LOCAL UNION #120

5440 LAFAYETTE RD.

INDIANAPOLIS, IN 46254

12.21.2021 BID SET - 12/21/2021

C700 LANDSCAPE PLAN

C800 SITE DETAILS

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S401 STRUCTURAL SECTIONS 03 ARCHITECTURAL A001 ARCHITECTURAL GENERAL NOTES A010 INTERIOR TYPES A011 EXTERIOR TYPES & TYPICAL MOUNTING HEIGHTS

A101 ARCHITECTURAL METAL BUIDLING PLAN

A110 ARCHITECTURAL SITE PLAN

A111 DIMENSION PLAN

A121 FLOOR PLAN

A131 EQUIPMENT PLAN A141 REFLECTED CEILING PLAN A142 CLERESTORY BRACING PLAN A151 INTERIOR FINISH PLAN A152 ROOM FINISH SCHEDULE AND INTERIOR FINISH A161 ROOF PLAN

DRAWING LIST

A201 EXTERIOR ELEVATIONS A301 BUILDING SECTIONS A310 WALL SECTIONS A350 SECTION DETAILS A401 INTERIOR ELEVATIONS A402 INTERIOR ELEVATIONS A403 INTERIOR ELEVATIONS A404 INTERIOR SIGNAGE DETAILS A405 CASEWORK/ MILLWORK/ INTERIOR DETAILS A451 CASEWORK DETAILS A501 ENLARGED PLANS

A510 PLAN DETAILS A601 OPENING TYPES AND SCHEDULES A602 OPENING DETAILS A603 DOOR DETAILS A901 PERSPECTIVES A910 SHADED EXTERIOR ELEVATIONS

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07 PLUMBING

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DRAWING LIST

10 ELECTRICAL

E001 - ELECTRICAL SYMBOLS & ABBREVIATIONS E101 - ELECTRICAL SITE PLAN E201 - FIRST FLOOR ELECTRICAL LIGHTING PLAN

E301 - FIRST FLOOR POWER & SYSTEMS PLAN E301A - FIRST FLOOR MECHANICAL EQUIPMENT POWER AND SYSTEMS PLAN

E302 - ROOF ELECTRICAL POWER & SYSTEMS PLAN E601 - ENLARGED ELECTRICAL PLANS E701 - ELECTRICAL ONELINE RISER DIAGRAM

E702 - ELECTRICAL SCHEMATICS E801 - ELECTRICAL SCHEDULES E802 - ELECTRICAL SCHEDULES

E901 - ELECTRICAL DETAILS E902 - ELECTRICAL DETAILS

TETURAL FOCALIZO

LABORERS INTERNATIONAL UNION OF NORTH AMERICA

201 N. Delaware Street, Suite B

317.951.9192 T | 317.951.9194 F

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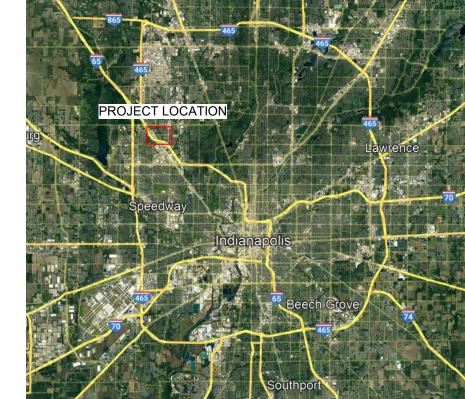
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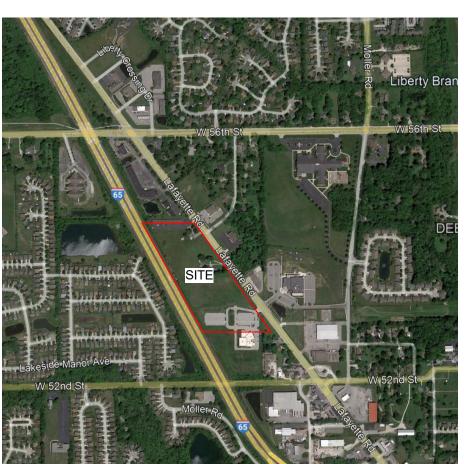
SCHEDULE OF ALTERNATES

- ALTERNATE #1: METAL WALL PANEL FINISH SYSTEM:
- BASE BID: PVDF FINISH (SEE SHEET A101) ALTERNATE BID: SILICONIZED POLYESTER FINISH (SEE SHEET A101) ALTERNATE #2: METAL ROOF PANEL FINISH SYSTEM:
- **ALTERNATE BID**: GALVALUME PLUS FINISH.
- ALTERNATE #3: METAL BUILDING INSUALATION SYSTEM: BASE BID: R-19 SAG & BAG INSULATION AND VAPOR BARRIER SYSTEM AT ALTERNATE BID: THERM-ALL PROLINER SYSTEM (R-25) AT WALL AND
- ALTERNATE #4: KRA KIRBYRIB ACOUSTICAL LINER PANEL

 A. BASE BID: PROVIDE KIRBYRIB ACOUSTICAL LINER PANEL AT WALLS AND CEILING (BOTTOM OF PURLINS) OF THE LARGE HALL AS INDICATED ON
- ALTERNATE BID: OMIT KIRBYRIB ACOUSTICAL LINER PANEL AT HALL. NOTE THIS DEDUCT ALTERNATE IS PAIRED WITH ACCEPTANCE OF
- ALTERNATE BID #3). **ALTERNATE #5**: DUMPSTER ENCLOSURE:
- BASE BID: DECORATIVE CONCRETE MASONRY WALLS AND BASTEEL







MECHANICAL, ELECTRICAL PLUMBING, **TECHNOLOGY**



Zionsville, IN 46077

Genesis Engineering Group 91 S. Main Street, Suite 200 Telephone: 317.927.8307

www.genesis-engineering.com

LANDSCAPE

Civil & Environmental Consultants, Inc. 530 E. Ohio St. Suite G Indianapolis, IN 46204 Telephone: 317.655.7777

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STRUCTURAL



Lynch, Harrison, and Brumleve, Inc. 550 Virginia Ave. Indianapolis, IN 46203 Telephone: 317.423.1150 Fax: 317.423.1551

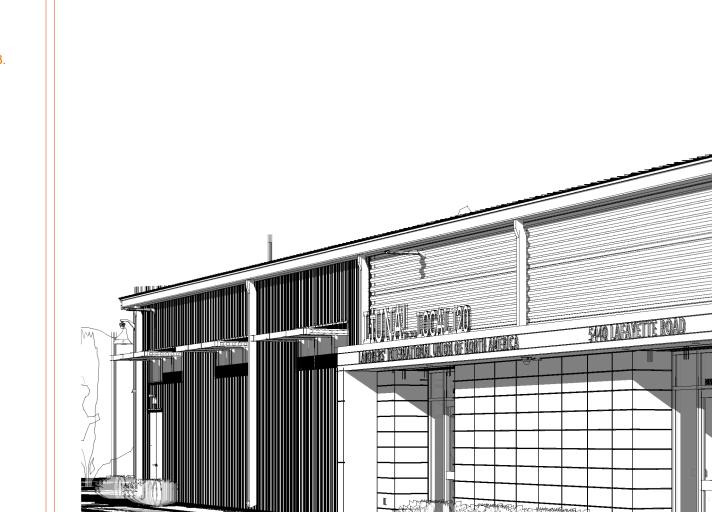
GENERAL CONTRACTOR



HANNIG CONSTRUCTION, INC. 815 Swan Street Terre Haute, IN 47807 Telephone: 812.235.6218 Fax: 812.235.1218 www.hannigconstruction.com

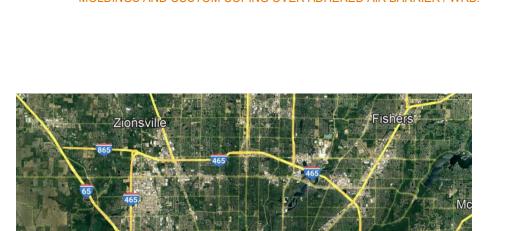
12.21.2021 BID SET

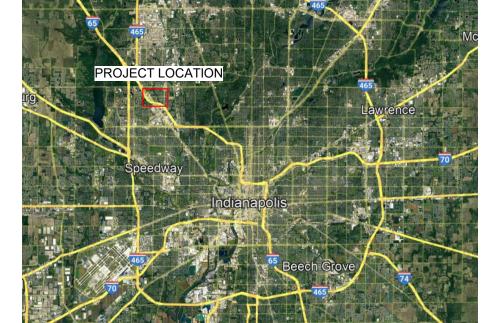
12/21/2021 arcDESIGN PROJECT NUMBER: 21102



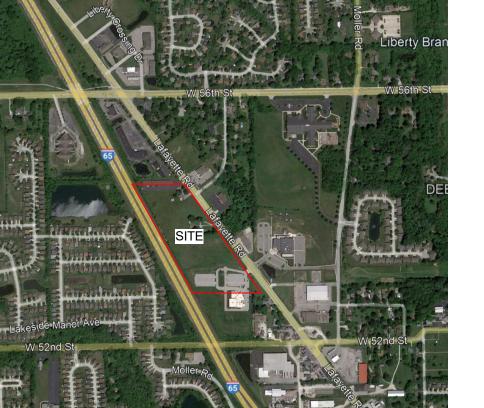
INFINITY DOUBLE SWING GATE WITH PVDF "BLACK" FINISH AS INDICATED ALTERNATE BID: BLACK VINYL COATED CHAIN LINK FENCE POSTS, TOP-OTTOM-AND MID RAILS, AND SWING GATES WITH VERTICAL BLACK PBR METAL PANELS ATTACHED TO RAILS AND POSTS IN LIEU OF CHAIN LINK ALTERNATE #6: CANOPY MCM SYSTEM:

A. BASE BID: CITADEL 2000 ENVELOPE 2000 RS. ALTERNATE BID: CITADEL ENVELOPE 2000 REVEAL (RV) WITH BATTEN MOLDINGS AND CUSTOM COPING OVER ADHERED AIR BARRIER / WRB.





