



CITY OF PORTLAND, OREGON - BUREAU OF DEVELOPMENT SERVICES

1900 SW Fourth Avenue, Suite 5000 • Portland, Oregon 97201 • www.portlandonline.com/bds • Fax 503-823-7425



Facility Permit Plan Intake Form

FOR INTAKE, STAFF USE ONLY		Building/Mechanical	City of Portland VIEWED FOR CODE COMPLIANCE FEB 21 2017 Permit Number	Jeff R
Date Received	2/13	Electrical		
Building Registration #		Plumbing		
Fixed Bid		Fire		Jeff G
Bin #	B1	Planning		
Building Permit #	16-266503 DFS 01 FA	BES		
Mechanical #		PDOT		
Plumbing Permit #		Structural		Eric
Electrical Permit #		Other		

APPLICANT: Complete all sections below that apply to the project. Please print legibly.

Print Name PATRICK VALDEFIERA Sign Name [Signature]
Street Address 424 NW 14th AVE
City PORTLAND State OR Zip Code 97209
Day Phone 503-349-2464 FAX email patrick.valdefiera@jedunn.com

Plans / permits available for pick up at 1900 SW 4th Avenue, 2nd floor between 8:00 am to 5:00 pm

Contact Name for plan/permit pick up PATRICK VALDEFIERA
Day Phone 503-349-2464 email patrick.valdefiera@jedunn.com

Project Building Name / # LEGACY EMANUEL X-RAY REMODEL, #16-266503 - FA
Project Address or Location 2801 N. GANTENBEIN AVE, PORTLAND, OR 97227
Project Name and Description LE X-RAY REMODEL, REMODEL OF EXISTING 1,043 SQ FT X-RAY ROOM ADD (FINISHES, STRUCTURAL COLUMN UPGRADES, RE-LAYOUT) DFS-FRP
Total Project Value \$475,365 Project Reference #/Billing ID #
Building Contractor JE DUNN CONSTRUCTION CCB #
Mechanical Contractor TOTAL MECHANICAL CCB #
Electrical Contractor CHRISTENSEN ELECTRICAL CCB# License #
Plumbing Contractor TOTAL MECHANICAL CCB# License #

☐ **Building Permit**
No. of Stories [Y] [N] Alarms Required
Const. Type [Y] [N] Smoke Det. Req'd
[Y] [N] Sprinklers Req'd
[Y] [N] Struct. Eng / Calcs Submitted

☐ **Mechanical Permit**
Mechanical Valuation
Description

☐ **Electrical Permit**
Please provide a completed standard electrical permit application form. You may mail or deliver it to 1900 SW 4th Avenue, Portland, Oregon 97201 or FAX to 503-823-7425.

☐ **Plumbing Permit**
Number of Fixtures
Back Flow Devices
Water Service (# of Feet)
Medical Gas
Other



J.E. Dunn Construction Company
1001 Locust St
Kansas City MO 64106

TRANSMITTAL
No 023123-00025

PROJECT: Legacy Emanuel First Floor ED X-Ray Remodel

DATE: 02/08/2017

TO: JRJ ARCHITECTS LLC
15455 NW GREENBRIAR PKWY STE
260
BEAVERTON OR 97006

RE: CON-001R1-Revised CFRP Package

ATTN: Scott Harris

JOB: 16086700

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Review and Comment	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	SENT VIA:	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached <input type="checkbox"/> Separate Cover	<input type="checkbox"/> Returned for Corrections
<input checked="" type="checkbox"/> Other: Calculations		<input checked="" type="checkbox"/> Due Date: 02/10/2017
		<input type="checkbox"/> Other:

Line	Item	Package	Code	Rev.	Qty	Date	Description	Status
1	Submittal	CON-001R1	050000-001A	1	1	02/08/2017	CFRP Shop Drawings (stamped)	For Approval
2	Submittal	CON-001R1	050000-002A	1	1	02/08/2017	CFRP Calculations (stamped and revised).	For Approval

☒ REVIEWED ☐ MAKE CORRECTIONS NOTED
☐ REJECTED ☐ REVISE AND RESUBMIT

THIS REVIEW DOES NOT RELIEVE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING THEIR WORK WITH ALL OTHER TRADES, AND PERFORMING THEIR WORK IN A SAFE AND SATISFACTORY MANNER.

02/09/2017

MPC

DATE CATENA CONSULTING ENGINEERS BY

REMARKS:

CC:

Signed: _____
Patrick Valdefiera

Structural Calculations
for
Legacy Emanuel Hospital & Health Center X-Ray
Replacement Columns Strengthening
Located at
2801 N. Gantenbein Avenue
Portland, Oregon

Prepared For:
Contech Services, Inc.

Date: January 25, 2017
Revised February 7, 2017

Erickson Structural Job Number: 170101



ERICKSON STRUCTURAL
CONSULTING ENGINEERS, PC

10000 NE 7TH AVENUE, SUITE 130
VANCOUVER, WA 98685
360.571.5577 OFFICE
360.571.5578 FAX

STRUCTURAL CALCULATIONS

Legacy Emanuel Hospital & Health Center X-ray Replacement Columns
Strengthening
located
at
2801 N. Gantenbein Avenue
Portland, Oregon
for

Contech Services, Inc.

