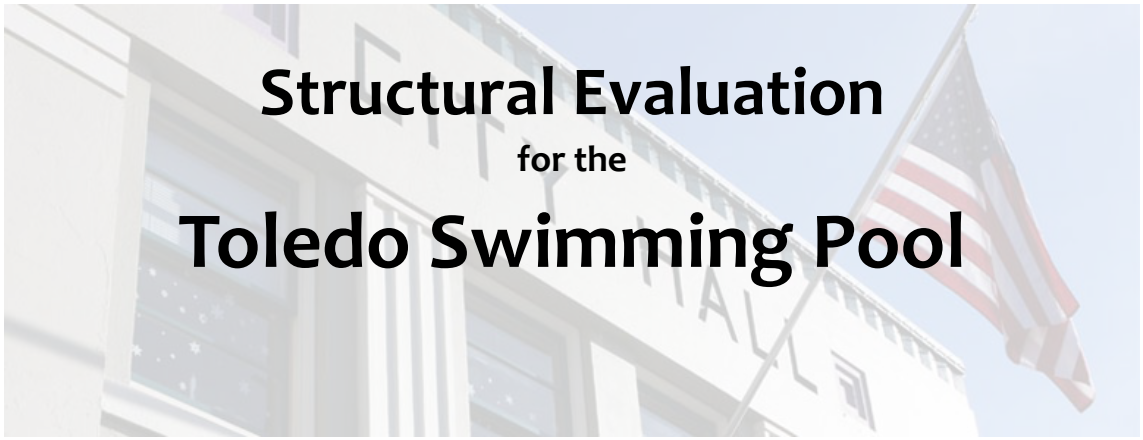


Structural Evaluation

for the

Toledo Swimming Pool

Prepared for:

City of Toledo

&

Young Design Studio

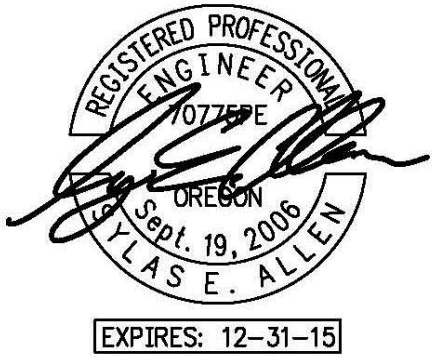
October, 2014

Prepared by:

Brandon A. Smith, PE
Project Engineer

and

Sylas E. Allen, PE
Project Manager



ZCS ENGINEERING Inc.

550 SW 6th Street, Grants Pass, Oregon, 97526

T: 541.479.3865 • F: 541.479.3870

October 27, 2014

Brent Young
Young Design Studio
2126 North Skidmore Court
Portland, Oregon 97217

Reference: City of Toledo Swimming Pool

Subject: Structural Evaluation

Dear Mr. Young,

Thank you for the opportunity to provide the attached structural evaluation report. The report presents the structural deficiencies of the pool building based on current code requirements, offers recommendations for bringing the building into compliance with the code, and provides an estimate of the probable cost of those structural improvements.

Based on the history of satisfactory performance of the building, the recommendations in this report may be implemented at the discretion of the City. However, if additional improvements are proposed, bringing the structure into code compliance may be required.

We look forward to the opportunity to discuss all options that are available to the City for the facility. If you have any questions or concerns, please do not hesitate to call me at (541) 479-3865 or email me at SyA@ZCSengineering.com.

Sincerely,

Sylas E. Allen, PE
Branch Manager

Enc: Structural Seismic Evaluation Report and Support Drawings by ZCS Engineering, Inc.

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1.0 Executive Summary

The Toledo Swimming Pool is owned and operated by the City of Toledo, in Lincoln County, Oregon. Young Design Studio, as an agent of the City, has retained ZCS Engineering, Inc. (ZCS) to perform an evaluation to determine the structural deficiencies when compared to buildings designed using modern building codes, and has been completed in accordance with the current edition of the Oregon Structural Specialty Code, and the American Society of Civil Engineers "Seismic Rehabilitation of Existing Buildings ASCE/SEI 41-06 and "Seismic Evaluation of Existing Buildings" ASCE/SEI 31-03.

The facility was originally an outdoor pool constructed in the 1950's. A partially enclosed cover, bathhouse, and equipment buildings were constructed in the 1960's. In approximately 1973 the cover was fully enclosed, a shed roof was constructed over the observation area on the east side of the main pool building, and the bathhouse was replaced by two new bathhouses attached to the main pool building. The total area of the pool building is 9,544 square-feet, and is generally constructed of a wood roof system with glulam beams, over steel columns with CMU and wood wall infill. The bathhouse walls are constructed of partially grouted, reinforced CMU.

The evaluation of the facility indicates that rehabilitation of the structural system components is necessary to meet current code requirements. Based on the evaluation, the following is a brief list of structural deficiencies of the existing building:

- Inadequate shear resistance of perimeter walls under lateral loading
- Inadequate connection of roof diaphragm to shear walls
- Inadequate shear resistance of roof diaphragms
- Deterioration of roof sheathing, selected wood beams, CMU walls, and wide-flange steel posts
- Roof beams overstressed under code loading conditions

Preliminary structural rehabilitation recommendations to mitigate the list of deficiencies determined by our analysis are outlined in Section 4.0 of this report. Included with the rehabilitation recommendations, we have prepared schematic structural retrofit drawings in order to convey the intent of the retrofit effort. These drawings are included in Appendix D.

To help the City understand the magnitude of the retrofit effort a preliminary construction cost estimate was developed including preconstruction and soft costs. Refer to Section 5.0 of the report body.

2.0 Project Introduction

The Toledo Swimming Pool is owned and operated by the City of Toledo, in Lincoln County, Oregon. The facility is located near the intersection of Northwest "A" and 7th Streets in the City of Toledo. Young Design Studio, as an agent of the City, has retained ZCS Engineering, Inc. (ZCS) to perform an evaluation to determine the structural deficiencies of the facility when compared to buildings designed using modern building codes. The evaluation has been completed in accordance with the current edition of the Oregon Structural Specialty Code, and the American Society of Civil Engineers "Seismic Rehabilitation of Existing Buildings ASCE/SEI 41-06 and "Seismic Evaluation of Existing Buildings" ASCE/SEI 31-03.

The facility was originally an outdoor pool constructed in the 1950's. A partially enclosed cover, bathhouse, and equipment buildings were constructed in the 1960's. In approximately 1973 the cover was fully enclosed, a shed roof was constructed over the observation area on the east side of the main pool building, and the bathhouse was replaced by a new bathhouse attached to the main pool building. The total area of the pool building is 9,544 square-feet, and is generally constructed of a wood roof system with glulam beams, over steel columns with CMU and wood wall infill. The observation area and bathhouse walls are constructed of partially grouted, reinforced CMU.

2.1 Scope of Work

The following scope of work was completed by ZCS:

Structural Investigation Services:

- Performed site visit to investigate the facility and develop a destructive investigation plan. Identified and measured existing building framing and structural elements. Identified damaged and deteriorated structural elements
- Provided direction for destructive work to access hidden structure and expose connections and temporary patching of finishes at locations of destructive investigation. Work performed by local contractor
- Performed additional site visit to investigate exposed areas
- Collated field findings into preliminary as-built drawings to assist in the existing building structural system analysis and illustrate deficient and damaged elements

Structural Engineer Services:

- Analyzed existing building structural elements to identify structural deficiencies and significance of damage and deterioration
- Develop concept solution to deficiencies
- Provided this report outlining structural deficiencies, proposed solutions, and cost

Additionally, ZCS met with City staff and Brent Young on October 14, 2014 to review the facility deficiencies and discuss options for repairs.

3.0 Structural Evaluation

3.1 Introduction

ZCS was tasked with evaluating the lateral and gravity force resisting systems of the Toledo Swimming Pool facility (Figure 1). The structural elements of the building are described below.

