written authorization of WDY, Inc.

If you have questions regarding this report, please do not hesitate to contact our office.

Sincerely,

WDY, Inc.

Greg G. Munsell, P.E, S.E.

Appendix A

Short Term Repair Recommendations

Recommended Short Term Repairs (columns)

Clearstory lines

GRID	1	2	3	4	5	6	7	8	9	10
A					C5					
B										
C			C4	C1			C3			
D			C4	C2		C1	C3	C3		
E							C3	C2		
F					C2					
G				C1	C2					
H				C1						
J										

Intermediate lines

GRID	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	
A										
B				C3	C2					
C				C3						
D	C3			C6						
E	C1	C1		C1		C1	C3			
F		C6		C1		C1	C3			
G			C3	C2			C3			
H		C1								
J										

Keynotes:

C1 Remove damaged base of column, place 12" dia concrete pier with new CBSQ base

C2 Replace entire post, base similar to C1

C3 Add temporary PT 2x6x30" each side to base, attach to (E) w/ (6) SDS25300 ea piece

C4 Remove damaged plate, install new PT HF 2x6 plate with min (2) epoxy anchors, replace post with PT DF 6x6 on ABU base

C5 Add temporary PT 2x6x24" to 2 sides of modified base, attach to (E) w/ (4) SDS25300 ea piece

C6 Minor existing base damage, owner to monitor

Recommended Short Term Repairs (lower beams)

Clearstory lines

GRID	1	2	3	4	5	6	7	8	9	10
A-B		B3	B3	B1			B3	B3	B2	
B-C	B1	B1	B2				B2		B3	
C-D	B1	B3		B1		B2	B3	B1	B1	
D-E		B3	B1			B2	B3	B1	B3	B2
E-F		B3	B3	B1		B2	B3	B3	B3	B1
F-G		B1	B1	B2			B3	B2	B3	B2
G-H		B1					B3	B2	B3	B3
H-J		B3		B1			B2	B3	B2	B3

Intermediate lines

GRID	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5
A-B										B2
B-C										
C-D										
D-E										
E-F										
F-G										
G-H										
H-J		B1				B3				B1

Keynotes:

B1 Minor wood damage from water intrusion; repair exterior to prevent further damage

B2 Sister 1-3/4"x7-1/4" LVL min 4'-0" long, lap to (E) post, attach w/ SDS25312 at 8" o.c. ea edge

B3 Replace entire (E) beam with DF#1 lumber of equal size (6x8, typically)

Note: South wall ledger also has sections of dry rot (approx 12 + 16 lin ft) and should be replaced and attached to each existing stud with min of (2) SDS25312 screws

Recommended Short Term Repairs (rafters)

2x Rafters

GRID	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11
A-B		R1		R2	R1		R1			R2
B-C		R2	R3					R2	R1	
C-D	R1	R1	R5	R2	R1		R1	R1		
D-E			R1					R1	R2	
E-F	R2	R2	R3		R3		R1	R3	R3	
F-G	R4	R2	J1		R2	R2		R2	R2	R1
G-H	R1				R1		R1	R2	R4	
H-J	R3				R1			R2	R3	R2

Sheathing

GRID	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11
A-B		S48	S42							
B-C		S24				S32				
C-D	S4		S8			S12	S8	S8		
D-E	S8				S16	S24	S6		S24	
E-F	S24	S8			S24	S12	S12	S8	S8	
F-G	S4	S6	S12		S16	S24		S12	S12	
G-H					S4		S64	S32	S24	
H-J	S12	S8	S12		S8		S48	S48	S16	

Keynotes:

R# Indicates number of 2x rafters in need of replacement
Rafters may be sistered to the center support. Full length not required.