January 25, 2017
Revised February 7, 2017

ALL COMPUTATIONS AND STRUCTURAL ENGINEERING FOR THIS PROJECT
HAVE BEEN PERFORMED BY MYSELF OR UNDER MY DIRECT SUPERVISION.





SUBJECT: Structural Calculations	DATE: January 25, 2017
PROJECT NAME: Legacy Emanuel Hospital & Health Center X-Ray	ENGINEER: AMC
PROJECT NUMBER: 170101	SHEET NUMBER: 1 OF 3

Legacy Health X-Ray Replacement *Column Shear Strengthening*

1.0 DESIGN GOAL

Provide additional shear capacity to columns as per design information provided on Sheet S1.2 and Sheet S6.10, Detail 1 on the drawings by JRJ architects, dated 10-17-2016. For the current phase of work, only the two columns at Grid E/4 & F/4 are being strengthened. Zone A (the top and bottom 30" of the column) requires 50 kips of additional shear capacity and Zone B (the middle 6'-8" section of the column) requires 88 kips of additional shear capacity.

2.0 GENERAL NOTES AND ASSUMPTIONS

1. Unless otherwise noted, design equations follow the recommendations of ACI 440.2R-08.
2. Existing concrete strength is 4 ksi as per 1/S6.10 of the project drawing.
3. The design shall account for holes in the FRP, no more than 1% of the area of FRP, per 1/S6.10 of the project drawings.
4. Existing rebar is 60 ksi as per 1/S6.10 of the project drawings.

3.0 PROPERTIES OF THE TYFO SCH-41 CARBON COMPOSITE SYSTEM

Ultimate properties

$$f_{fu}^* = 121 \text{ ksi} \quad \text{ultimate tensile stress}$$

$$\epsilon_{fu}^* = 0.0085 \frac{\text{in}}{\text{in}} \quad \text{ultimate rupture strain}$$

Reduction factors

$$C_E = 0.95 \quad \text{environmental reduction factor for carbon fiber (table 9.1)}$$

Design properties

$$f_{fu} = C_E \cdot f_{fu}^* = 114.9 \text{ ksi} \quad \text{design ultimate tensile stress (eq. 9-3)}$$

$$\epsilon_{fu} = C_E \cdot \epsilon_{fu}^* = 0.0081 \quad \text{design rupture strain (eq. 9-4)}$$


$$E_f = \frac{f_{fu}}{\epsilon_{fu}} = 14235 \text{ ksi} \quad \text{tensile modulus of elasticity (eq. 9-5)}$$

A more conservative modulus is used in design

$$E_f = 11900 \text{ ksi} \quad \text{conservative design modulus of elasticity}$$

$$t_f = 0.04 \text{ in} \quad \text{thickness per layer}$$



SUBJECT: Structural Calculations	DATE: January 25, 2017 Revised February 7, 2017 
PROJECT NAME: Legacy Emanuel Hospital & Health Center X-Ray	ENGINEER: AMC
PROJECT NUMBER: 170101	SHEET NUMBER: 2 OF 3

4.0 EXISTING SECTION PROPERTIES

$$f_c = 4000 \text{ psi}$$

specified concrete compressive strength

$$b = 24 \text{ in}$$

column width

$$h = 24 \text{ in}$$

column depth

5.0 SHEAR STRENGTHENING CALCULATIONS

$$\psi_f = 0.95$$

additional reduction factor (full wrap - table 11-1)

$$w_f = 24 \text{ in}$$

width of FRP

$$n = 1$$

number of layers

$$d_f = h = 24 \text{ in}$$

effective FRP depth

The effective strain in the FRP is taken as the lesser value of 0.004 or 75% of the ultimate fiber strain

$$\epsilon_{fe} = \min(0.004, 0.75 \cdot \epsilon_{fu}) = 0.004$$

effective FRP strain (eq. 11-6a)

Shear capacity of FRP

Calculations for Zone A

$$s_f = 24 \text{ in}$$

spacing of FRP (full coverage)

$$A_{fv} = 2 \cdot n \cdot t_f \cdot w_f = 1.9 \text{ in}^2$$

area of shear FRP (eq. 11-4)

$$f_{fe} = \epsilon_{fe} \cdot E_f = 47.6 \text{ ksi}$$

effective FRP stress (eq. 11-5)

$$V_f = \frac{A_{fv} \cdot f_{fe} \cdot d_f}{s_f} = 91.4 \text{ kip}$$

nominal shear capacity of FRP (eq. 11-3)

Shear capacity of frp

$$\phi = 0.60$$

shear strength reduction factor (ACI 318 section 9.3)

$$\phi V_n = \phi \cdot \psi_f \cdot V_f = 52.1 \text{ kip}$$


factored shear strength provided by frp



One layer of Tyfo SCH 41 provides greater than the required 50 kips of additional shear capacity in Zone A.