The main pool building roof diaphragm consists of unblocked 2-4-1 plywood (equivalent to 1-1/8" APA rated Sturd-I-Floor), over 4x10 purlins at 48" on-center, over 7" wide variable depth glulam beams at 16 to 17 feet on-center, spanning 52'. The main pool building roof is supported by 17' tall steel wide-flange posts along the west, east, and south wall lines. CMU infill extends 11 to 12' up the steel columns, with wood wall and transom window infill above. Post foundations along the west wall line are 2'-8"x6'-0"x10-1/2" thick concrete. Post foundations along the south and east wall line are 2'-8" square by 10-1/2" thick concrete. The north wall line is full height, partially grouted, reinforced 8" CMU with a continuous 16" wide by 8" thick concrete footing.

The shed roof diaphragm consists of unblocked 2-4-1 plywood, over 4x8 purlins at 4' on-center, spanning 13'-6". The shed roof is supported by partially grouted, reinforced 8" CMU walls.

The bathhouse building roof diaphragm consist of 3" tongue-and-groove decking over 4x12 and 6x12 purlins at 4' to 8' on-center of varying span lengths. The bathhouse roof is supported by partially grouted, reinforced 8" CMU exterior walls over 2'-0" wide by 8" thick continuous concrete footings.

Cracking in the north wall is the only significant masonry damage in the facility. This section of wall was constructed prior to the 1973 sidewall infill work that was done when the bathhouse was rebuilt. The damage is concentrated at the return air louver opening that was installed at the same time. Drill investigation revealed a grouted cell at 48 inches on-center and the possible presence of bed joint reinforcing at 32 inches on-center. Window sill trim, and jamb trim destructive investigation revealed no significant deterioration. The cracks appear to be caused by minor deferential settlement of the subgrade and lack of wall reinforcement. Geotechnical investigation was not within the scope of this assignment. Exterior pedestrian walk-around reveled no evidence of subsidence or other foundation related issues along remaining walls.

The secondary roof structure was replaced in 1973; 2x12 joists were replaced with the present 4x10 purlins and plywood decking. Surface examination and drilling revealed no deterioration to timber or metal hardware.

The 2-4-1 plywood roof decking is designed to span 48" when using 4x supports. The roof diaphragm is unblocked and will most likely not hold up to diaphragm demands. The in-plane load path for the main roof diaphragm is non-existent and the out-of-plane load path for the masonry walls is highly suspect. No positive connection between sidewall masonry and steel columns can be verified without destruction. The 1973 drawings do not detail this junction.

Steel sidewall columns are corroded from chlorine exposure at their bases inside the building. The corrosion to the exterior flange of the columns does not appear as extensive. There were visible signs of corrosion, but the exterior was not as degraded as the interior flanges. Columns at the observation area marriage line have been jacketed with concrete piers 16 inches up from the pool deck since our last inspection 2 years ago. It is possible that the steel columns are replacements for original timber columns. This idea is based on the discovery of brackets at the top of the stub column that rests on top of the CMU near the southeast corner of the main pool building. The masonry that supports it was constructed prior to the 1973 remodel. Rather than remove masonry for a new full height column, they elected to use a stub column on top.

Sidewall masonry and bathroom masonry is in good condition. 1973 drawings indicate grouted vertical cells at 32 inches on-center. However, drilling revealed 48 inch spacing in some locations. New masonry walls were installed over continuous foundations that were cut into the existing floor.

The three 48 inch square louvres in the roof are gravity dampers to prevent over internal pressurization of the facility. Facility operators have never seen them open. The air handling system is run at all times to keep air flowing. Facility doors are propped open to improve fresh air circulation.

The observation area roof and exterior masonry wall rely on the column line at the main pool building for out-of-plane support. There is no adequate spandrel between the columns. There is not a reliable out-of-plane or in-plane perimeter connection system at the exterior masonry wall.

Timber deterioration was observed in some locations in non-structural assemblies, but no structural system deterioration of any significance was found from observation within the building. Some roof plywood has been replaced in small localized areas during a reroof operation in recent years, suggesting the possibility of a roofing breach that should be considered as a potential reoccurrence in facility planning.

Upon further investigation of the roof deck from above via removal of roofing material, we observed the following: The roofing seems to be a combination of two separate systems that

are not compatible with each other. The top layer of roofing is a single-ply PVC like material that looks to be near the end of its useful life. Under this layer is felt that appears to have been installed at the same time as the single-ply roofing. The second system under that is a built-up roofing system comprised of 3/4" layer of tar/vapor barrier over 1-1/4" insulation over another thin vapor barrier over 1-1/8" plywood decking. When first cutting open the single-ply roofing, near the center of the main pool roof, the felt and top of the built-up roofing were visibly wet. Once cutting through the tar/vapor barrier the insulation layer was also wet to the touch and warm.

Near the south-west corner of the main pool building roof, the roofing itself was exactly the same and also wet to the touch when the single-ply was opened. When peeling the insulation out, it was wet and fell apart as it was pulled out unlike the insulation at the center of the roof. When peeling the bottom vapor barrier off it, easily took the top lamination of the plywood with it. The plywood at this location was visibly dry rotting and soft to the touch. The dry rot seems to stop at the first purlin from the edge.

When peeling the insulation out, near the north-east corner of the main pool building roof, it was wet and pulled out much like the insulation at the center of the roof. There was no visible sign of rot at this opening. However, there was separation in the decking and signs of rot in the farthest north east corner of the roof, as seen from below. The top of the plywood decking did not show any signs of decay from the top surface or from hole that was drilled to find its depth.

3.2 Lateral Resisting Element Deficiencies

The following lateral resisting element deficiencies are based on visual observations of the existing structural elements and the structural analysis performed during the Tier 1 check of the ASCE 31-03. The Tier 1 checklists are attached in Appendix B. The following outlines the deficiencies for each portion of the facility.

Main Pool Building

- Perimeter CMU walls do not provide adequate shear capacity
- Roof diaphragm shear capacity inadequate to transfer lateral loads to end walls in transverse direction
- Deterioration of roof sheathing at roof diaphragm perimeter (Figure 8)
- Deterioration of wide-flange post bases at ground-line inside the building (Figure 6)
- Lack of connection between roof diaphragm and CMU infill walls (shear walls). Currently separated by weak wood wall framing with transom windows

- Insufficient connection between wide-flange posts and CMU infill walls to ensure elements act as a single unit during lateral force application, also allowing the walls to fall away or into the facility
- Cracking of existing CMU wall at north end due to lack of reinforcement steel and suspect subgrade (Figure 5)

Observation Area Structure

- Potential deterioration of roof sheathing (based on deterioration of main building roof sheathing)
- Insufficient connection between roof diaphragm and CMU shear walls
- Deterioration of structural wood framing at main pool building roof connection (Figure 4)

Bathhouse Building

- Roof diaphragm shear capacity inadequate due to straight sheathing (Figure 7)
- Insufficient connection between roof and main pool building south wall to resist pounding action between structures

3.3 Gravity Resisting Element Deficiencies

The following gravity resisting element deficiencies are based on visual observations and structural analysis performed based on applicable codes.

- Main Pool Building roof beams are 50% overstressed during current code loading conditions (Figure 2)

3.4 Evaluation of Incidental Items

The following incidental items deficiencies are based on visual observation.

- Deterioration of HVAC system support hangers and lack of lateral bracing
- Attachment of equipment over 20 pounds and above 4', and all equipment over 100 pounds

Based upon ZCS's previous experience and discussions with site personnel, the buildings may contain some form of hazardous material. These materials will need to be dealt with on a case-by-case basis as they are encountered during the project.

4.0 Structural Rehabilitation Recommendations

Based on the deficiencies listed in Section 3.2 through 3.4, the following structural improvements should be made to the existing structures. These improvements are detailed below and in the attached schematic structural retrofit drawings in Appendix D that were prepared to assist in defining the necessary scope of rehabilitation work for this structure.