VICINITY MAP



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ARCHITECT

Civil & Environmental Consultants, Inc.

Fax: 317.655.7778

www.lhb-eng.com

			FIRE	STOPPING SCH	EDULE			EXIT SUMMARY					
TYPE	LOCATION	TOP OF WALL	BOTTOM OF WALL	THROUGH PENETRATIONS, NON-COMBUSTIBLE PIPES TUBES OR CONDUITS	THROUGH PENETRATIONS, COMBUSTIBLE PIPES, TUBES OR CONDUITS	THROUGH PENETRATIONS, METAL DUCTWORK (MIN. 26 GA)	MEMBRANE PENETRATIONS	LEVEL	TYPE	EXIT NUM.	EXIT WIDTH	EXIT FACTOR	CAPACITY
	G EXTERIOR ROOF BEARING WALLS	TAPE & JOINT FINISH (INTERIOR)		FIRE SEALANT (INTERIOR), SEALANT (EXTERIOR)	FIRE SEALANT (INTERIOR) SEALANT (EXTERIOR)	FIRE SEALANT (INTERIOR), SEALANT (EXTERIOR)	FIRE SEALANT (INTERIOR)						
	INTERIOR ROOF BEARING WALLS & COLUMNS (U.O.I)	TAPE & JOINT FINISH	H FIRE SEALANT	FIRE SEALANT	FIRE SEALANT	FIRE SEALANT	FIRE SEALANT						
1 HR RATED FIRE BARRIER	INCIDENTAL/SPECIAL HAZARD ROOM SEPARATION WALLS	ONE-HOUR LISTED TOP OF WALL JOINT	FIRE SEALANT	FIRE SEALANT	ONE HOUR LISTED THRU-PENETRATION SYS. (SEE SPECS)	FIRE SEALANT AT DUCTS W/O DAMPERS (SEE MECH. FOR DAMPERS)	SAME AS THROUGH PENETRATIONS						
1 HR RATED ROOF/CEILING SYSTEM	FLAT & PITCHED ROOF/CEILINGS	N/A	N/A	FIRE SEALANT	ONE HOUR LISTED THRU-PENETRATION SYS. (SEE SPECS)	FIRE SEALANT AT DUCTS W/O DAMPERS (SEE MECH. FOR DAMPERS)	SAME AS THROUGH PENETRATIONS						
1 HR RATED SMOKE BARRIER	SMOKE COMPARTMENT SEPARATION WALLS	ONE-HOUR LISTED TOP OF WALL JOINT		ONE HOUR LISTED THRU-PENETRATION SYS. (SEE SPECS)	ONE HOUR LISTED THRU-PENETRATION SYS. (SEE SPECS)	FIRE SEALANT AT DUCTS W/O DAMPERS (SEE MECH. FOR DAMPERS)	SAME AS THROUGH PENETRATIONS						
2 HR RATED FIRE WALL	BUILDING (UNIT) SEPARATION WALLS	TWO HOUR LISTED TOP OF WALL JOINT SYS.		FIRE SEALANT	TWO HOUR LISTED THRU-PENETRATION SYS. (SEE SPECS)	SEE MECH. FOR DAMPERS	SAME AS THROUGH PENETRATIONS						
SMOKE PARTITIONS	CORRIDOR & INCIDENTAL/SPECIAL HAZARD ROOM SEPARATION WALLS (WHERE INDICATED)	TAPE & JOINT FINISH	H ACOUSTIC SEALANT	ACOUSTIC SEALANT	ACOUSTIC SEALANT	ACOUSTIC SEALANT	ACOUSTIC SEALANT						

	8,009 SF ASSEMBLY - UNCONCENTRATED NET 15 534 534 160 1/4" 1 11,078 SF BUSINESS AREAS GROSS 100 111 111 33 1/4"							
			OCCU	PANCY	/		REQ'D EX	(IT WIDTH
NAME	AREA	FUNCTION	TYPE	OLF	CALC. LOAD	ANTIC. LOAD	STAIRS * .3	OTHER * .2
1ST FLOOR			•					
A-3	8,009 SF		NET	15	534	534	160 1/4"	106 3/4"
В	11,078 SF	BUSINESS AREAS	GROSS	100	111	111	33 1/4"	22 1/4"
1ST FLOOR	19,087 SF		•			645	193 1/2"	129"
TOTAL BUILDING:	19,087 SF					645	193 1/2"	129"

	OCCUPANCY TABULATION												
			REQ'D EXIT WIDTH										
NAME	AREA	FUNCTION	TYPE	OLF	CALC. LOAD	ANTIC. LOAD	STAIRS * .3	OTHER * .2					
1ST FLOOR			'										
A-3	8,009 SF	ASSEMBLY - UNCONCENTRATED	NET	15	534	534	160 1/4"	106 3/4"					
В	11,078 SF	BUSINESS AREAS	GROSS	100	111	111	33 1/4"	22 1/4"					
1ST FLOOR	19,087 SF		,			645	193 1/2"	129"					
TOTAL BUILDING:	19,087 SF					645	193 1/2"	129"					

SYMBOL / LI	NETYPE		DESC	חוחי	TION		
EXIST.	NEW		DESC	KIP	TION		
		1 HR FIRE BARRIER					
		1 HR FIRE /	SMOKE BARF	RIER			
		2 HR FIRE E	BARRIER				
		2 HR FIRE /	SMOKE BARF	RIER			
(11111111111111111111111111111111111111		SMOKE PAI	RTITION (NON	RATI	ED)		
		NON RATED WALL					
		SMOKE COMPARTMENT WALL					
		SUITE BOU	NDARY WALL				
		PLAN H	ATCHES				
	EXIT CORF	RIDOR	+ + + + + + + + + + + + + + + + + + + +	+ + +	SUITE		
	EXIT ENCL	OSURE		•	ASSEMBLY		
		SYM	MBOLS				
EXIT	A	EXIT DOOF	2				
11'-	->	EXIT ACCE	SS TRAVEL D	ISTAI	NCE		
<u> </u>		COMMON PATH OF TRAVEL DISTANCE					

EMERGENCY KEY BOX EKB NOTE: SUFFICE READING 'EX' AFTER ANY SYMBOL INDICATED IS AN EXISTING DEVICE TO REMAIN

NOTE: ALL NEW FIRE/SMOKE RATED WALLS TO BE PERMANENTLY IDENTIFIED WITH SIGNS OR STENCILING IDENTIFYING THE SPECIFIC WALL RATING. IDENTIFICATION SHALL BE LOCATED ABOVE SUSPENDED CEILING SYSTEMS, WITHING 15 FEET OF THE END OF EACH WALL AND AT INTERVALS NOT EXCEEDING 30 FEET ALONG THE WALL, AND INCLUDE LETTERING NOT LESS THAN 3" IN HEIGHT WITH A MINIMUM 3/8 INCH STROKE IN A CONTRASTING COLOR.

architecture + interiors 201 N. Delaware Street, Suite B Indianapolis, IN 46204 317.951.9192 T | 317.951.9194 F This drawing and its contents are the property of arcDESIGN P.C., and shall not be reproduced in whole or in part by any means, mechanical or electronic, without express written permission of arcDESIGN. No. AR19300125 STATE OF SMOKE COMPARTMENT TRAVEL DISTANCE FIRE EXTINGUISHER CABINET FIRE EXTINGUISHER CABINET W/ HOSE CONNECTION FIRE EXTINGUISHER - WALL MOUNTED FAP FIRE ALARM PANEL NOTE: DOORS MARKED WITH THE "EXIT" INDICATOR SHALL HAVE AN ADA COMPLIANT EXIT SIGN ADJACENT TO THE EXIT DOOR. SEE ACCESSIBLE SIGN DETAIL. SEE ELECTRICAL DOCUMENTS FOR LOCATIONS OF ILLUMINATED EXIT

PROJECT DATA

New corporate office building and site. The office building will include spaces for meetings, training, and administrative functions for Union Members.

Project Location: 5440 Lafayette Rd. Indianapolis, Indiana Future Tenant:

Laborers International Union of North America Local Union 120.

Scope of Work: Construction of a new corporate office building and site.

LiUNA Local 120, Mr. James "Ward" Daniels, Business Manager 1520 East Riverside Drive Indianapolis, Indiana, 46202 Phone: (317) 634-8551, Email: HYPERLINK "mailto:laborers120@laborers120.com" laborers120

State of Indiana, Department of Homeland Security, Office of Fire and Building Services City of Indianapolis, Department of Business and Neighborhood Services

2014 Indiana Building Code (IBC, 2012 Edition, as amended) 2014 Indiana Fire Code (International Fire Code, 2012 Edition, as amended).

NFPA 72 - National Fire Alarm Code NFPA 101 - Life Safety Code

2014 Indiana Mechanical Code (International Mechanical Code, 2012 Edition, as amended)/ 2010 Indiana Energy Code (Energy Standard for Buildings Except Low-Rise Residential Buildings ANSI/ASHRAE 90.1, 2007 Edition, as amended).