A steel collar is to be installed by others at the top of the column in Zone A. This collar requires 1/4" anchors at 24" spacing. These anchors are to be installed such that the penetrations via fasteners are no more than 1% of the area of applied FRP. The FRP design provides 30% greater capacity than is required so the FRP will still provide sufficient capacity even with fiber interruptions due to the anchors.



SUBJECT: Structural Calculations	DATE: January 25, 2017 Revised February 7, 2017 
PROJECT NAME: Legacy Emanuel Hospital & Health Center X-Ray	ENGINEER: AMC
PROJECT NUMBER: 170101	SHEET NUMBER: 3 OF 3

Calculations for Zone B

$$n = 2$$

number of layers

$$A_{fv} = 2 \cdot n \cdot t_f \cdot w_f = 3.8 \text{ in}^2$$

area of shear FRP (eq. 11-4)

$$f_{fe} = \epsilon_{fe} \cdot E_f = 47.6 \text{ ksi}$$

effective FRP stress (eq. 11-5)

$$V_f = \frac{A_{fv} \cdot f_{fe} \cdot d_f}{s_f} = 182.8 \text{ kip}$$

nominal shear capacity of FRP (eq. 11-3)

Shear capacity of frp

$$\phi = 0.60$$

shear strength reduction factor (ACI 318 section 9.3)

$$\phi V_n = \phi \cdot \psi_f \cdot V_f = 104.2 \text{ kip}$$

factored shear strength provided by frp



Two layers of Tyfo SCH 41 provides greater than the required 88 kips of additional shear capacity in Zone B.

6.0 CONCLUSION

Install one layer of the Tyfo SCH 41 System with primary fibers horizontal in Zone A and 2 layer of the Tyfo SCH 41 System with primary fibers horizontal in Zone B.

7.0 REFERENCES

1. ACI 440.2 R-08, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.
2. ACI 318-11, Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary.

Tyfo[®] SCH-41 Composite

using Tyfo[®] S Epoxy

DESCRIPTION

The Tyfo[®] SCH-41 Composite is comprised of Tyfo[®] S Epoxy and Tyfo[®] SCH-41 reinforcing fabric, which is NSF-Certified. Tyfo[®] SCH-41 is a custom, uni-directional carbon fabric orientated in the 0° direction. The Tyfo[®] S Epoxy is a two-component epoxy matrix.

USE

Tyfo[®] SCH-41 Fabric is combined with Tyfo[®] Epoxy to add strength to bridges, buildings, and other structures.

ADVANTAGES

- ICC-ES ESR-2103 listed product
- Component of UL listed, fire-rated assembly
- NSF/ANSI Standard 61 listed product for drinking water systems
- Improved long-term durability
- Good high & low temperature properties
- Long working time
- High tensile modulus and strength
- Ambient cure
- 100% solvent-free
- Rolls can be cut to desired widths prior to shipping

COVERAGE

Approximately 600 sq. ft. surface area with 3 to 4 units of Tyfo[®] S Epoxy and 1 roll of Tyfo[®] SCH-41 Fabric when used with the Tyfo[®] Saturator.

PACKAGING

Order Tyfo[®] S Epoxy in 55-gallon (208L) drums or pre-measured units in 5-gallon (19L) containers. Tyfo[®] SCH-41 Fabric typically shipped in 24" x 300 lineal foot (0.6m x 91.4m) rolls. Typically ships in 12" x 13" x 27" (305mm x 330mm x 686mm) boxes.

EPOXY MIX RATIO

100.0 component A to 42.0 component B by volume. (100 component A to 34.5 component B by weight.)

SHELF LIFE

Epoxy - two years in original, unopened and properly stored containers.
 Fabric - ten years in proper storage conditions.

STORAGE CONDITIONS

Store epoxy at 40° to 90° F (4° to 32° C). Avoid freezing. Store rolls flat, not on ends, at temperatures below 100° F (38° C). Avoid moisture and water contamination.

CERTIFICATE OF COMPLIANCE

- Will be supplied upon request, complete with state and federal packaging laws with copy of labels used.
- Material safety data sheets will be supplied upon request.
- Possesses 0% V.O.C. level.

5/15 SCH-41

TYPICAL DRY FIBER PROPERTIES

PROPERTY	TYPICAL TEST VALUE
Tensile Strength	580,000 psi (4.0 GPa)
Tensile Modulus	33.4 x 10 ⁶ psi (230 GPa)
Ultimate Elongation	1.7%
Density	0.063 lbs./in. ³ (1.74 g/cm ³)
Minimum weight per sq. yd.	19 oz. (644 g/m ²)