Main Pool Building

- Reinforce glulam roof beams in-place
- Repair deteriorated wide-flange posts
- Install connections between wide-flange posts and CMU infill walls
- Remove and replace CMU shear walls (one bay each corner, each way)
- Remove and replace CMU along north wall and reinforce foundation
- Remove and replace roofing and insulation material
- Remove and replace perimeter roof sheathing
- Block all roof sheathing edges between roof purlins
- Re-nail roof sheathing to roof framing and blocking
- Installation of new equipment supports (evaluation of MEP components not included in the scope of this evaluation)

Observation Area

- Remove and replace roofing and insulation material
- Replace deteriorated roof sheathing
- Install connections at 4’ on-center between roof diaphragm and top of CMU walls on all three sides of observation area structure
- Remove and replace deteriorated wood beams at marriage line to main pool building

Bathhouse Building

- Remove and replace roofing and insulation
- Install plywood roof sheathing over existing straight sheathing
- Install connection at 4’ on-center between bathhouse roof diaphragm and new full height main pool building CMU walls

5.0 Preliminary Construction Cost Estimate

The attached engineer's opinion of probable cost has been developed by ZCS to assist in developing an overall project restoration project cost. The prices provided in the attached cost estimate have been developed using the extensive list of past projects as a baseline for this project. These prices are based on Oregon BOLI, wage rates. The cost estimate is broken down into multiple line items associated with each major task (general conditions, structural steel, etc.) associated with the rehabilitation. Additional line items are included in the project cost estimate for design and associated permit costs.

The scope of this cost estimate is limited to structural rehabilitation and restoration associated finishes. Items not included in the scope of this cost estimate include, but are not limited to, restoration of the pool or pool systems, MEP systems, and accessibility upgrades. See Appendix C for detailed cost information.

6.0 Conclusion

Based on our visual observations, we find the structure in good condition and generally safe for occupancy.

Given the current condition of the structure, the current code section on existing buildings does not mandate that upgrades are required unless the building is scheduled for structural repairs, alterations, additions, or change in occupancy. For the purpose of this report our recommendations have been based on our understanding the goal of the City is to continue utilizing the existing building, and the City wants the structural systems to be compliant with the current code. To clarify, upgrades outlined in this report are strictly at the discretion of the City. However, if the City chooses not to correct the structural deficiencies at this time, the City should implement policies and procedures for use of the building during, or in anticipation of, code level events. For example, the building shall not be occupied during a snow event and a snow removal policy should be implemented.

We have attempted to identify all areas requiring upgrades to achieve a scope of work for current code compliance and associated estimated costs.

Please contact our office if you would like to discuss our findings. Please review the attached upgrade schematic drawings that can be used to refine a scope and budget. This may give you enough information to make a decision on how to proceed.

Appendix A: Figures

Figure 1 – North Exterior Elevation

Figure 2 – Main Pool Building Interior - Facing North

Figure 3 – Main Pool Building Roof Beam-Post Connection

Figure 4 – Observation Area Structure Connection to Main Pool Building

Figure 5 – Cracking of CMU North End Wall

Figure 6 – Deterioration of Steel Post Bases

Figure 7 – Bathhouse Building Roof Beams and Decking

Figure 8 – Deterioration of Main Pool Building Roof Sheathing

Appendix B: Structural Tier 1 Check Sheets

 TOLEDO POOL FACILITY

3.7.13 Basic Structural Checklist for Building Type RM1: Reinforced Masonry Bearing Walls with Flexible Diaphragms

This Basic Structural Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

C3.7.13 Basic Structural Checklist for Building Type RM1

These buildings have bearing walls that consist of reinforced brick or concrete block masonry. Wood floor and roof framing consists of wood joists, glulam beams, and wood posts or small steel columns. Steel floor and roof framing consists of steel beams or open web joists, steel girders, and steel columns. Lateral forces are resisted by the reinforced brick or concrete block masonry shear walls. Diaphragms consist of straight or diagonal wood sheathing, plywood, or untopped metal deck, and are flexible relative to the walls. Foundations consist of brick or concrete spread footings or deep foundations.

Building System

(C)	NC	N/A	LOAD PATH: The structure shall contain a minimum of one complete load path for Life Safety and Immediate Occupancy for seismic force effects from any horizontal direction that serves to transfer the inertial forces from the mass to the foundation. (Tier 2: Sec. 4.3.1.1)
(C)	NC	N/A	ADJACENT BUILDINGS: The clear distance between the building being evaluated and any adjacent building shall be greater than 4 percent of the height of the shorter building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.1.2)
C	NC	(N/A)	MEZZANINES: Interior mezzanine levels shall be braced independently from the main structure, or shall be anchored to the lateral-force-resisting elements of the main structure. (Tier 2: Sec. 4.3.1.3)
C	NC	(N/A)	WEAK STORY: The strength of the lateral-force-resisting system in any story shall not be less than 80 percent of the strength in an adjacent story, above or below, for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.1)
C	NC	(N/A)	SOFT STORY: The stiffness of the lateral-force-resisting system in any story shall not be less than 70 percent of the lateral-force-resisting system stiffness in an adjacent story above or below, or less than 80 percent of the average lateral-force-resisting system stiffness of the three stories above or below for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.3.2.2)
C	NC	(N/A)	GEOMETRY: There shall be no changes in horizontal dimension of the lateral-force-resisting system of more than 30 percent in a story relative to adjacent stories for Life Safety and Immediate Occupancy, excluding one-story penthouses and mezzanines. (Tier 2: Sec. 4.3.2.3)
(C)	NC	N/A	VERTICAL DISCONTINUITIES: All vertical elements in the lateral-force-resisting system shall be continuous to the foundation. (Tier 2: Sec. 4.3.2.4)

C NC (N/A) MASS: There shall be no change in effective mass more than 50 percent from one story to the next for Life Safety and Immediate Occupancy. Light roofs, penthouses, and mezzanines need not be considered. (Tier 2: Sec. 4.3.2.5)

C (NC) N/A DETERIORATION OF WOOD: There shall be no signs of decay, shrinkage, splitting, fire damage, or sagging in any of the wood members, and none of the metal connection hardware shall be deteriorated, broken, or loose. (Tier 2: Sec. 4.3.3.1)

C (NC) N/A MASONRY UNITS: There shall be no visible deterioration of masonry units. (Tier 2: Sec. 4.3.3.7)

(C) NC N/A MASONRY JOINTS: The mortar shall not be easily scraped away from the joints by hand with a metal tool, and there shall be no areas of eroded mortar. (Tier 2: Sec. 4.3.3.8)

C (NC) N/A REINFORCED MASONRY WALL CRACKS: All existing diagonal cracks in wall elements shall be less than 1/8 inch for Life Safety and 1/16 inch for Immediate Occupancy, shall not be concentrated in one location, and shall not form an X pattern. (Tier 2: Sec. 4.3.3.10)

Lateral-Force-Resisting System

(C) NC N/A REDUNDANCY: The number of lines of shear walls in each principal direction shall be greater than or equal to 2 for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.1.1)

(C) NC N/A SHEAR STRESS CHECK: The shear stress in the reinforced masonry shear walls, calculated using the Quick Check procedure of Section 3.5.3.3, shall be less than 70 psi for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.4.2.4.1)

(C) NC N/A REINFORCING STEEL: The total vertical and horizontal reinforcing steel ratio in reinforced masonry walls shall be greater than 0.002 for Life Safety and Immediate Occupancy of the wall with the minimum of 0.0007 for Life Safety and Immediate Occupancy in either of the two directions; the spacing of reinforcing steel shall be less than 48 inches for Life Safety and Immediate Occupancy; and all vertical bars shall extend to the top of the walls. (Tier 2: Sec. 4.4.2.4.2)