2009 Indiana Electrical Code (NFPA 70 – National Electrical Code, 2008 Edition, as amended).

B – Office, A3 - Assembly

Applicable No. of Stories: 1 Story

Type of Construction: Type IIB (Steel-Framed, Non-Combustible, Non-Protected)

Approximately 19,000 SF

Table 503 – Type IIB, B Occupancy: 3 Stories, 23,000 SF per story. Table 503 – Type IIB, A3 Occupancy: 2 Stories, 9,500 SF per story

Allowable Area: 506.1 - Frontage + Sprinkler = 45,125 SF 506.2 – Frontage Increase: 75% or 16,625 SF 506.3 - Sprinkler Increase: 300% or 28,500 SF

To Be Determined per Chapter 10 Occupancy Load Factors by Room Use.

Egress Travel Distance: Table 1014.3 – Common Path of Egress Travel: 100 LF. Table 1016.2 – Increase with sprinkler: 300 LF. Table 1018.2 – Minimum Corridor Width: 44 inches

1018.4 – Dead Ends Limited to 50 feet. 1018.5.1 - Return Air Plenum Permitted

Table 1015.1 – One Exit for Occupant Load of 49 or less. 2 Exits required for Assembly use for Occupant Loads exceeding 49. 1008.1.2 – Doors shall swing in the direction of egress where serving a Room or Area containing an Occupant Load of 50 or more persons.

1008.1.10 – Panic and Fire Exit Hardware. Doors serving Rooms or Spaces with an Occupant Load of 50 or more in a Group A or E Occupancy shall not be provided with a latch or lock unless it is Panic Hardware or Fire Exit Hardware.

Allowable area is achieved by an Automatic Fire Suppression System (Sprinklers) designed in compliance with NFPA 13.

1018.1 – No corridor fire resistance required with sprinkler. No fire resistance rating required between Assembly and Office Room or Area uses due to no-separated use classification of the building as Assembly A3.

Fire Resistive Doors: Not required in walls with no fire-resistance rating requirement.

General:

The building will utilize a pre-engineered metal building system (Metal Building) and is planned to comply with the minimum requirements for thermal performance prescribed by the Code.

Energy Code: 2010 Indiana Energy Code / ASHRAE 90.1 (2007) Standard Location: Indianapolis, Indiana Zone 5a (Table B1) Building Classifications: Nonresidential, Metal Building

Minimum Requirements for Opaque Elements, Table 5.5.5: Roofs: U-0.065, R-19.0 (No requirement for c.i.) Walls, Above-Grade: U-0.113, R-13.0 (No requirement for c.i.) Walls, Below-Grade: Not Applicable. Slab-On-Grade Floors: Unheated, Insulation Minimum R-Value-NR (No Requirement)

Opaque Doors: Swinging: U-0.700 Non-Swinging: U-0.500 Vertical Glazing: Metal Framed Curtain/Storefront Walls: U-0.45, SHGC-0.40

Metal Framed Entrance Doors: U-0.80, SHGC-0.40 Climactic Design Criteria US and US Territory Climatic Date (Table D-1) for Indianapolis, Indiana Heating Design Temperature: -3 degrees F Cooling Design Temperature:

Dry-Bulb: 88 degrees F Wet Bulb: 74 degrees F NORTH

12.21.2021 BID SET

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REVISIONS:

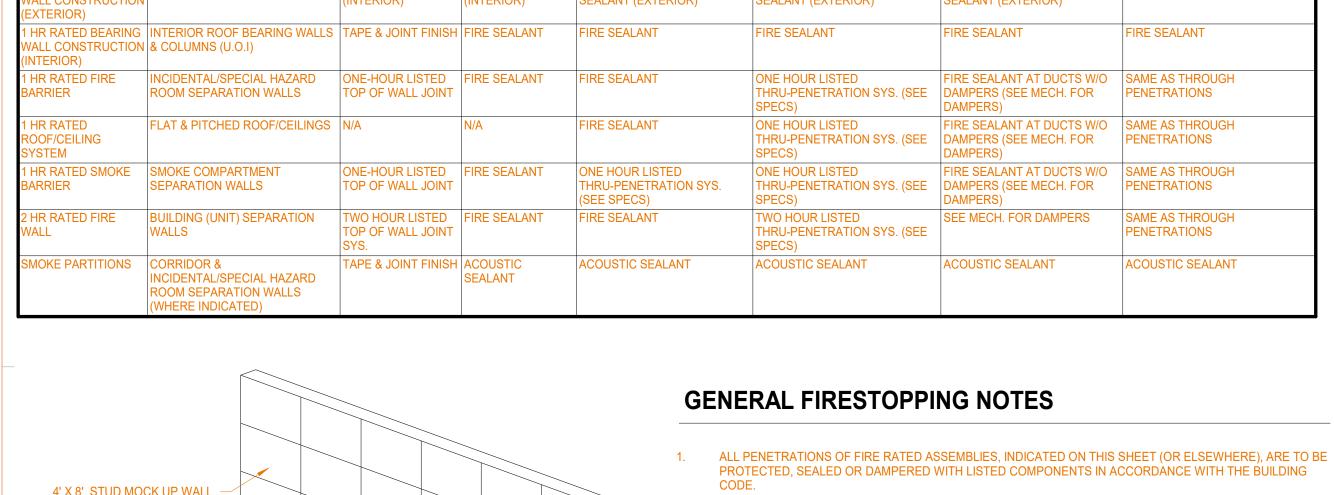
arcDESIGN PROJECT NUMBER 21102

DRAWN BY:

DRAWING TITLE:

LIFE SAFETY **PLAN**

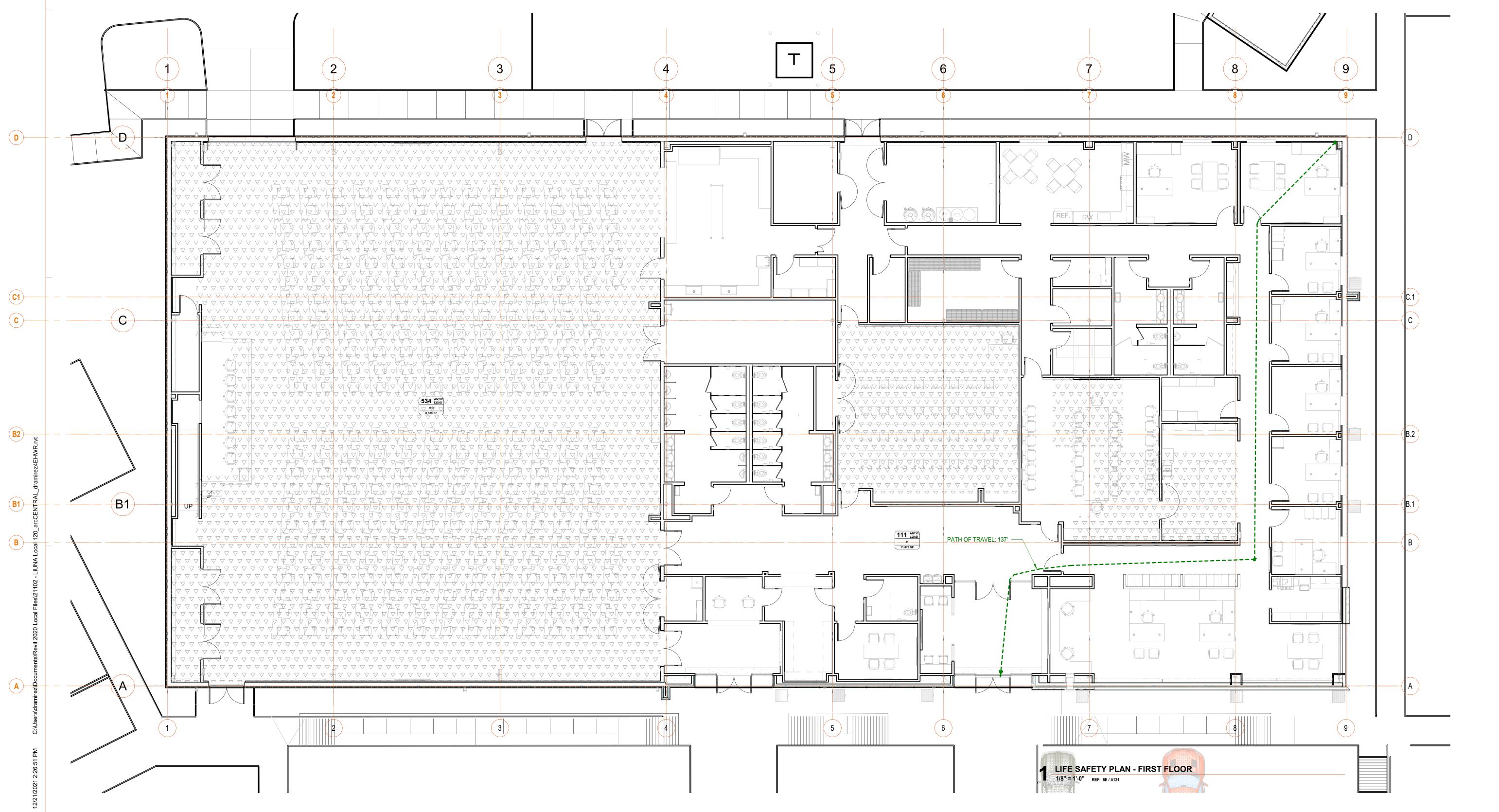
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4' X 8' STUD MOCK UP WALL MOCK UP STUD WALL WALL RATING √ 5/8" TYPE X GYPSUM BOARD LISTED FIRE STOPPING SYSTEM ITEM TYPE, MATERIAL, & SIZE OR RANGE OF SIZES — PENETRATING ITEM — LISTED SYSTEM NO. FROM