COMPOSITE GROSS LAMINATE PROPERTIES

PROPERTY	ASTM METHOD	TYPICAL TEST VALUE	DESIGN VALUE*
Ultimate Tensile Strength in Primary Fiber Direction	D3039	143,000 psi (986 MPa) (5.7 kip/in. width)	121,000 psi (834 MPa) (4.8 kip/in. width)
Elongation at Break	D3039	1.0%	0.85%
Tensile Modulus	D3039	13.9 x 10 ⁶ psi (95.8 GPa)	11.9 x 10 ⁶ psi (82 GPa)
Flexural Strength	D790	17,900 psi (123.4 MPa)	15,200 psi (104.8 MPa)
Flexural Modulus	D790	452,000 psi (3.12 GPa)	384,200 psi (2.65 GPa)
Longitudinal Compressive Strength	D3410	50,000 psi (344.8 MPa)	42,500 psi (293 MPa)
Longitudinal Compressive Modulus	D3410	11.2 x 10 ⁶ psi (77.2 GPa)	9.5 x 10 ⁶ psi (65.5 GPa)
Longitudinal Coefficient of Thermal Expansion	D696	3.6 ppm./°F	
Transverse Coefficient of Thermal Expansion	D696	20.3 ppm./°F	
Nominal Laminate Thickness		0.04 in. (1.0mm)	0.04 in. (1.0mm)

* Gross laminate design properties based on ACI 440 suggested guidelines will vary slightly. Contact Fyfe Co. LLC engineers to confirm project specification values and design methodology.

EPOXY MATERIAL PROPERTIES

Curing Schedule 72 hours post cure at 140° F (60° C).		
PROPERTY	ASTM METHOD	TYPICAL TEST VALUE*
Tensile Strength ¹	D638 Type 1	10,500 psi (72.4 MPa)
Tensile Modulus	D638 Type 1	461,000 psi (3.18 GPa)
Elongation Percent	D638 Type 1	5.0%
Flexural Strength	D790	17,900 psi (123.4 MPa)
Flexural Modulus	D790	452,000 psi (3.12 GPa)
T _g	D4065	180° F (82° C)

¹ Testing temperature: 70° F (21° C) Crosshead speed: 0.5 in. (13mm)/min. Grips Instron 2716-0055 - 30 kips
 * Specification values can be provided upon request.

HOW TO USE THE TYFO® S COMPOSITE SYSTEM

DESIGN

The Tyfo® Fibrwrap® System shall be designed to meet specific design criteria. The criteria for each project is dictated by the engineer of record and any relevant building codes and/or guidelines. The design should be based on the allowable strain for each type of application and the design modulus of the material. The Fyfe Co. LLC engineering staff will provide preliminary design at no obligation.

INSTALLATION

Tyfo® System to be installed by Fyfe Co. LLC trained and certified applicators. Installation shall be in strict compliance with the Fyfe Co. LLC Quality Control Manual.

SURFACE PREPARATION

The required surface preparation is largely dependent on the type of element being strengthened. In general, the surface must be clean, dry and free of protrusions or cavities, which may cause voids behind the Tyfo® composite. Column surfaces that will receive continuous wraps typically require only a broom cleaning. Discontinuous wrapping surfaces (walls, beams, slabs, etc.) typically require a light sandblast, grinding or other approved methods to prepare for bonding. Sharp and chamfered corners will be rounded off by grinding or using thickened Tyfo® S epoxy (Tyfo® WS epoxy or approved repair mortar). At the time of application, the substrate shall not have any free moisture on it. If moisture cannot be avoided, the use of Tyfo® WP (Wet-Prime epoxy) is recommended. Tyfo® Fibrwrap® Anchors are incorporated in some designs. The Fyfe Co. LLC engineering staff will provide the proper specifications and details based on the project requirements.

MIXING

For pre-measured units in 5-gallon (19L) containers, pour the contents of component B into the pail of component A. For drums, premix each component: 100.0 parts of component A to 42.0 parts of component B by volume (100 parts of component A to 34.5 parts of component B by weight). Mix thoroughly for five minutes with a Tyfo® low speed mixer at 400-600 RPM until uniformly blended.

APPLICATION

Apply one prime coat of Tyfo® S Epoxy on the substrate by using a roller. Saturate the fabric by feeding it through the Tyfo® Saturator. Apply using the Tyfo® wrapping equipment or approved hand methods (See the Tyfo® Saturator Manual). Prior to the application of the saturated fabric, fill any uneven surface with thickened Tyfo® S epoxy. Saturate and apply subsequent layers of the fabric according to the Specifications and the Design Requirements. The use of a roller or hand pressure, ensure proper orientation of fibers, release or roll out entrapped air and ensure that each individual layer is firmly bedded and adhered to the preceding layer or substrate. Apply a final coat of thickened Tyfo® S Epoxy and detail all fabric edges, including butt splice, termination points and jacket edges. Please refer to the NSF Listing for the NSF-61 Listed Application.

PROTECTIVE COATINGS

In case of plaster final coating, apply sand by hand for better bonding surface while the final coat of epoxy is still tacky. In case of paint final coating, paint between 24 and 72 hours after final application of epoxy. If more than 72 hours after application, prepare the surface of the final coat of epoxy by light sandblast or hand sanding to slightly etch the surface.

LIMITATIONS

Application temperature of the epoxy is a minimum 40° F (4° C) and maximum of 100° F (38° C). DO NOT THIN, solvents will prevent proper cure.

FIELD QUALITY CONTROL

Record batch numbers for fabric and epoxy used each day and note locations of installations. Measure square feet of fabric and volume of epoxy used each day.

CAUTION!

COMPONENT A - Irritant:

Prolonged contact to the skin may cause irritation. Avoid eye contact.