Connections

C NC (N/A) WALL ANCHORAGE: Exterior concrete or masonry walls that are dependent on the diaphragm for lateral support shall be anchored for out-of-plane forces at each diaphragm level with steel anchors, reinforcing dowels, or straps that are developed into the diaphragm. Connections shall have adequate strength to resist the connection force calculated in the Quick Check procedure of Section 3.5.3.7. (Tier 2: Sec. 4.6.1.1)

C (NC) N/A WOOD LEDGERS: The connection between the wall panels and the diaphragm shall not induce cross-grain bending or tension in the wood ledgers. (Tier 2: Sec. 4.6.1.2)

C (NC) N/A TRANSFER TO SHEAR WALLS: Diaphragms shall be connected for transfer of loads to the shear walls for Life Safety and the connections shall be able to develop the lesser of the shear strength of the walls or diaphragms for Immediate Occupancy. (Tier 2: Sec. 4.6.2.1)

(C) NC N/A FOUNDATION DOWELS: Wall reinforcement shall be doweled into the foundation for Life Safety, and the dowels shall be able to develop the lesser of the strength of the walls or the uplift capacity of the foundation for Immediate Occupancy. (Tier 2: Sec. 4.6.3.5)

(C) NC N/A GIRDER/COLUMN CONNECTION: There shall be a positive connection utilizing plates, connection hardware, or straps between the girder and the column support. (Tier 2: Sec. 4.6.4.1)

3.7.13S Supplemental Structural Checklist for Building Type RM1: Reinforced Masonry Bearing Walls with Flexible Diaphragms

This Supplemental Structural Checklist shall be completed where required by Table 3-2. The Basic Structural Checklist shall be completed prior to completing this Supplemental Structural Checklist.

Lateral-Force-Resisting System

C NC (N/A) REINFORCING AT OPENINGS: All wall openings that interrupt rebar shall have trim reinforcing on all sides. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.3)

C NC (N/A) PROPORTIONS: The height-to-thickness ratio of the shear walls at each story shall be less than 30. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.4.2.4.4)

Diaphragms

(C) NC N/A CROSS TIES: There shall be continuous cross ties between diaphragm chords. (Tier 2: Sec. 4.5.1.2)

(C) NC N/A OPENINGS AT SHEAR WALLS: Diaphragm openings immediately adjacent to the shear walls shall be less than 25 percent of the wall length for Life Safety and 15 percent of the wall length for Immediate Occupancy. (Tier 2: Sec. 4.5.1.4)

C NC (N/A) OPENINGS AT EXTERIOR MASONRY SHEAR WALLS: Diaphragm openings immediately adjacent to exterior masonry shear walls shall not be greater than 8 feet long for Life Safety and 4 feet long for Immediate Occupancy. (Tier 2: Sec. 4.5.1.6)

C NC (N/A) PLAN IRREGULARITIES: There shall be tensile capacity to develop the strength of the diaphragm at re-entrant corners or other locations of plan irregularities. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.7)

C NC (N/A) DIAPHRAGM REINFORCEMENT AT OPENINGS: There shall be reinforcing around all diaphragm openings larger than 50 percent of the building width in either major plan dimension. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.1.8)

(C) NC N/A STRAIGHT SHEATHING: All straight sheathed diaphragms shall have aspect ratios less than 2-to-1 for Life Safety and 1-to-1 for Immediate Occupancy in the direction being considered. (Tier 2: Sec. 4.5.2.1)

(C) NC N/A SPANS: All wood diaphragms with spans greater than 24 feet for Life Safety and 12 feet for Immediate Occupancy shall consist of wood structural panels or diagonal sheathing. (Tier 2: Sec. 4.5.2.2)

C (NC) N/A UNBLOCKED DIAPHRAGMS: All diagonally sheathed or unblocked wood structural panel diaphragms shall have horizontal spans less than 40 feet for Life Safety and 30 feet for Immediate Occupancy and shall have aspect ratios less than or equal to 4-to-1 for Life Safety and 3-to-1 for Immediate Occupancy. (Tier 2: Sec. 4.5.2.3)

C NC (N/A) NON-CONCRETE FILLED DIAPHRAGMS: Untopped metal deck diaphragms or metal deck diaphragms with fill other than concrete shall consist of horizontal spans of less than 40 feet and shall have span/depth ratios less than 4-to-1. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.5.3.1)

C NC N/A OTHER DIAPHRAGMS: The diaphragm shall not consist of a system other than wood, metal deck, concrete, or horizontal bracing. (Tier 2: Sec. 4.5.7.1)

Connections

C NC N/A STIFFNESS OF WALL ANCHORS: Anchors of concrete or masonry walls to wood structural elements shall be installed taut and shall be stiff enough to limit the relative movement between the wall and the diaphragm to no greater than 1/8 inch prior to engagement of the anchors. (Tier 2: Sec. 4.6.1.4)

3.9.1 Basic Nonstructural Component Checklist

This Basic Nonstructural Component Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Partitions

C NC N/A — UNREINFORCED MASONRY: Unreinforced masonry or hollow clay tile partitions shall be braced at a spacing equal to or less than 10 feet in levels of low or moderate seismicity and 6 feet in levels of high seismicity. (Tier 2: Sec. 4.8.1.1)

Ceiling Systems

C NC N/A — SUPPORT: The integrated suspended ceiling system shall not be used to laterally support the tops of gypsum board, masonry, or hollow clay tile partitions. Gypsum board partitions need not be evaluated where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.2.1)

Light Fixtures

C NC N/A — EMERGENCY LIGHTING: Emergency lighting shall be anchored or braced to prevent falling during an earthquake. (Tier 2: Sec. 4.8.3.1)

Cladding and Glazing

C NC N/A — CLADDING ANCHORS: Cladding components weighing more than 10 psf shall be mechanically anchored to the exterior wall framing at a spacing equal to or less than 4 feet. A spacing of up to 6 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.1)

C NC N/A — DETERIORATION: There shall be no evidence of deterioration, damage or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.4.2)

C NC N/A — CLADDING ISOLATION: For moment frame buildings of steel or concrete, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.3)

C NC N/A — MULTI-STORY PANELS: For multi-story panels attached at each floor level, panel connections shall be detailed to accommodate a story drift ratio of 0.02. Panel connection detailing for a story drift ratio of 0.01 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.4)

C NC N/A — BEARING CONNECTIONS: Where bearing connections are required, there shall be a minimum of two bearing connections for each wall panel. (Tier 2: Sec. 4.8.4.5)

C NC N/A INSERTS: Where inserts are used in concrete connections, the inserts shall be anchored to reinforcing steel or other positive anchorage. (Tier 2: Sec. 4.8.4.6)

C NC N/A PANEL CONNECTIONS: Exterior cladding panels shall be anchored out-of-plane with a minimum of 4 connections for each wall panel. Two connections per wall panel are permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.4.7)

Masonry Veneer

C NC N/A SHELF ANGLES: Masonry veneer shall be supported by shelf angles or other elements at each floor 30 feet or more above ground for Life Safety and at each floor above the first floor for Immediate Occupancy. (Tier 2: Sec. 4.8.5.1)

C NC N/A TIES: Masonry veneer shall be connected to the back-up with corrosion-resistant ties. The ties shall have a spacing equal to or less than 24 inches with a minimum of one tie for every 2-2/3 square feet. A spacing of up to 36 inches is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.5.2)

C NC N/A WEAKENED PLANES: Masonry veneer shall be anchored to the back-up adjacent to weakened planes, such as at the locations of flashing. (Tier 2: Sec. 4.8.5.3)

C NC N/A DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the connection elements. (Tier 2: Sec. 4.8.5.4)

Parapets, Cornices, Ornamentation, and Appendages

C NC N/A URM PARAPETS: There shall be no laterally unsupported unreinforced masonry parapets or cornices with height-to-thickness ratios greater than 1.5. A height-to-thickness ratio of up to 2.5 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.1)

C NC N/A CANOPIES: Canopies located at building exits shall be anchored to the structural framing at a spacing of 6 feet or less. An anchorage spacing of up to 10 feet is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.8.2)