- PROTECTED, SEALED OR DAMPERED WITH LISTED COMPONENTS IN ACCORDANCE WITH THE BUILDING CONTRACTOR SHALL VERIFY ALL WALL AND FLOOR/CEILING SYSTEMS TO BE PENETRATED, THE PENETRATING ITEMS AND THE FIRESTOPPING DESIGNS. IF THE PENETRATING CONDITIONS DO NOT MATCH
- THE SUGGESTED FIRESTOP SYSTEMS LISTED IN THE SPECIFICATIONS, THE CONDITIONS AND A RECOMMENDED FIRESTOP DESIGN MUST BE SUBMITTED TO THE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION. CABLES AND WIRES WITH AND WITHOUT COMBUSTIBLE JACKETS AND COMBUSTIBLE AND NON-COMBUSTIBLE PIPES, TUBES, CONDUITS AND VENTS WHICH PENETRATE A FIRE RATED WALL,
- FLOOR/CEILING ASSEMBLY, ROOF/CEILING ASSEMBLY OR A SINGLE MEMBRANE THAT IS AN INTEGRAL COMPONENT OF THE ASSEMBLY, SHALL BE FIRESTOPPED OPENINGS FOR STEEL ELECTRICAL OUTLET BOXES THAT DO NOT EXCEED 16 SQ. IN. ARE PERMITTED. LARGER OUTLET BOXES THAT HAVE BEEN TESTED AND LABELED FOR USE IN THE FIRE RATED ASSEMBLE
 - OUTLET BOXES ON OPPOSITE SIDES OF A RATED WALL ASSEMBLY SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF 24 INCHES UNLESS THE OUTLET BOXES ARE TESTED AND LABELED FOR USE IN THE FIRE CABLES, WIRES, CONDUITS, TUBES AND PIPES THAT PENETRATE A FLOOR/CEILING OR ROOF/CEILING ASSEMBLY SHALL HAVE AN "F" AND "T" RATING NOT LESS THAN THE ASSEMBLY PENETRATED. "T" RATINGS
- ARE NOT REQUIRED WHERE PENETRATIONS ARE CONTAINED WITHIN A CHASE WALL OR WHERE PIPES, TUBES AND CONDUITS ARE NOT IN DIRECT CONTACT WITH COMBUSTIBLE MATERIALS. WHERE INDICATED IN THE FIRESTOPPING SCHEDULE TOP OF WALL AND BOTTOM OF WALL JOINTS TO BE ON BOTH SIDES UNLESS OTHERWISE INDICATED.

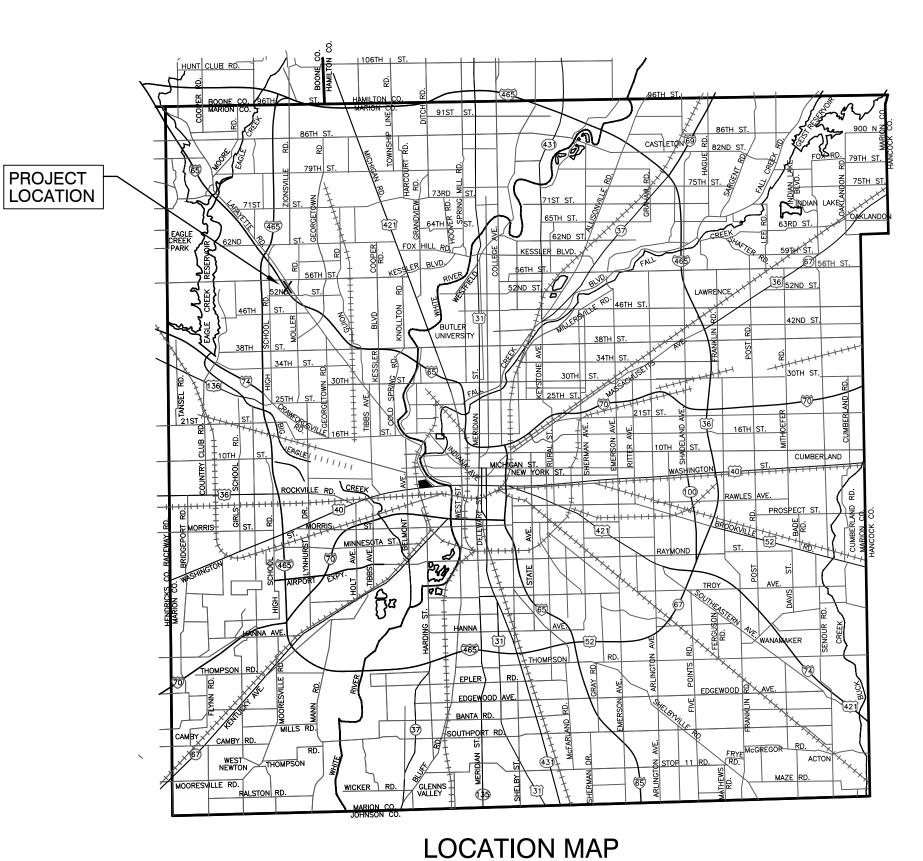
→ FIRESTOPPING PENETRATION MOCKUP PANEL 1/2" = 1'-0" ?



LIUNA LOCAL 120 OFFICE BUILDING

5440 LAFAYETTE ROAD, INDIANAPOLIS, IN 46254

BID SET DECEMBER 21, 2021



MARION COUNTY, INDIANA



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BENCHMARKS:

UNLESS OTHERWISE NOTED. ELEVATIONS SHOWN HEREON ARE BASED UPON AN OPUS SOLUTION AND ARE ON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

TBM#1: CUT "X" ON THE NORTHWEST BOLT OF TRAFFIC POLE BASE, LOCATED ON THE WEST SIDE OF LAFAYETTE RD. APPROXIMATELY 115 NORTH OF THE SOUTHWEST CORNER OF THE SITE.

TBM#2: CUT SQUARE ON THE BACK OF A CURB LOCATED ON THE WEST SIDE OF LAFAYETTE RD APPROXIMATELY 125 NORTH OF THE NORTHEAST CORNER OF THE

TBM#3: CUT SQUARE ON THE SOUTHEAST CORNER OF A FLAGPOLE BASE, LOCATED ON THE NORTH END OF THE SITE ELEV. = 805.93

UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. INDIANA 811 ONE—CALL PUBLIC UTILITY LOCATE SERVICE TICKET NUMBERS 2103244667 AND 2103244762 WERE ISSUED FOR THIS SITE.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, THE CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, AND SANITARY SEWER. ANY CONFLICTS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND THE APPROPRIATE AUTHORITIES.

CITY OF INDIANAPOLIS CODE COMPLIANCE **DEPARTMENT OF BUSINESS AND NEIGHBORHOOD SERVICES** 1200 MADISON AVE., SUITE 100 **INDIANAPOLIS, IN 46225**

PH: (317) 327-8700

REFERENCE

TOPOGRAPHIC SURVEY COMPLETED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.; PROJECT NUMBER: 310-295, DATED: SEPTEMBER 28, 2021.

CONSULTANT TEAM:

OWNER/DEVELOPER

LIUNA LOCAL 120 1520 E. RIVERSIDE DR. **INDIANAPOLIS, IN 46202** PH: (317) 634-8551 CONTACT: WARD DANIELS. **BUSINESS MANAGER** EMAIL: wdaniels@laborers120.com

ARCHITECT

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CIVIL ENGINEER

CIVIL & ENVIRONMENTAL CONSULTANTS, INC. 530 E. OHIO STREET, SUITE G INDIANAPOLIS, IN 46204 PH: (317) 655-7777

SURVEYOR

CIVIL & ENVIRONMENTAL CONSULTANTS, INC. 530 E. OHIO STREET, SUITE G INDIANAPOLIS, IN 46204 PH: (317) 655-7777 **CONTACT: ANTHONY SYERS**

UTILITY CONTACTS:

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CITIZENS GAS RICH MILLER 2020 NORTH MERIDIAN STREET INDIANAPOLIS, IN 46204 PHONE: 317-927-4684

CITIZENS ENERGY GROUP RICH NEWELL 2020 NORTH MERIDIAN STREET INDIANAPOLIS, IN 46204 PHONE: 317-927-4377

CITIZENS ENERGY GROUP CWA AUTHORITY, INC. 2150 DR. MARTIN LUTHER KING JR. ST. INDIANAPOLIS, IN 46202 PHONE: 317-927-4351

INFRASTRUCTURE: CITY OF INDIANAPOLIS PROJECT COMPLIANCE ANALYST 1200 MADISON AVENUE, SUITE 100 INDIANAPOLIS, INDIANA 46225 317-327-4952 jmeid@indygov.org

TELEPHONE / FIBER / CABLE: INTELLIGENT FIBER NETWORK 400 INTERNATION PKWY. RICHARDSON, TX 75081

ZAYO BANDWIDTH JEFF KENNELLY PROPERTY SOLUTION EXECUTIVE 3030 ROOSEVELT AVENUE INDIANAPOLIS, IN 46218 PHONE: 317-713-3899 Jeff.kennelly@mybrighthouse.com