COMPONENT B - Irritant:

Corrosive. Contact with skin may cause severe burns. Avoid eye contact. Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves recommended. Remove contaminated clothing. Avoid breathing vapors. Use adequate ventilation. Use of an organic vapor respirator recommended.

SAFETY PRECAUTIONS

Avoid breathing vapors. Avoid contact with eyes and skin. Use of an approved respirator with an organic absorption cartridge is recommended for possible vapors. Rubber gloves, rubber boots, and protective suits are recommended for handling and application of this material. Safety glasses or a face shield are recommended to prevent eye contact.

FIRST AID

In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately. For respiratory problems, remove to fresh air. Wash clothing before reuse.

CLEANUP

Collect with absorbent material, flush with water. Dispose of in accordance with local disposal regulations. Uncured material can be removed with approved solvent. Cured materials can only be removed mechanically.

SHIPPING LABELS CONTAIN

- State specification number with modifications, if applicable
- Component designation
- Type, if applicable
- Manufacturer's name
- Date of manufacture
- Batch name
- State lot number, if applicable
- Directions for use
- Warnings or precautions by law

**KEEP CONTAINER TIGHTLY CLOSED.
NOT FOR INTERNAL CONSUMPTION.
CONSULT MATERIAL SAFETY DATA SHEET
(MSDS) FOR MORE INFORMATION.
KEEP OUT OF REACH OF CHILDREN.
FOR INDUSTRIAL USE ONLY.**

Fyfe Co. LLC

Tyfo® Fibrwrap® Systems

3940 Ruffin Road, Suite C, San Diego, CA 92123

Tel: 858.642.0694 Fax: 858.444.2982

E-mail: info@fyfeco.com www.fyfeco.com

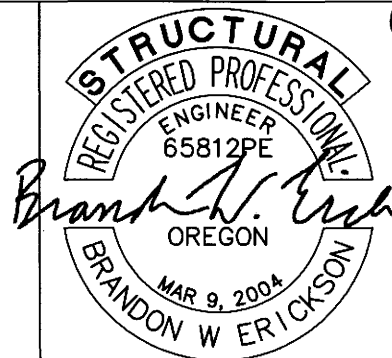
Statement of Responsibility: The technical information and application advice in this publication is based on the present state of our best scientific and practical knowledge. As the nature of the information herein is general, no assumption can be made as to the product's suitability for a particular use or application, and no warranty as to its accuracy, reliability or completeness, either expressed or implied, is given other than those required by State legislation. The owner, his representative or the contractor is responsible for checking the suitability of products for their intended use. Field service, where provided, does not constitute supervisory responsibility. Suggestions made by the Fyfe Co., either verbally or in writing, may be followed, modified or rejected by the owner, engineer or contractor since they, and not the Fyfe Co., are responsible for carrying out procedure appropriate to a specific application.

Legacy Emanuel Hospital And Health Center X-RAY Replacement

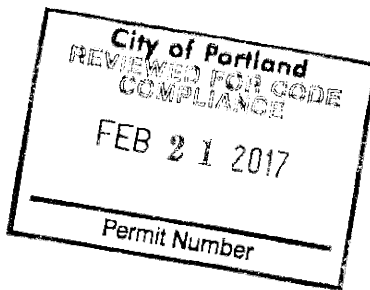
Column Strengthening
Portland, Oregon

Working Drawings For The Externally Bonded Fiber Reinforced Polymer (FRP) Strengthening System

JED 16086700
050000-001
01/26/17
JED 16086700
050000-001A
02/08/17



EXPIRES: 12-31-17



ERICKSON STRUCTURAL
CONSULTING ENGINEERS, PC
10000 NE 7TH AVE. • SUITE 130
VANCOUVER, WA • 98685
P • 360.571.5577 F • 360.571.5578
W • ERICKSONSTRUCTURAL.COM

CONTECH
CONTECH SERVICES, INC.

REVISION:

LEGACY EMANUEL
HOSPITAL AND HEALTH
CENTER X-RAY
REPLACEMENT COLUMN
STRENGTHENING

2801 N. Gantenbein Ave.
Portland, Oregon

Date: 01/25/2017
Drawn By: AMC
Checked By: BWE
Scale: AS SHOWN

Title: COVERSHEET

Sheet No.

CS

Erickson Structural Job No.

Structural Narrative:

THESE WORKING DRAWINGS HAVE BEEN PREPARED BASED UPON INFORMATION DEPICTED ON THE PROJECT DRAWINGS, PREPARED BY CATENA CONSULTING ENGINEERS, DATED OCTOBER 10, 2016.

THE FRP STRENGTHENING SYSTEM REFERENCED IN THESE WORKING DRAWINGS IS BASED UPON THE DESIGN LOADS SPECIFIED IN THE DRAWINGS PREPARED BY CATENA CONSULTING ENGINEERS, NOTED ABOVE AND UPON THE DESIGN PROPERTIES OF THE TYFO SCH-41 FRP SYSTEM.

Prepared for:

CONTECH
CONTECH SERVICES, INC.