Masonry Chimneys

C NC N/A URM CHIMNEYS: No unreinforced masonry chimney shall extend above the roof surface more than twice the least dimension of the chimney. A height above the roof surface of up to three times the least dimension of the chimney is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.9.1)

Stairs

C NC N/A URM WALLS: Walls around stair enclosures shall not consist of unbraced hollow clay tile or unreinforced masonry with a height-to-thickness ratio greater than 12-to-1. A height-to-thickness ratio of up to 15-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.10.1)

C NC N/A STAIR DETAILS: In moment frame structures, the connection between the stairs and the structure shall not rely on shallow anchors in concrete. Alternatively, the stair details shall be capable of accommodating the drift calculated using the Quick Check procedure of Section 3.5.3.1 without including tension in the anchors. (Tier 2: Sec. 4.8.10.2)

Building Contents and Furnishing

C NC N/A — TALL NARROW CONTENTS: Contents over 4 feet in height with a height-to-depth or height-to-width ratio greater than 3-to-1 shall be anchored to the floor slab or adjacent structural walls. A height-to-depth or height-to-width ratio of up to 4-to-1 is permitted where only the Basic Nonstructural Component Checklist is required by Table 3-2. (Tier 2: Sec. 4.8.11.1)

Mechanical and Electrical Equipment

C NC N/A — EMERGENCY POWER: Equipment used as part of an emergency power system shall be mounted to maintain continued operation after an earthquake. (Tier 2: Sec. 4.8.12.1)

C NC N/A — HAZARDOUS MATERIAL EQUIPMENT: HVAC or other equipment containing hazardous material shall not have damaged supply lines or unbraced isolation supports. (Tier 2: Sec. 4.8.12.2)

C NC N/A — DETERIORATION: There shall be no evidence of deterioration, damage, or corrosion in any of the anchorage or supports of mechanical or electrical equipment. (Tier 2: Sec. 4.8.12.3)

C NC N/A — ATTACHED EQUIPMENT: Equipment weighing over 20 lb that is attached to ceilings, walls, or other supports 4 feet above the floor level shall be braced. (Tier 2: Sec. 4.8.12.4)

Piping

C NC N/A — FIRE SUPPRESSION PIPING: Fire suppression piping shall be anchored and braced in accordance with NFPA-13 (NFPA, 1996). (Tier 2: Sec. 4.8.13.1)

C NC N/A — FLEXIBLE COUPLINGS: Fluid, gas, and fire suppression piping shall have flexible couplings. (Tier 2: Sec. 4.8.13.2)

Hazardous Materials Storage and Distribution

C NC N/A — TOXIC SUBSTANCES: Toxic and hazardous substances stored in breakable containers shall be restrained from falling by latched doors, shelf lips, wires, or other methods. (Tier 2: Sec. 4.8.15.1)

3.9.2 Intermediate Nonstructural Component Checklist

This Intermediate Nonstructural Component Checklist shall be completed where required by Table 3-2. The Basic Nonstructural Component Checklist shall be completed prior to completing this Intermediate Nonstructural Component Checklist.

Ceiling Systems

C NC (N/A) LAY-IN TILES: Lay-in tiles used in ceiling panels located at exits and corridors shall be secured with clips. (Tier 2: Sec. 4.8.2.2)

C NC (N/A) INTEGRATED CEILINGS: Integrated suspended ceilings at exits and corridors or weighing more than 2 pounds per square foot shall be laterally restrained with a minimum of four diagonal wires or rigid members attached to the structure above at a spacing equal to or less than 12 feet. (Tier 2: Sec. 4.8.2.3)

C NC (N/A) SUSPENDED LATH AND PLASTER: Ceilings consisting of suspended lath and plaster or gypsum board shall be attached to resist seismic forces for every 12 square feet of area. (Tier 2: Sec. 4.8.2.4)

Light Fixtures

C NC (N/A) INDEPENDENT SUPPORT: Light fixtures in suspended grid ceilings shall be supported independently of the ceiling suspension system by a minimum of two wires at diagonally opposite corners of the fixtures. (Tier 2: Sec. 4.8.3.2)

Cladding and Glazing

C (NC) N/A GLAZING: Glazing in curtain walls and individual panes over 16 square feet in area, located up to a height of 10 feet above an exterior walking surface, shall have safety glazing. Such glazing located over 10 feet above an exterior walking surface shall be laminated annealed or laminated heat-strengthened safety glass or other glazing system that will remain in the frame when glass is cracked. (Tier 2: Sec. 4.8.4.8)

Parapets, Cornices, Ornamentation, and Appendages

C NC (N/A) CONCRETE PARAPETS: Concrete parapets with height-to-thickness ratios greater than 2.5 shall have vertical reinforcement. (Tier 2: Sec. 4.8.8.3)

C NC (N/A) APPENDAGES: Cornices, parapets, signs, and other appendages that extend above the highest point of anchorage to the structure or cantilever from exterior wall faces and other exterior wall ornamentation shall be reinforced and anchored to the structural system at a spacing equal to or less than 10 feet for Life Safety and 6 feet for Immediate Occupancy. This requirement need not apply to parapets or cornices compliant with Section 4.8.8.1 or 4.8.8.3. (Tier 2: Sec. 4.8.8.4)

Masonry Chimneys

C NC (N/A) ANCHORAGE: Masonry chimneys shall be anchored at each floor level and the roof. (Tier 2: Sec. 4.8.9.2)

Mechanical and Electrical Equipment

C NC (N/A) VIBRATION ISOLATORS: Equipment mounted on vibration isolators shall be equipped with restraints or snubbers. (Tier 2: Sec. 4.8.12.5)

Ducts

C NC (N/A) STAIR AND SMOKE DUCTS: Stair pressurization and smoke control ducts shall be braced and shall have flexible connections at seismic joints. (Tier 2: Sec. 4.8.14.1)

3.8 Geologic Site Hazards and Foundations Checklist

This Geologic Site Hazards and Foundations Checklist shall be completed where required by Table 3-2.

Each of the evaluation statements on this checklist shall be marked Compliant (C), Non-compliant (NC), or Not Applicable (N/A) for a Tier 1 Evaluation. Compliant statements identify issues that are acceptable according to the criteria of this standard, while non-compliant statements identify issues that require further investigation. Certain statements may not apply to the buildings being evaluated. For non-compliant evaluation statements, the design professional may choose to conduct further investigation using the corresponding Tier 2 Evaluation procedure; corresponding section numbers are in parentheses following each evaluation statement.

Geologic Site Hazards

The following statements shall be completed for buildings in levels of high or moderate seismicity.

C NC N/A LIQUEFACTION: Liquefaction-susceptible, saturated, loose granular soils that could jeopardize the building's seismic performance shall not exist in the foundation soils at depths within 50 feet under the building for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.1.1)

C NC N/A SLOPE FAILURE: The building site shall be sufficiently remote from potential earthquake-induced slope failures or rockfalls to be unaffected by such failures or shall be capable of accommodating any predicted movements without failure. (Tier 2: Sec. 4.7.1.2)

C NC N/A SURFACE FAULT RUPTURE: Surface fault rupture and surface displacement at the building site is not anticipated. (Tier 2: Sec. 4.7.1.3)

Condition of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC N/A FOUNDATION PERFORMANCE: There shall be no evidence of excessive foundation movement such as settlement or heave that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.1)

The following statement shall be completed for buildings in levels of high or moderate seismicity being evaluated to the Immediate Occupancy Performance Level.

C NC N/A DETERIORATION: There shall not be evidence that foundation elements have deteriorated due to corrosion, sulfate attack, material breakdown, or other reasons in a manner that would affect the integrity or strength of the structure. (Tier 2: Sec. 4.7.2.2)

Capacity of Foundations

The following statement shall be completed for all Tier 1 building evaluations.