ATT DISTRIBUTION SCOTT EICKMAN MANAGER PLANNING & ENGINEERING PHONE: 317-252-4223 317-525-1660 (CELL) se7939@att.com

TOTAL SITE AREA = 5.37 ACRES

Sheet List Table

Sheet Title

TITLE SHEET

ALTA SURVEY

TOPOGRAPHIC SURVEY

DEMOLITION PLAN

SITE LAYOUT PLAN

SITE LAYOUT PLAN - WEST

SITE LAYOUT PLAN - EAST

GRADING PLAN

GRADING PLAN - WEST

GRADING PLAN - EAST

DRAINAGE PLAN

STORM SEWER PROFILES

STORM SEWER PROFILES

SITE UTILITY PLAN

LANDSCAPE PLAN

SITE DETAILS

SITE DETAILS

SITE DETAILS

SITE DETAILS

SITE DETAILS

SITE DETAILS

STORM SEWER SPECIFICATIONS

SANITARY SEWER SPECIFICATIONS

STORMWATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN NOTES

STORMWATER POLLUTION PREVENTION PLAN DETAILS

STORMWATER POLLUTION PREVENTION DETAILS

Sheet

Number

22

29

WATER QUALITY STATE PLANE COORDINATES TABLE: AQUA-SWIRL XC-9 X = 161362.4206Y=1676352.9645

STORMWATER STRUCTURE SUMMARY TABLE: PROPOSED STRUCTURES = 19 PROPOSED WATER QUALITY STR. = 1

PRIVATE:	
12" HDPE	167 LF
15" HDPE	397 LF
18" HDPE	495 LF
24" HDPE	205 LF
30" HDPE	28 LF
12" RCP	233 LF
15" RCP	137 LF
18" RCP	25 LF
30" RCP	433 LF

FOR BIDDING **PURPOSES ONLY**





Drawing

Number

C000

ALTA

TOPO

C200

C202

C300

C301

C302

C400

C402

C500

C700

C800

C802

C803

C804

C805

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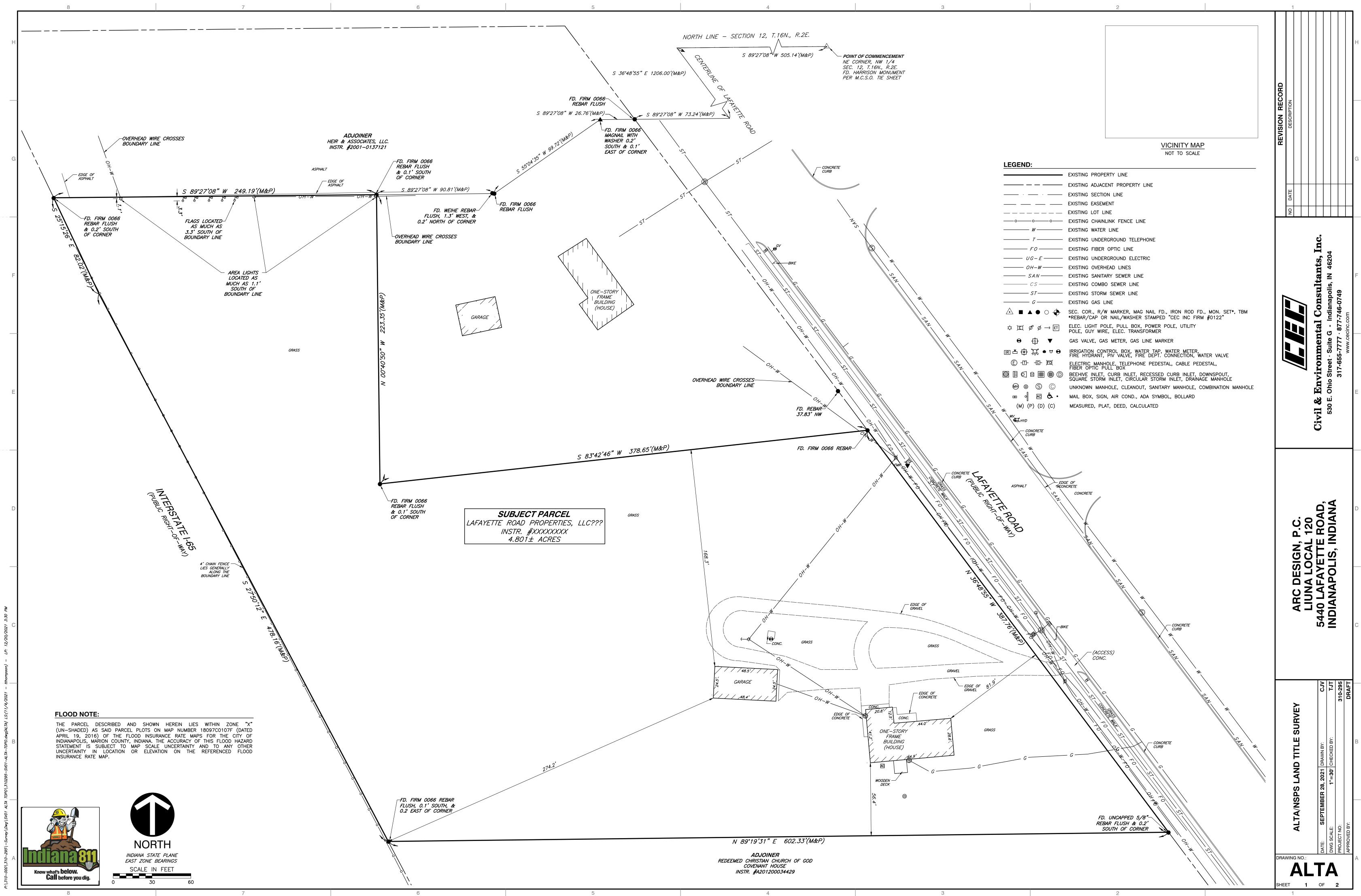
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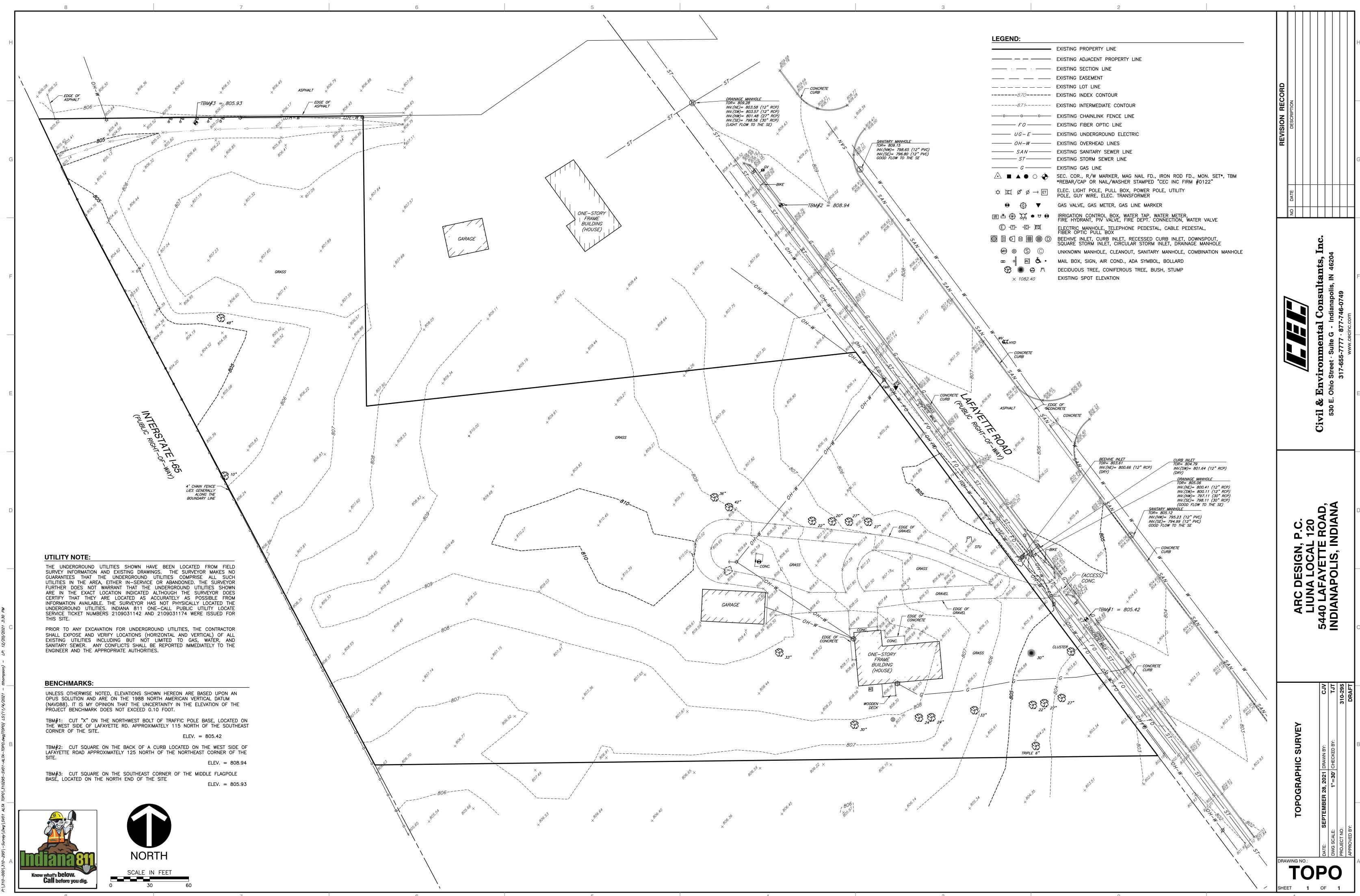