CONTECH SERVICES, INC.
6917 NE 39TH COURT
VANCOUVER, WA 98661
OFFICE 503.223.9817
FAX 360.750.1377
CELL 503.880.6095

Prepared by:

ERICKSON STRUCTURAL
CONSULTING ENGINEERS, PC
10000 NE 7TH AVE. • SUITE 130
VANCOUVER, WA • 98685
P • 360.571.5577 F • 360.571.5578
W • ERICKSONSTRUCTURAL.COM

Contact: Amber Corsen, P.E.
amber@ericksonstructural.com

Drawing Index:

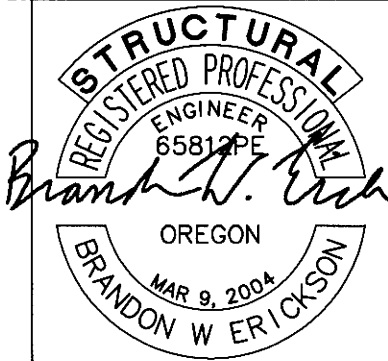
- CS COVERSHEET
1 GENERAL NOTES
2 PARTIAL FLOOR PLAN
3 PARTIAL COLUMN ELEVATION
4 FRP DETAIL

16-266503 DFS 01 FA

GENERAL NOTES:

1. MARK PERIMETER OF AREAS TO BE STRENGTHENED. THE PERIMETER LINE SHOULD EXTEND BEYOND THE EXACT LIMITS TO ENSURE THAT ALL REQUIRED AREAS ARE ROUGHENED.
2. PREPARE ALL SURFACES TO RECEIVE COMPOSITE STRENGTHENING BY GRINDING, SANDBLASTING OR OTHER APPROVED METHODS.
3. REMOVE DUST AND DEBRIS FROM SURFACES USING COMPRESSED AIR, BROOMS OR VACUUM.
4. CLEARLY MARK ALL LOCATIONS TO BE STRENGTHENED.
5. APPLY ONE PRIME COAT OF TYFO® S EPOXY TO ALL AREAS TO RECEIVE COMPOSITE STRENGTHENING.
6. APPLY PRIME COAT OF THICKENED TYFO® S EPOXY TO ALL UNEVEN SURFACES TO RECEIVE COMPOSITE STRENGTHENING.
7. IMMEDIATELY APPLY THE FIRST LAYER OF PRE-CUT AND PRE-SATURATED TYFO® FIBRWRAP® SYSTEM TO THE REQUIRED LOCATIONS AS DETAILED. MAINTAIN THE PROPER FIBER ORIENTATION ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.
8. INSTALL REMAINING LAYERS OF THE TYFO® FIBRWRAP® SYSTEM AS DETAILED.
9. FINISH ALL SEAMS AND EDGES WITH THICKENED TYFO® S EPOXY.
10. ALLOW APPROXIMATELY 12 HOURS (TIME MAY BE ADJUSTED BY THE ON SITE FIBRWRAP® TECHNICIAN) OF CURE TIME PRIOR TO FINISH COATING.
11. FINISH AS REQUIRED.
12. DESIGN LOADS SHOWN ARE PER ENGINEER OF RECORD (CATENA CONSULTING ENGINEERS).
13. DEPICTION OF EXISTING CONDITIONS IS DONE SO WITHOUT GUARANTEE OF ACCURACY. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND NOTIFY FRP SPECIALITY STRUCTURAL ENGINEER IF ITEMS IN FIELD DIFFER FROM WHAT IS SHOWN IN THE DRAWINGS.
14. NOTIFY ERICKSON STRUCTURAL CONSULTING ENGINEERS, PC OF DEVIATIONS BETWEEN STRUCTURAL CONDITIONS SHOWN IN THESE DOCUMENTS AND THOSE ENCOUNTERED IN THE FIELD.
15. ADDITIONAL EXISTING EQUIPMENT, OPENINGS AND SIMILAR CONDITIONS MAY NOT BE SHOWN FOR CLARITY. FIELD VERIFY.

JED 16086700
050000-001A
02/08/17
JED 16086700
050000-001
01/26/17



EXPIRES: 12-31-17

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CONSULTING ENGINEERS, PC
10000 NE 7TH AVE. • SUITE 130
VANCOUVER, WA • 98685
P • 360.571.5577 F • 360.571.5578
W • ERICKSONSTRUCTURAL.COM



REVISION:

LEGACY EMANUEL
HOSPITAL AND HEALTH
CENTER X-RAY
REPLACEMENT COLUMN
STRENGTHENING

2801 N. Gantenbein Ave.
Portland, Oregon

Date:	01/25/2017
Drawn By:	AMC
Checked By:	BWE
Scale:	AS SHOWN

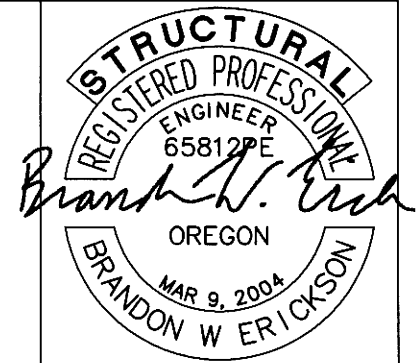
Title: GENERAL NOTES

Sheet No.