C NC N/A POLE FOUNDATIONS: Pole foundations shall have a minimum embedment depth of 4 feet for Life Safety and Immediate Occupancy. (Tier 2: Sec. 4.7.3.1)

The following statements shall be completed for buildings in levels of moderate seismicity being evaluated to the Immediate Occupancy Performance Level and for buildings in levels of high seismicity.

C NC N/A OVERTURNING: The ratio of the horizontal dimension of the lateral-force-resisting system at the foundation level to the building height (base/height) shall be greater than $0.6S_a$. (Tier 2: Sec. 4.7.3.2)

C NC N/A — TIES BETWEEN FOUNDATION ELEMENTS: The foundation shall have ties adequate to resist seismic forces where footings, piles, and piers are not restrained by beams, slabs, or soils classified as Class A, B, or C. (Section 3.5.2.3.1, Tier 2: Sec. 4.7.3.3)

C NC N/A — DEEP FOUNDATIONS: Piles and piers shall be capable of transferring the lateral forces between the structure and the soil. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.4)

C NC N/A — SLOPING SITES: The difference in foundation embedment depth from one side of the building to another shall not exceed one story in height. This statement shall apply to the Immediate Occupancy Performance Level only. (Tier 2: Sec. 4.7.3.5)

Appendix C: Construction Cost Estimate Worksheets

ENGINEER'S OPINION OF PROBABLE COST -
TOLEDO POOL RETROFIT

Description	Quanity	Units	Unit Price	Total Price for Construction Item
Construction				
General Conditions	1	LS	$38,000.00	**$38,000.00**
Main Pool Building				
Remove & Replace Roofing Mat'l & Insulation	6,081	SF	$13.50	**$82,093.50**
Remove & Replace Deteriorated Roof Sheathing	664	SF	$8.00	**$5,312.00**
Install Steel Post-CMU Infill Connection	240	LF	$30.00	**$7,200.00**
Install Steel Beam at Exist. CMU Infill Walls	160	LF	$30.00	**$4,800.00**
Remove Existing CMU Infill Walls/Wood Infill Walls	2,567	SF	$10.00	**$25,670.00**
Install New CMU Shear Walls	2,567	SF	$30.00	**$77,010.00**
Refurbish Deteriorated Wide-Flange Post Bases	12	EA	$500.00	**$6,000.00**
Reinforce Roof Beams	6	EA	$5,000.00	**$30,000.00**
Observation Area				
Remove and Replace Roofing Mat'l & Insulation	786	SF	$13.50	**$10,611.00**
Remove and Replace Roof Sheathing	786	SF	$8.00	**$6,288.00**
Install Shear Wall-Roof Diaphragm Connection	84		$40.00	**$3,360.00**
Upgrade Main Pool Building-Roof Diaphragm Connection	56	LF	$60.00	**$3,360.00**
Bathhouse Area				
Remove and Replace Roofing and Insulation	2,673	SF	$15.00	**$40,095.00**
Install Plywood Roof Sheathing over Straight Sheathing	2,673	SF	$5.00	**$13,365.00**
Install Main Pool Building-Roof Diaphragm Connection	53	LF	$60.00	**$3,180.00**
Misc. MEP	1	LS	$50,000.00	**$50,000.00**
Relocation/Storage	1	LS	$15,000.00	**$15,000.00**
			Construction Subtotal	**$421,344.50**
Associated Design Level Project Costs				
Design/Permitting/Construction Administration Cost				**$84,268.90**
			Design Level Subtotal	**$84,268.90**
			Bonding and Insurance	**$15,168.40**
			Profit & Overhead	**$30,336.80**
			Total Rehabilitaion Cost	**$551,118.61**

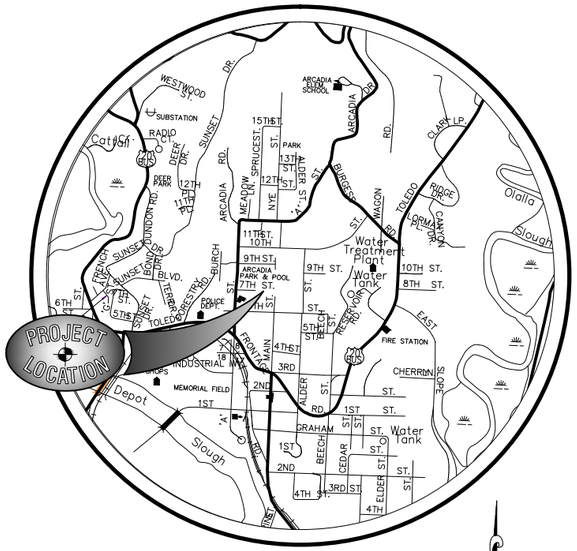
Appendix D: Schematic Structural Retrofit Drawings

TOLEDO POOL FACILITY

SCHEMATIC STRUCTURAL RETROFIT PLAN

NW 7TH STREET, TOLEDO, OREGON

1 S0.0 **TOLEDO POOL NORTH ELEVATION**
NTS



2 S0.0 **VICINITY MAP**
NTS

SHEET INDEX

IF THIS BAR DOES NOT MEASURE 1-INCH IN LENGTH, THEN THE DRAWING IS NOT TO SCALE

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TOLEDO POOL FACILITY
STRUCTURAL RETROFIT PLAN
NW 7TH STREET, TOLEDO, OREGON

ZCS ENGINEERING
ZIMMEN • CARTER • SOUDERS
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ph (541) 479-3865 fax (541) 479-3870

PROJECT NO:	G-0698-14
DRAWN:	BAS
CHECKED:	SEA
DATE:	10-21-14

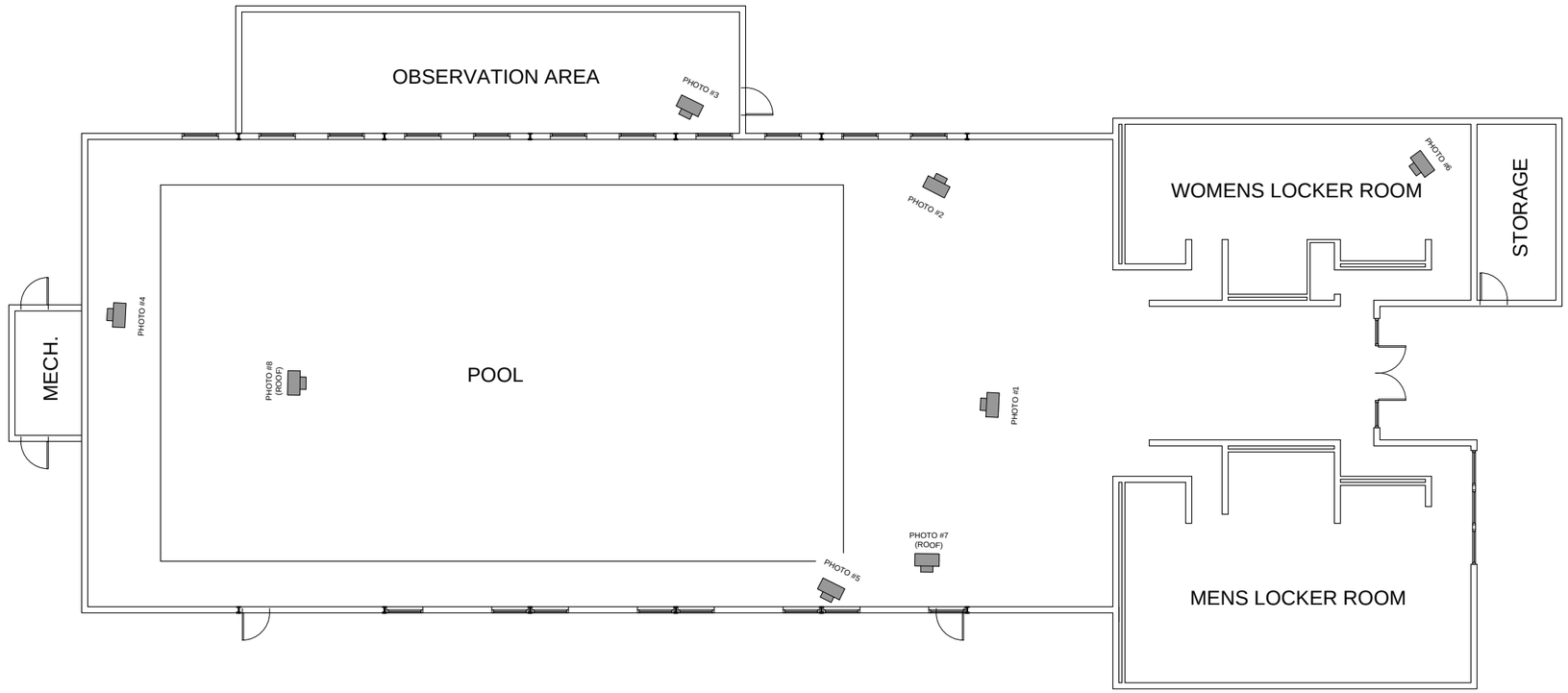
REGISTERED PROFESSIONAL ENGINEER
OREGON
JULY 19, 2006
S. E. ALLEN
EXPIRES: 12-31-15