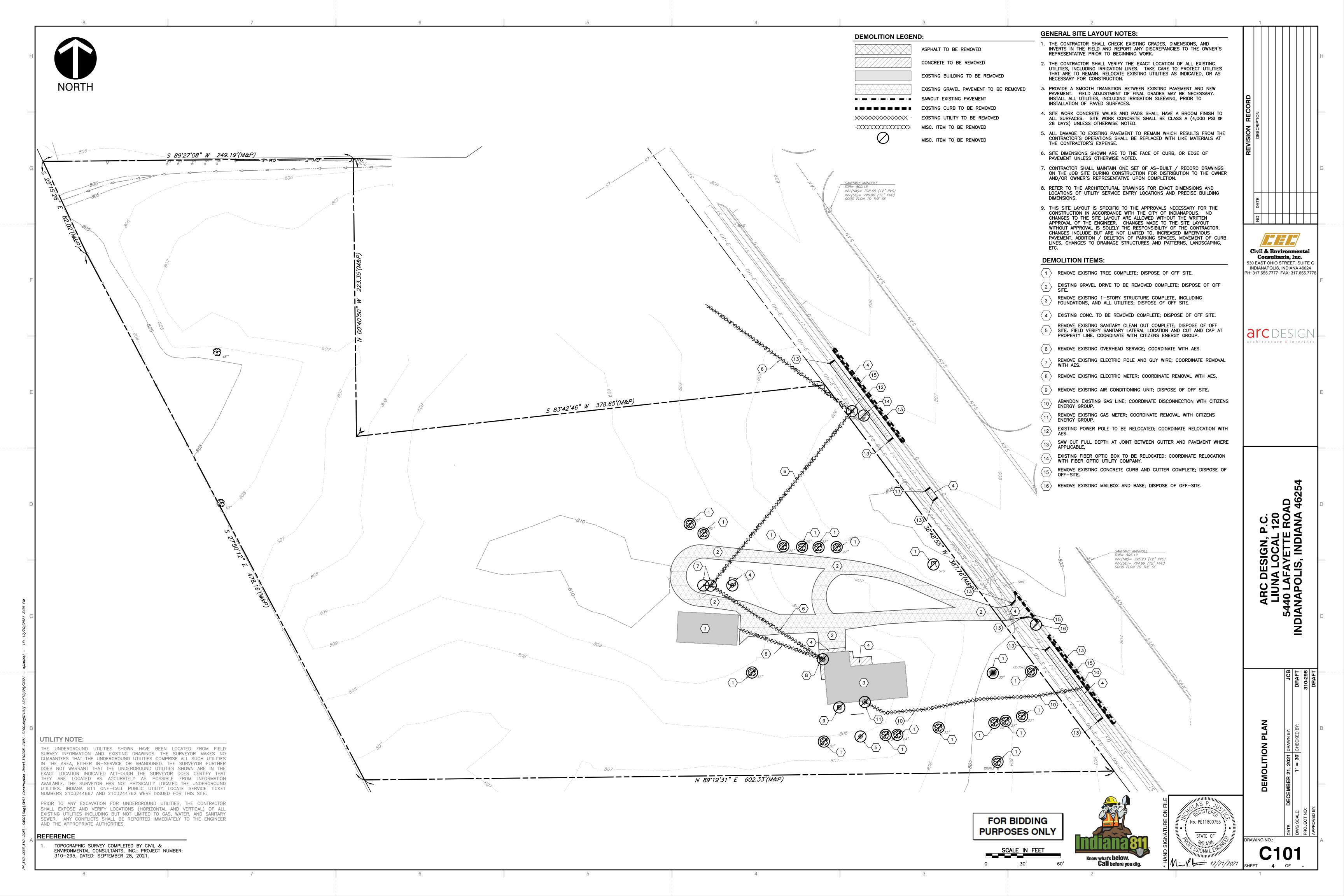
ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROA INDIANAPOLIS, INDIANA 4

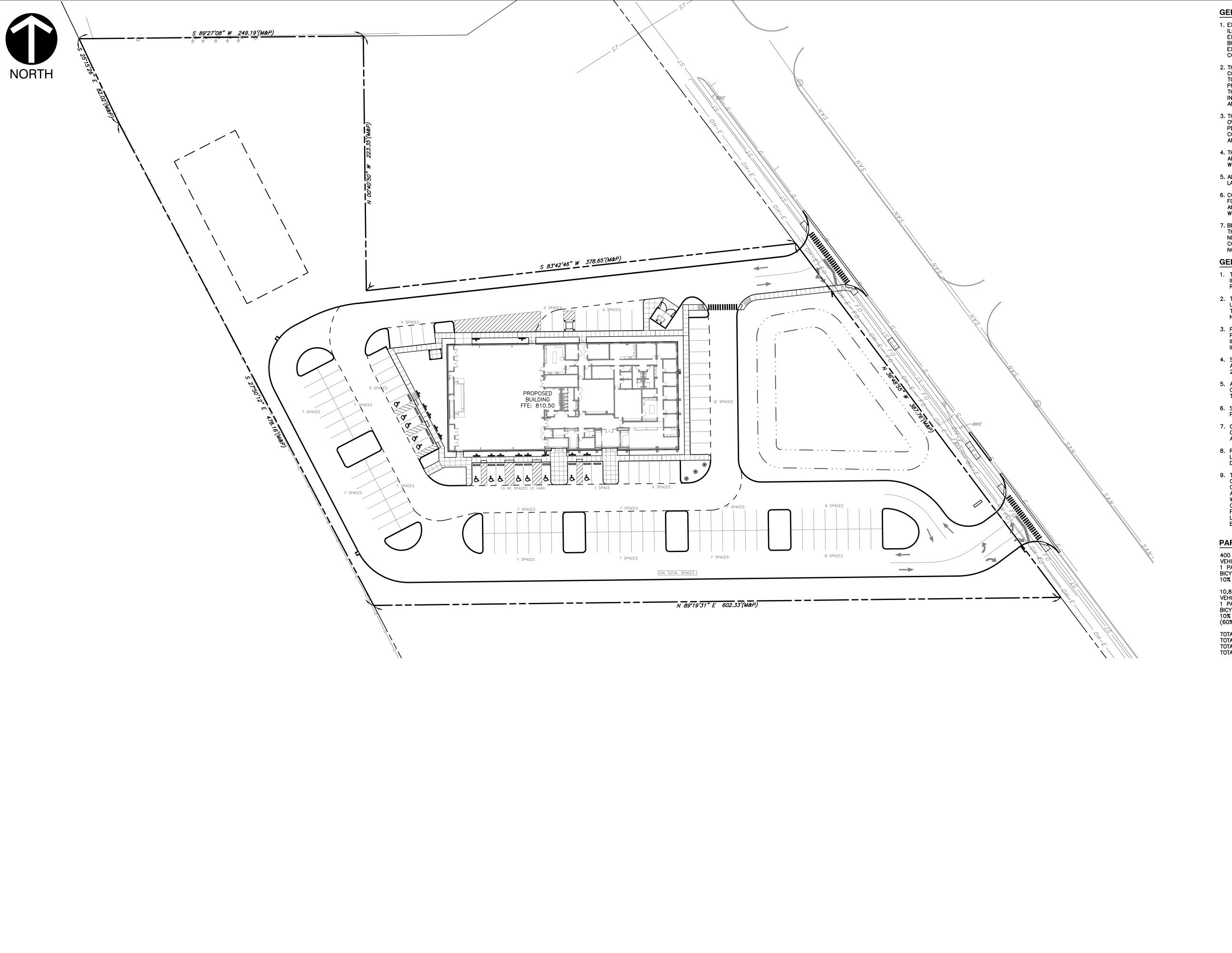
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REFERENCE

TOPOGRAPHIC SURVEY COMPLETED BY CIVIL &

310-295, DATED: SEPTEMBER 28, 2021.

ENVIRONMENTAL CONSULTANTS, INC.; PROJECT NUMBER:

GENERAL SITE NOTES:

- 1. EXISTING CONDITIONS AS DEPICTED ON THESE PLANS ARE GENERAL AND ILLUSTRATIVE IN NATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EXAMINE THE SITE AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THIS PROJECT. IF CONDITIONS ENCOUNTERED DURING EXAMINATION ARE SIGNIFICANTLY DIFFERENT THAN THOSE SHOWN, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY.
- 2. THE CONTRACTOR AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COMPLYING WITH APPLICABLE FEDERAL, STATE AND LOCAL REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SUBCONTRACTORS TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.
- 3. THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND OWNER'S REPRESENTATIVE FOR ANY AND ALL INJURIES AND/OR DAMAGES TO PERSONNEL, EQUIPMENT AND/OR EXISTING FACILITIES OCCURRING IN THE COURSE OF THE DEMOLITION AND CONSTRUCTION DESCRIBED IN THE PLANS AND SPECIFICATIONS.
- 4. THE CONTRACTOR SHALL COMPLY WITH ALL LOCAL CODES, OBTAIN ALL APPLICABLE PERMITS, AND PAY ALL REQUIRED FEES PRIOR TO BEGINNING
- 5. ALL WORK PERFORMED BY THE CONTRACTOR SHALL CONFORM TO THE LATEST REGULATIONS OF THE AMERICANS WITH DISABILITIES ACT.
- 6. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THE PROJECT.
- 7. BEFORE INSTALLATION OF STORM OR SANITARY SEWER, OR OTHER UTILITY, THE CONTRACTOR SHALL VERIFY ALL CROSSINGS, BY EXCAVATION WHERE NECESSARY, AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.

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PARKING CALCULATIONS:

400 SEAT ASSEMBLY HALL VEHICULAR SPACES

1 PARKING SPACE PER 4 SEATS = 100 PARKING SPACES

BICYCLE SPACES 10% OF PARKING SPACES = 10 BICYCLE SPACES

10,821 SQUARE FEET OFFICE SPACE

VEHICULAR SPACES

1 PARKING SPACE PER 350 SQUARE FEET = 31 PARKING SPACES BICYCLE SPACES

10% OF PARKING SPACES = 3 BICYCLE SPACES (60% TO BE COVERED)

TOTAL PARKING SPACES REQUIRED = 131 SPACES TOTAL PROVIDED = 134 SPACES WHICH INCLUDES 13 ADA ACCESSIBLE SPACES TOTAL BICYCLE PARKING SPACES REQUIRED = 13 BICYCLE SPACES TOTAL PROVIDED = 16 BICYCLE SPACES, ALL COVERED

ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROAD INDIANAPOLIS, INDIANA 462

Civil & Environmental

Consultants, Inc.