1

JED 16086700
050000-001A
02/08/17

JED 16086700
050000-001
01/26/17



EXPIRES: 12-31-17

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VANCOUVER, WA • 98685
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CONTECH SERVICES, INC.

REVISION:

LEGACY EMANUEL
HOSPITAL AND HEALTH
CENTER X-RAY
REPLACEMENT COLUMN
STRENGTHENING

2801 N. Gantenbein Ave.
Portland, Oregon

Date: 01/25/2017

Drawn By: AMC

Checked By: BWE

Scale: AS SHOWN

Title: PARTIAL FLOOR PLAN

Sheet No.

2

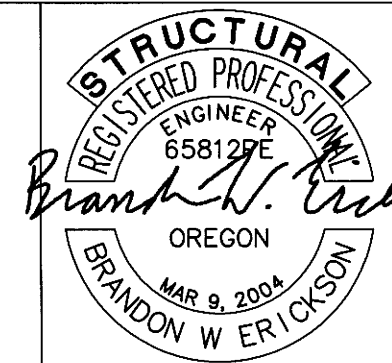
Erickson Structural Job No. 170101

EXISTING COLUMN TO BE
STRENGTHENED PER A/3

EXISTING COLUMN TO BE
STRENGTHENED PER A/3

EXISTING WALLS

A
2 PARTIAL FLOOR PLAN
1/4" = 1'-0"



EXPIRES: 12-31-17

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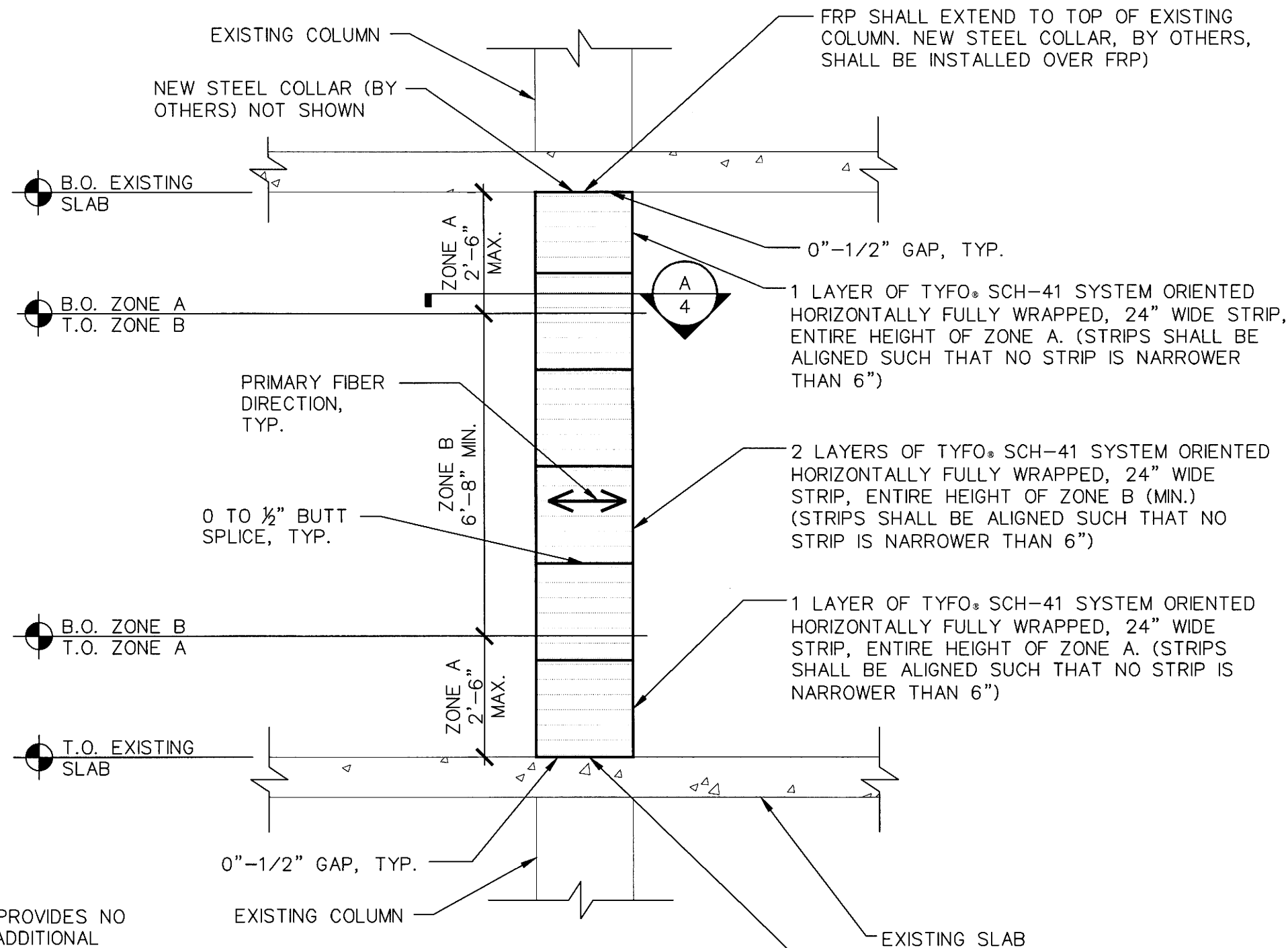
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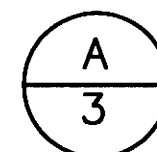
Date:	01/25/2017
Drawn By:	AMC
Checked By:	BWE
Scale:	AS SHOWN
Title:	PARTIAL COLUMN ELEVATION