S# Indicates approximate sq ft of damaged sheathing/boards in need of replacement

Note: short term repairs should include repair of cricket/drainage system each line to mitigate ponding. Repairs to the overflows at each of the west ends should also be made to prevent water intrusion at wall. We assume that the column and beam repairs would bring the slope back to an east-west slope

Appendix B

Photos

Photo 1: Typical roof framing

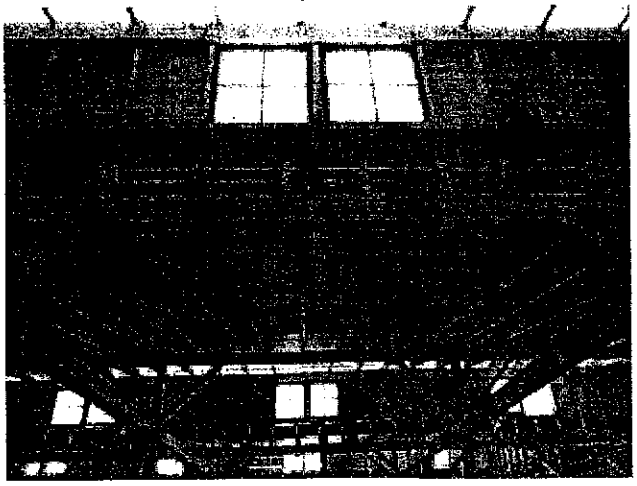

Photo 2: Typical clerestory wall framing

Photo 3: Beam water damage

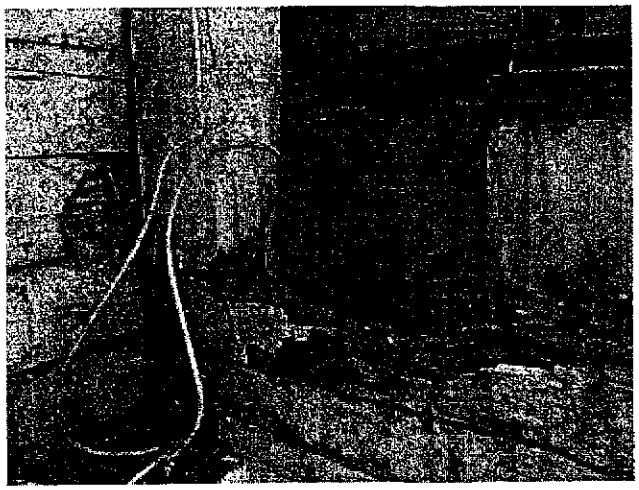

Photo 4: West wall beam end damage

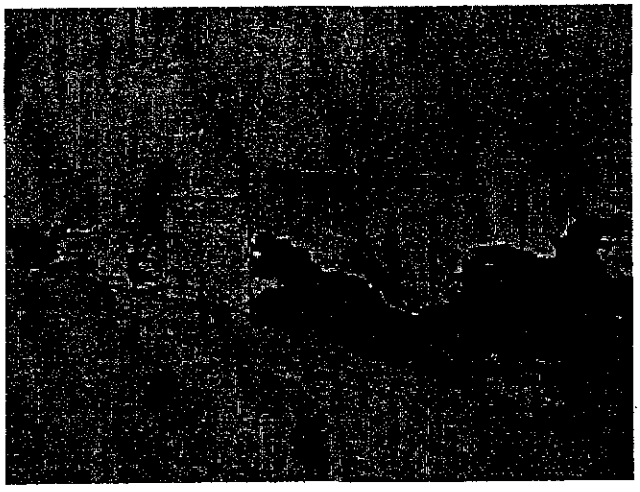

Photo 5: Dryrot at base of wall

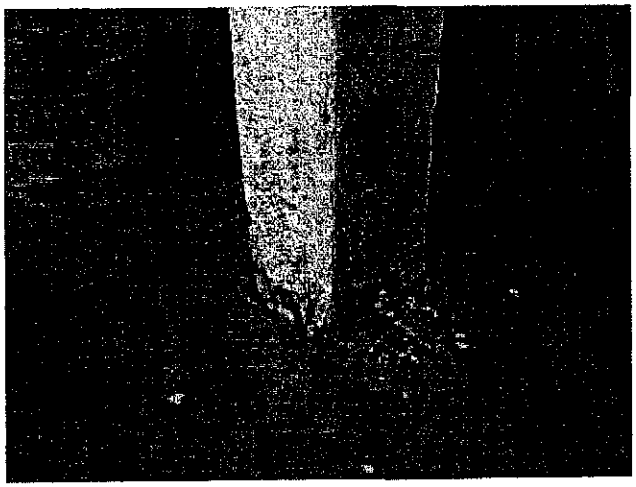

Photo 6: Typical column base damage

Appendix C

Calculations

WDY **Structural • Civil Engineers**

Job Name:	CCEC Livestock Barn Evaluation	Job No:	14098	Sheet No:	RF-
Client:	Clackamas County	Date:	June 2014	By:	GGM