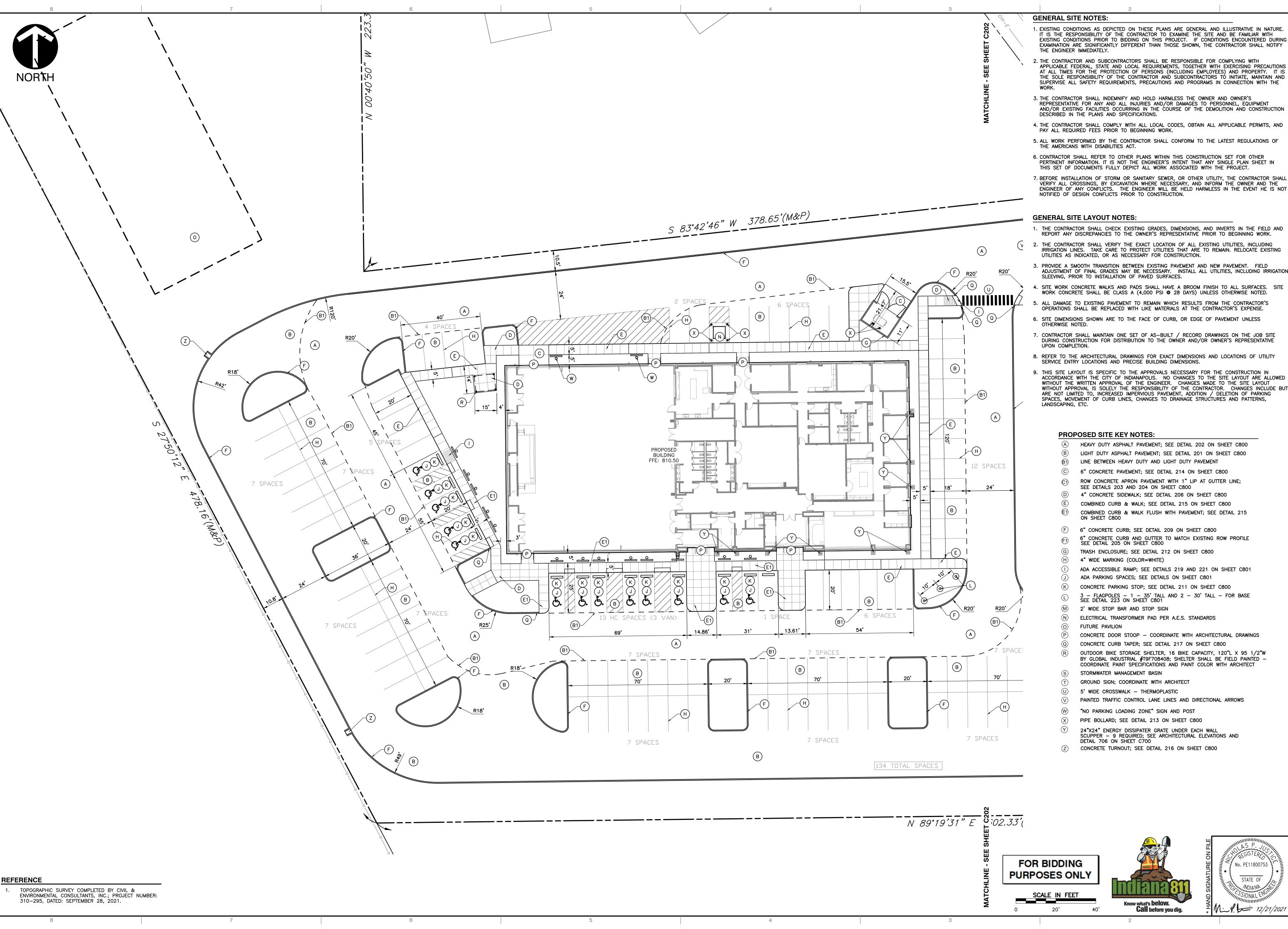
530 EAST OHIO STREET, SUITE G INDIANAPOLIS. INDIANA 46024

PH: 317.655.7777 FAX: 317.655.7778

STATE OF

Mil. 12/21/2021





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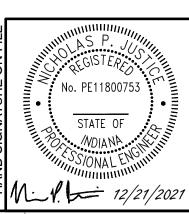
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BY GLOBAL INDUSTRIAL #T9F708408; SHELTER SHALL BE FIELD PAINTED -



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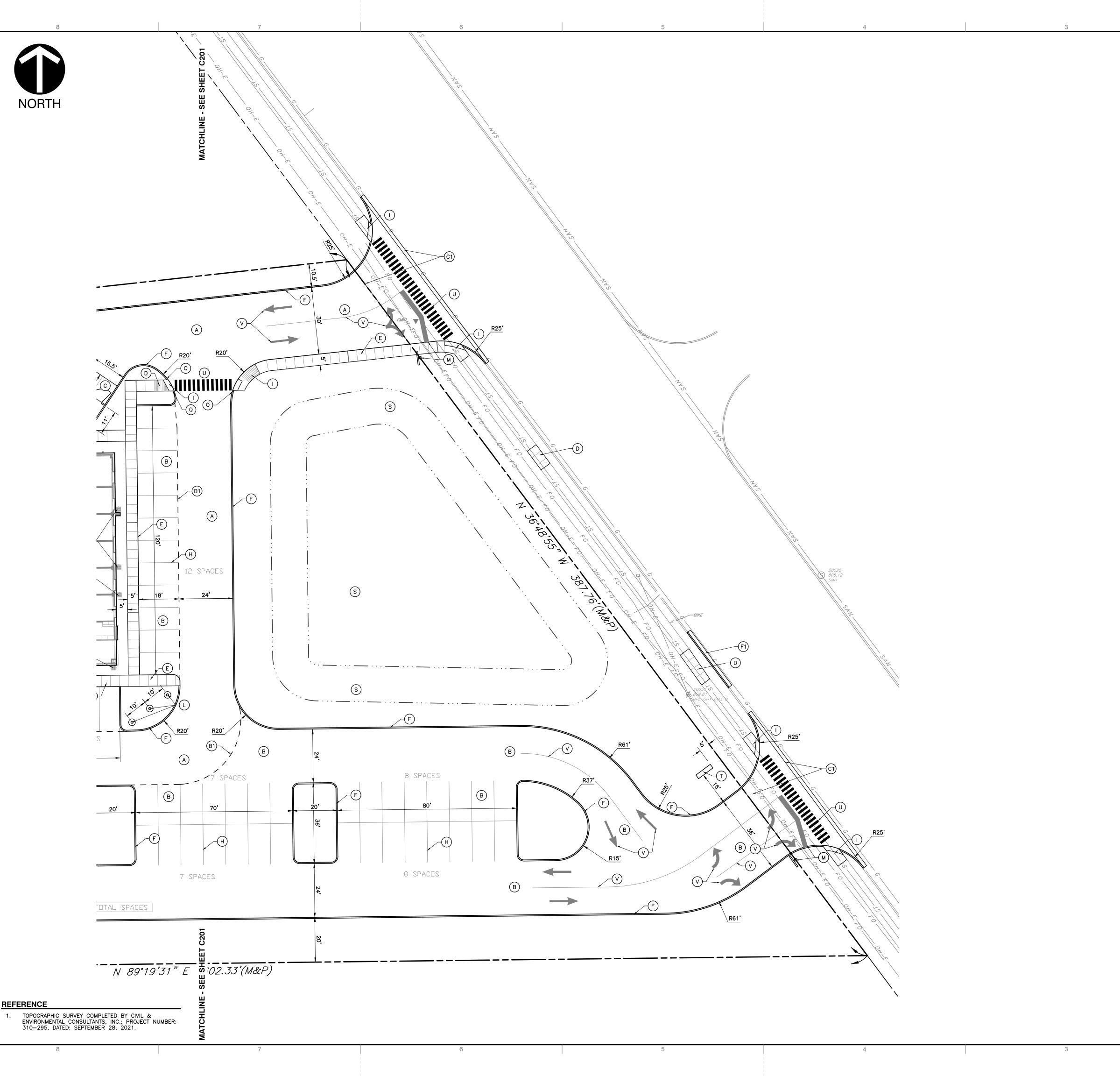
Civil & Environmenta

Consultants, Inc.