Sheet No.
3
Erickson Structural Job No. 170101



NOTES:

1. NEW FRP IN ZONE A PROVIDES NO LESS THAN 50 KIPS ADDITIONAL SHEAR CAPACITY TO EXISTING COLUMN.
2. NEW FRP IN ZONE B PROVIDES NO LESS THAN 88 KIPS ADDITIONAL SHEAR CAPACITY TO EXISTING COLUMN.
3. THESE DRAWINGS ARE INTENDED TO DEPICT NEW FRP INFORMATION ONLY. REFERENCES TO OTHER BUILDING FEATURES, NEW OR EXISTING, ARE FOR INFORMATIONAL PURPOSES ONLY.



PARTIAL COLUMN ELEVATION

3/8" = 1'-0"



EXPIRES:12-31-17

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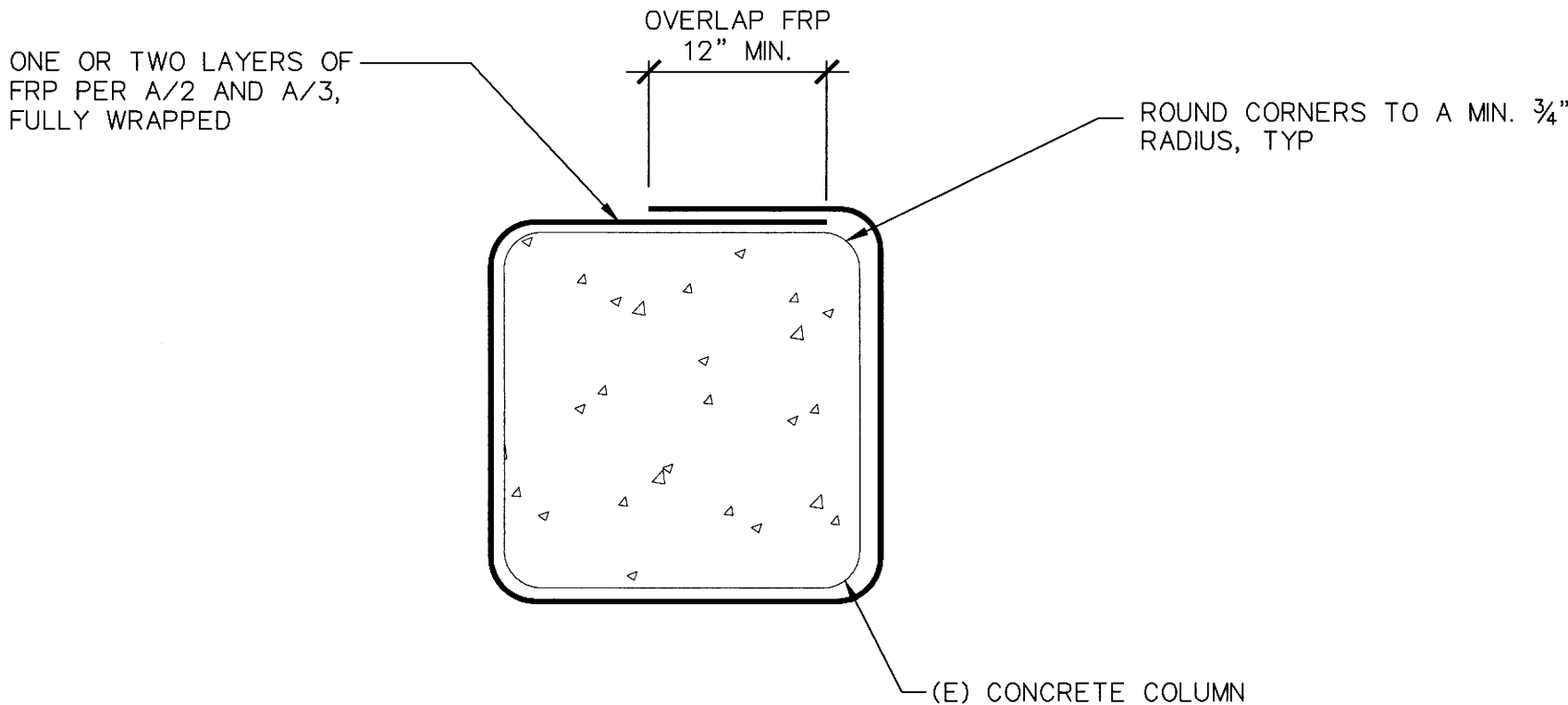
Title:

FRP DETAIL

Sheet No.

4

Erickson Structural Job No. 170101



A

4

TYPICAL COLUMN SECTION

1" = 1'-0"