Existing Framing Capacity

Long span rafters

Member width:	1.50	in.
Member depth:	7.25	in.
Member span:	19.25	ft.
Bending stress:	1450	psi
Shear stress:	95	psi
Load duration:	1.00	
Allowable Moment:	1.59	k-ft
Allowable uniform load (bending):	34.3	plf
Allowable Shear:	688.8	lbs.
Allowable uniform load (shear):	76.4	plf
Allowable uniform load (defl.):	31.7	plf
Capacity:	17.1	psf

Calculated section properties

Area:	10.9	in^2
Section Modulus:	13.1	in^3
Moment of Inertia:	47.6	in^4
Req'd deflection limit	(TL)=L/ 180	
=	1.28	in.
Existing spacing:	2.00	ft o.c.
Existing DL:	8.0	psf
Code min LL:	25.0	psf
Existing load:	33.0	psf

Short span rafters

Member width:	1.50	in.
Member depth:	7.25	in.
Member span:	12.25	ft.
Bending stress:	1450	psi
Shear stress:	95	psi
Load duration:	1.00	
Allowable Moment:	1.59	k-ft
Allowable uniform load (bending):	84.6	plf
Allowable Shear:	688.8	lbs.
Allowable uniform load (shear):	124.8	plf
Allowable uniform load (defl.):	122.8	plf
Capacity:	42.3	psf

Calculated section properties

Area:	10.9	in^2
Section Modulus:	13.1	in^3
Moment of Inertia:	47.6	in^4
Req'd deflection limit	(TL)=L/ 180	
=	0.82	in.
Existing spacing:	2.00	ft o.c.
Existing DL:	8.0	psf
Code min SL:	25.0	psf
Existing load:	33.0	psf

WDY **Structural • Civil Engineers**

Job Name:	CCEC Livestock Barn Evaluation	Job No:	14098	Sheet No:	RF-2
Client:	Clackamas County	Date:	June 2014	By:	GGM

Capacity of existing framing members

Member location:	Typical Clerestory Beam	Span:	12.0	ft
Nominal Size:	6x8	Fb:	1500	psi
Actual width, b:	5.50 in	Fv:	120	psi
Actual depth, d:	7.50 in	E:	1700	ksi
Idf:	1.15			
Deflection criteria =	L / 180	=	0.80	in

Section Properties

Area, A =	41.25 in^2
Section Mod, S =	51.56 in^3
Mom.of Inertia, I =	193.36 in^4

Section Capacities — Allowable uniform load (plf)

Based on shear:	633 plf
Based on moment:	412 plf
Based on deflection:	564 plf
Tributary width	19.0 ft
Allowable TL	21.7 psf
Actual DL	8.0 psf
Available LL	**13.7 psf**

WDY **Structural . Civil Engineers**

Job Name:	CCEC Livestock Barn Evaluation	Job No:	14098	Sheet No:	RF-3
Client:	Clackamas County	Date:	June 2014	By:	GGM

Capacity of existing framing members

Member location:	Typical Clerestory Beam	Span:	16.0 ft
Nominal Size:	6x8	Fb:	1500 psi
Actual width, b:	5.50 in	Fv:	120 psi
Actual depth, d:	7.50 in	E:	1700 ksi
Idf:	1.15		
Deflection criteria =	L / 180	=	1.07 in

Section Properties

Area, A =	41.25 in^2
Section Mod, S =	51.56 in^3
Mom.of Inertia, I =	193.36 in^4

Section Capacities — Allowable uniform load (plf)

Based on shear:	474 plf
Based on moment:	232 plf
Based on deflection:	238 plf
Tributary width	19.0 ft
Allowable TL	12.2 psf
Actual DL	8.0 psf
Available LL	**4.2 psf**

Appendix D

Cost Estimates

BROCKAMP&
JAEGER, INC.
General Contractors

June 12, 2014

Mr. Greg Munsell
WDY Structural – Civil Engineers
6443 SW Beaverton Hillsdale Hwy, Suite 210
Portland, OR 97221

Re: CCEC Livestock Barn Evaluation

Dear Greg,

We have completed an evaluation and "scale of magnitude" estimate for both short-term and long term repairs of the above noted building. Please note, our estimates include hard construction costs only. They do not include such costs as permits, testing, or special inspections.