PRELIMINARY - NOT FOR CONSTRUCTION

COVER SHEET

S0.0

NOT FOR CONSTRUCTION



1 / S0.1 **FLOOR PLAN**
1/8" = 1'-0"

IF THIS BAR DOES NOT MEASURE
1-INCH IN LENGTH, THEN THE
DRAWING IS NOT TO SCALE

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EXPIRES: 12-31-15

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FLOOR PLAN

S0.1

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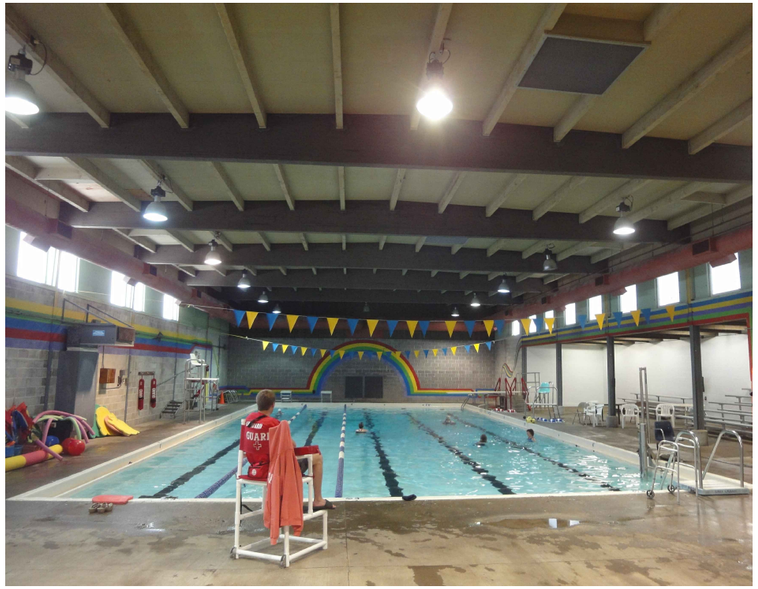

1 S0.2 **PHOTO #1**
MAIN POOL BUILDING FACING NORTH
NTS

2 S0.2 **PHOTO #2**
ROOF BEAM - POST CONNECTION
NTS

3 S0.2 **PHOTO #3**
OBSERVATION AREA CONNECTION
NTS

4 S0.2 **PHOTO #4**
CRACKING OF NORTH END WALL
NTS

IF THIS BAR DOES NOT MEASURE 1-INCH IN LENGTH, THEN THE DRAWING IS NOT TO SCALE

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EXISTING CONDITION PHOTOS

S0.2

NOT FOR CONSTRUCTION

1 S0.3 **PHOTO #5**
DETERIORATION OF STEEL POST BASES
NTS

2 S0.3 **PHOTO #6**
BATHHOUSE ROOF BEAMS & DECKING
NTS

3 S0.3 **PHOTO #7**
DETERIORATION OF ROOF SHEATHING
NTS

3 S0.3 **PHOTO #8**
MAIN POOL BUILDING ROOF
NTS

IF THIS BAR DOES NOT MEASURE 1-INCH IN LENGTH, THEN THE DRAWING IS NOT TO SCALE

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EXISTING CONDITION PHOTOS

S0.3

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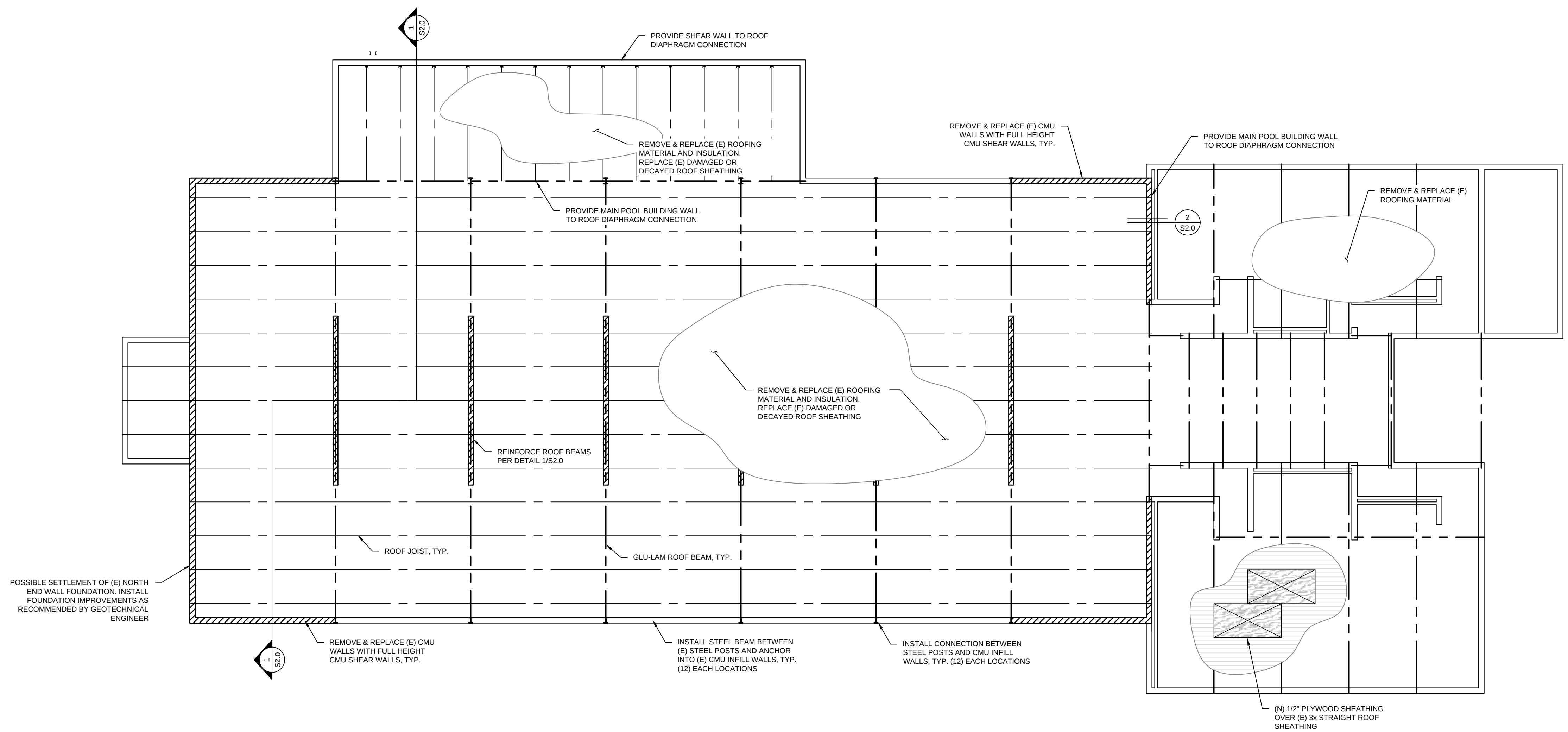

1 S1.0 **STRUCTURAL RETROFIT PLAN**
1/8" = 1'-0"

PROJECT NARRATIVE

THE INTENT OF THESE DRAWINGS IS TO ILLUSTRATE THE LEVEL OF UNDERSTANDING THE ENGINEER HAS WITH REGARDS TO THE EFFORT THAT WILL BE REQUIRED TO STRUCTURALLY REHABILITATE THE BUILDING. THESE SCHEMATIC DRAWINGS HAVE BEEN PREPARED USING THE CURRENT OREGON STRUCTURAL SPECIALTY CODE (OSSC) AND THE ASCE 41 (SEISMIC REHABILITATION OF EXISTING BUILDINGS) AS REFERENCE FOR PRESCRIBED LOADING AND BUILDING PERFORMANCE LEVEL RATINGS.