Our estimate for the short term repairs of the building is $468,654.00. We estimate the duration of this work to take two (2) months. Enclosed is a detail breakdown of the short term repairs.

Our estimate for long term repair and seismic upgrade of the building is $2,192,400.00.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Darin Hirte,
Project Manager

15796 S. BOARDWALK
Telephone (503) 655-9151
CCB# 30
OREGON CITY, OREGON 97045
Fax (503) 656-5344

BROCKAMP & JAEGER, INC.
General Contractors

15796 South Boardwalk
Oregon City, Oregon 97045
(503) 655-9151

B&J Project #
CCEC Livestock Barn Evaluation
Short Term Repair
Unit Cost Estimate Summary

Area's :
A. Multi-Tenant Space
B. Single Tenant Space
C. Showroom

Line No./Description				Estimate #1 06.12.14 Cost	Estimate No. Cost	Variance
A	Bare Construction Costs:			394,234		394,234
C	Building Permit & P.C Fees			NIC	NIC	
D	Utility Connection & T.I.F. Fees			NIC	NIC	
E	Preconstruction Services			NIC	NIC	
F	Special Inspections			NIC	NIC	
	Subtotal			394,234	0	394,234
G	Contractor Fee @.....		7.00%	27,596		27,596
	Subtotal			421,830	0	421,830
H	PL/PD Insurance		1.00%	4,218		4,218
		Subtotal		426,049	0	426,049
I	Contingency @		10.00%	42,605		42,605
			Subtotal	468,654	0	468,654
J	WA Sales Tax @		0.0%	0		0
K	TOTAL			468,654	0	468,654

Unit Cost Summary

	Quantity	Unit	Unit Cost	Subtotal	Line Totals	Remarks
1 General Conditions						Page 2
supervision & jobsite overhead	2	month	14,500	29,000		
forklift rental	1	ls	1,600	1,600		
manlift rental	1	ls	2,000	2,000		
safety equipment	1	LS	2,000	2,000		
					34,600	
2 Site Work/Existing Conditions						
temporary shoring for C1, C2 & C4 columns	19	ea	395	7,505		
temporary shoring for B3 beam replacement	24	ea	1,030	24,720		
temporary shoring for south wall ledger replacement	1	ls	960	960		
striping		ls		0		
					33,185	
3 Concrete						
C1 concrete pier with post base	11	ea	385	4,235		
C2 concrete pier with post base	6	ea	385	2,310		
					6,545	
4 Masonry						
Not Used	0	ls		0		
					0	
5 Metals						
Not Used	0	ls		0		
					0	
6 Wood & Plastics						
C2 replace column	6	ea	265	1,590		
C3 column add support	11	ea	155	1,705		
C4 column repair and support	2	ea	574	1,148		
C5 column add support	1	ea	155	155		
B2 lower beam add support	14	ea	180	2,520		
B3 replace beam	24	ea	585	14,040		
south wall ledger replacement	28	lf	31.00	868		
rafter replacements	69	ea	90.00	6,210		
sheathing replacement	718	sf	12.00	8,616		
cricket repairs	12,000	sf	9.50	114,000		
overflow repairs	10	ea	1,800	18,000		
					166,852	
7 Thermal & Moisture						Page 3
roof patch back at sheathing replacement	718	sf	14.00	10,052		
roof patch back at crickets	12,000	sf	9.00	108,000		
misc sheet metal repair	1	ls	15,000	15,000		
					133,052	
8 Doors & Windows						
Not Used	10	ea		0		
					0	
9 Finishes						
Not Used	0	ls		0		
					0	
10 Specialties						
Not Used	0	ls		0		
					0	
11 Equipment						
Not Used	0	ls		0		
					0	
12 Furnishings						
Not Used	0	ls		0		
					0	
13 Special Construction						
Not Used	0	ea		0		
					0	
14 Conveying Systems						
Not Used	0	ls		0		
					0	
						Page 4
15 Mechanical						
Not Used	0	ls		0		
					0	
16 Electrical						
electrical relocation allowance	1	ls	20,000	20,000		
					20,000	
17 Low Voltage						
Not Used	0	ls		0		
					0	
TOTAL, BARE COST					394,234	