THE DRAWING ILLUSTRATES BOTH EXISTING CONDITIONS AND GENERAL REPAIRS THAT WOULD NEED TO BE ACCOMPLISHED TO REACH AN ACCEPTABLE LEVEL OF PERFORMANCE (LIFE SAFETY) ACCORDING TO CURRENT CODE. THE FOLLOWING ARE A LIST OF DEFICIENCIES DETERMINED DURING SITE INVESTIGATION AND PLAN REVIEW:

MAIN POOL BUILDING

- MAIN POOL BUILDING ROOF BEAMS ARE 50% OVERSTRESSED DURING CURRENT CODE LOADING CONDITIONS
- PERIMETER CMU WALLS DO NOT PROVIDE ADEQUATE SHEAR CAPACITY
- ROOF DIAPHRAGM SHEAR CAPACITY INADEQUATE TO TRANSFER LATERAL LOADS TO END WALLS IN TRANSVERSE DIRECTION
- DETERIORATION OF ROOF SHEATHING AT ROOF DIAPHRAGM PERIMETER (FIGURE 8)
- DETERIORATION OF WIDE-FLANGE POST BASES AT GROUND-LINE INSIDE THE BUILDING (FIGURE 6)
- LACK OF CONNECTION BETWEEN ROOF DIAPHRAGM AND CMU INFILL WALLS (SHEAR WALLS). CURRENTLY SEPARATED BY WEAK WOOD WALL FRAMING WITH TRANSOM WINDOWS
- INSUFFICIENT CONNECTION BETWEEN WIDE-FLANGE POSTS AND CMU INFILL WALLS TO ENSURE ELEMENTS ACT AS A SINGLE UNIT DURING LATERAL FORCE APPLICATION, ALSO ALLOWING THE WALLS TO FALL AWAY OR INTO THE FACILITY
- CRACKING OF EXISTING CMU WALL AT NORTH END DUE TO LACK OF REINFORCEMENT STEEL AND SUSPECT SUBGRADE (FIGURE 5)

OBSERVATION AREA STRUCTURE

- POTENTIAL DETERIORATION OF ROOF SHEATHING (BASED ON DETERIORATION OF MAIN BUILDING ROOF SHEATHING)
- INSUFFICIENT CONNECTION BETWEEN ROOF DIAPHRAGM AND CMU SHEAR WALLS
- DETERIORATION OF STRUCTURAL WOOD FRAMING AT MAIN POOL BUILDING ROOF CONNECTION (FIGURE 4)

BATHHOUSE BUILDING

- ROOF DIAPHRAGM SHEAR CAPACITY INADEQUATE DUE TO STRAIGHT SHEATHING (FIGURE 7)
- INSUFFICIENT CONNECTION BETWEEN ROOF AND MAIN POOL BUILDING SOUTH WALL TO RESIST POUNDING ACTION BETWEEN STRUCTURES

IF THIS BAR DOES NOT MEASURE 1-INCH IN LENGTH, THEN THE DRAWING IS NOT TO SCALE

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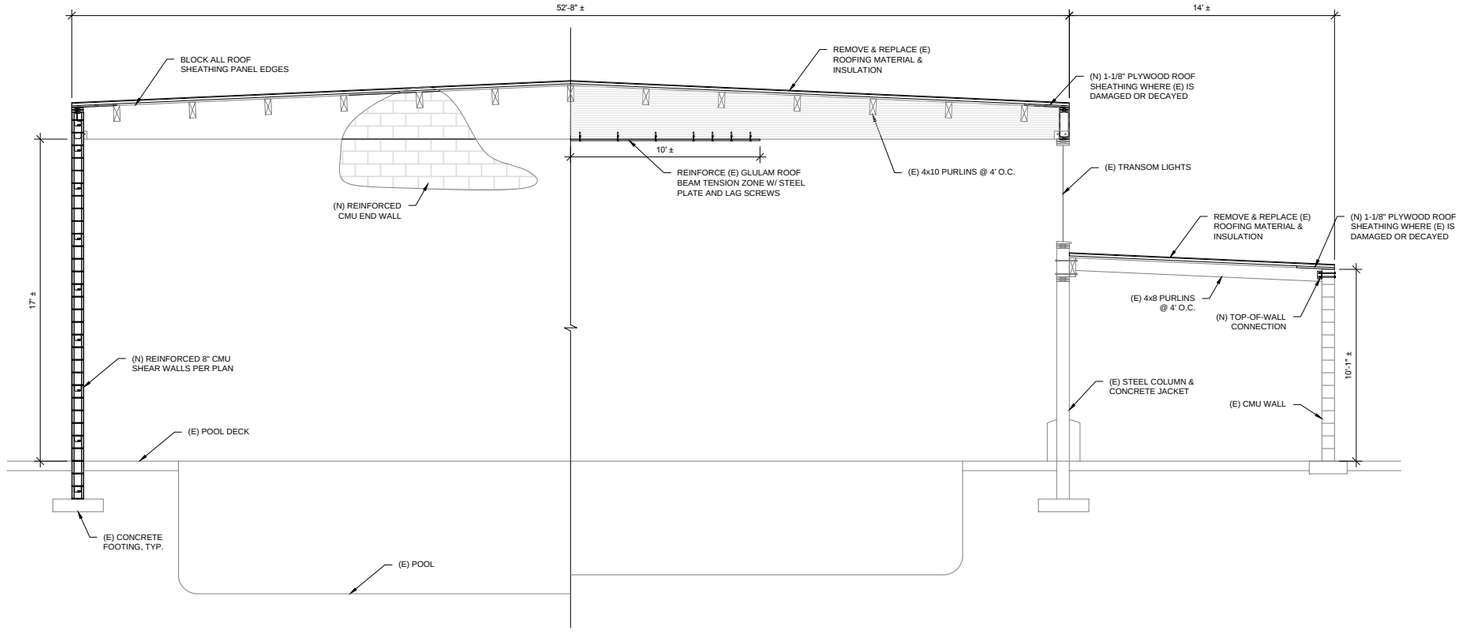
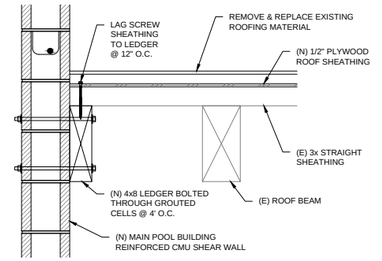
BUILDING "A" PLAN

S1.0

NOT FOR CONSTRUCTION



1 S2.0 **TYPICAL SECTION**
1/4" = 1'-0"



2 S2.0 **BATHHOUSE ROOF CONNECTION TO MAIN POOL BUILDING WALL**
1" = 1'-0"

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S. E. ALLEN
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SECTION & DETAIL

S2.0

NOT FOR CONSTRUCTION