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INDIANAPOLIS. INDIANA 46024

PH: 317.655.7777 FAX: 317.655.7778



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PROPOSED SITE KEY NOTES:

- HEAVY DUTY ASPHALT PAVEMENT; SEE DETAIL 202 ON SHEET C800 LIGHT DUTY ASPHALT PAVEMENT; SEE DETAIL 201 ON SHEET C800
- LINE BETWEEN HEAVY DUTY AND LIGHT DUTY PAVEMENT 6" CONCRETE PAVEMENT; SEE DETAIL 214 ON SHEET C800
- ROW CONCRETE APRON PAVEMENT WITH 1" LIP AT GUTTER LINE;
- SEE DETAILS 203 AND 204 ON SHEET C800
- 4" CONCRETE SIDEWALK; SEE DETAIL 206 ON SHEET C800
- COMBINED CURB & WALK; SEE DETAIL 215 ON SHEET C800 COMBINED CURB & WALK FLUSH WITH PAVEMENT; SEE DETAIL 215
- ON SHEET C800 6" CONCRETE CURB; SEE DETAIL 209 ON SHEET C800
- 6" CONCRETE CURB AND GUTTER TO MATCH EXISTING ROW PROFILE SEE DETAIL 205 ON SHEET C800
- TRASH ENCLOSURE; SEE DETAIL 212 ON SHEET C800 4" WIDE MARKING (COLOR=WHITE)
- ADA ACCESSIBLE RAMP; SEE DETAILS 219 AND 221 ON SHEET C801
- ADA PARKING SPACES; SEE DETAILS ON SHEET C801 CONCRETE PARKING STOP; SEE DETAIL 211 ON SHEET C800
- 3 FLAGPOLES 1 35' TALL AND 2 30' TALL FOR BASE SEE DETAIL 223 ON SHEET C801
- 2' WIDE STOP BAR AND STOP SIGN
- ELECTRICAL TRANSFORMER PAD PER A.E.S. STANDARDS
- FUTURE PAVILION
- CONCRETE DOOR STOOP COORDINATE WITH ARCHITECTURAL DRAWINGS
- CONCRETE CURB TAPER; SEE DETAIL 217 ON SHEET C800
- OUTDOOR BIKE STORAGE SHELTER, 16 BIKE CAPACITY, 120"L X 95 1/2"W BY GLOBAL INDUSTRIAL #T9F708408; SHELTER SHALL BE FIELD PAINTED -COORDINATE PAINT SPECIFICATIONS AND PAINT COLOR WITH ARCHITECT
- STORMWATER MANAGEMENT BASIN
- GROUND SIGN; COORDINATE WITH ARCHITECT
- 5' WIDE CROSSWALK THERMOPLASTIC
- PAINTED TRAFFIC CONTROL LANE LINES AND DIRECTIONAL ARROWS
- "NO PARKING LOADING ZONE" SIGN AND POST
- PIPE BOLLARD; SEE DETAIL 213 ON SHEET C800
- 24"X24" ENERGY DISSIPATER GRATE UNDER EACH WALL SCUPPER 9 REQUIRED; SEE ARCHITECTURAL ELEVATIONS AND DETAIL 706 ON SHEET C700
- CONCRETE TURNOUT; SEE DETAIL 216 ON SHEET C800

FOR BIDDING PURPOSES ONLY





SHEET

Civil & Environmental

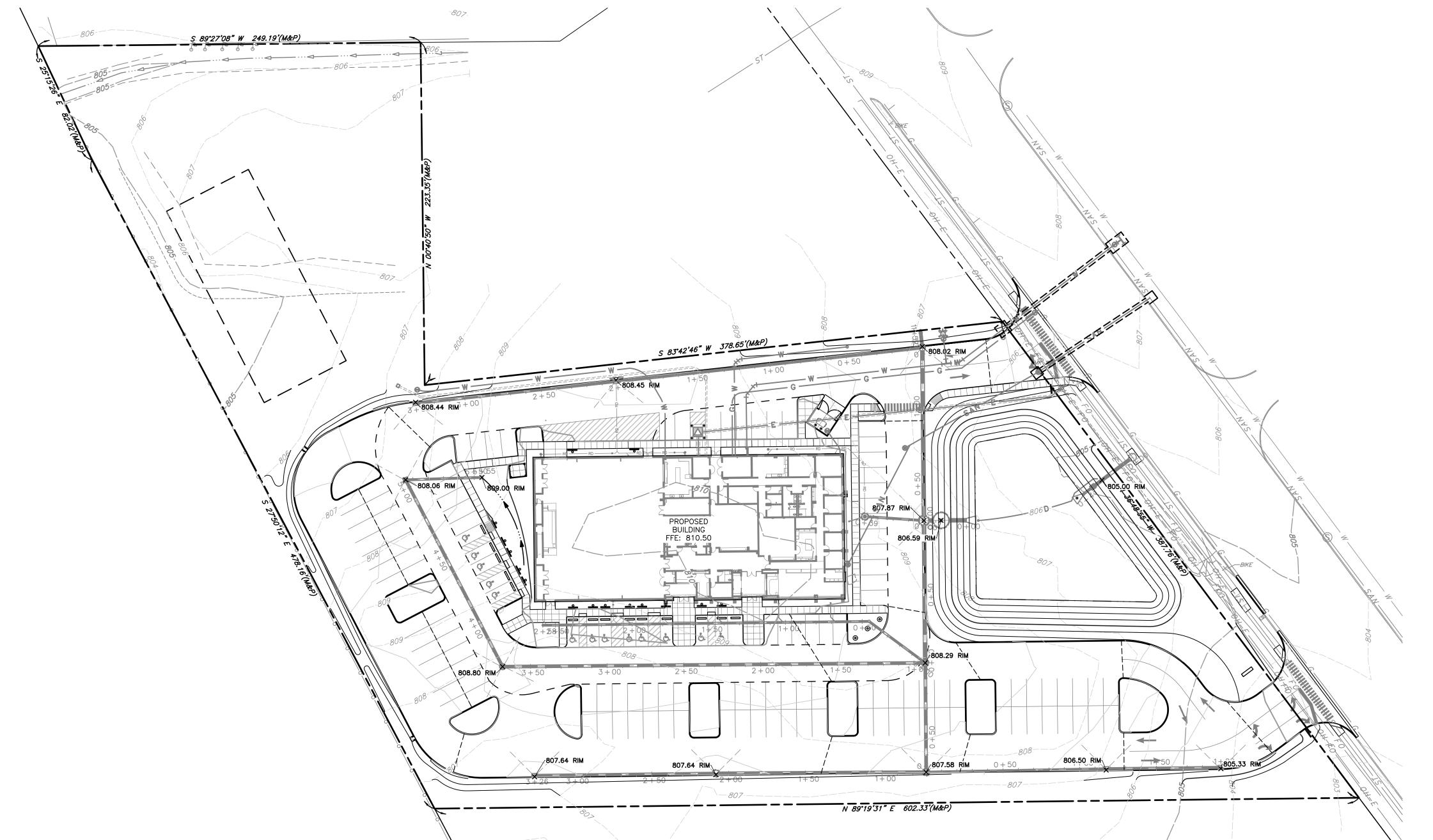
Consultants, Inc.

530 EAST OHIO STREET, SUITE G INDIANAPOLIS. INDIANA 46024

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chitecture + interio





GRADING GENERAL NOTES:

- 1. CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION CONTROL MEASURES PREPARED FOR THIS PROJECT.
- 2. EARTHWORK SHALL INCLUDE CLEARING AND GRUBBING, STRIPPING AND STOCKPILING TOPSOIL, MASS GRADING, EXCAVATION, FILLING, UNDER CUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.
- 3. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACT AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
- 4. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TOA DEPTH INDICATED ON THE LANDSCAPE PLANS (6" MINIMUM). PAVEMENT SLOPES ACROSS ACCESSIBLE PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2%.
- 5. ALL SLOPES SHALL BE 3:1 (HORIZONTAL: VERTICAL) MAXIMUM UNLESS NOTED
- 6. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PLAN, UNLESS NOTED OTHERWISE.
- 7. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
- 8. DRAINAGE SYSTEMS SHALL BE INSPECTED DURING CONSTRUCTION BY A REGISTERED PROFESSIONAL ENGINEER OR LAND SURVEYOR. WITHIN 30 DAYS AFTER COMPLETION OF ON AND OFF-SITE DRAINAGE FACILITIES, THE REGISTERED PROFESSIONAL SHALL CERTIFY IN WRITING THE COMPLIANCE OF THE DRAINAGE FACILITIES PER LOCAL REQUIREMENTS.
- 9. CONTRACTOR SHALL PERPETUATE ALL DRAINS AND TILES ENCOUNTERED DURING CONSTRUCTION. COORDINATE WITH ENGINEER OF RECORD REGARDING THE CONNECTION TO THE PROPOSED STORM SEWER SYSTEM.
- 10. STORM STRUCTURES RECEIVING SUB-SURFACE DRAINS (SSD) SHALL HAVE BOTH CONNECTIONS CORE DRILLED. T OR Y BLIND CONNECTIONS ARE NOT
- 11. REFER TO AND FOLLOW THE RECOMMENDATIONS OF THE GEOTECHNICAL REPORT PREPARED FOR THIS PROJECT.

GRADING LEGEND:

PROPOSED INDEX CONTOUR PROPOSED INTERMEDIATE CONTOUR PROPOSED DRAINAGE SWALE ---- PROPOSED GRADE BREAK PROPOSED STORM SEWER LINE ---- PROPOSED UNDERDRAIN ×--766.90 PROPOSED SPOT ELEVATION

> ABBREVIATIONS: TC = TOP OF CURB BC = BOTTOM OF CURBTS = TOP OF STEPS BS = BOTTOM OF STEPS

ME = MATCH EXISTING

BENCHMARKS:

UNLESS OTHERWISE NOTED, ELEVATIONS SHOWN HEREON ARE BASED UPON AN OPUS SOLUTION AND ARE ON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

TBM#1: CUT "X" ON THE NORTHWEST BOLT OF TRAFFIC POLE BASE, LOCATED ON THE WEST SIDE OF LAFAYETTE RD. APPROXIMATELY 115 NORTH OF THE SOUTHWEST CORNER OF THE SITE. ELEV. = 805.42

TBM#2: CUT SQUARE ON THE BACK OF A CURB LOCATED ON THE WEST SIDE OF LAFAYETTE RD APPROXIMATELY 125 NORTH OF THE NORTHEAST CORNER OF THE

PROPOSED CURB SPOT ELEVATION; TOP OF CURB

ON TOP, GUTTER ELEVATION ON BOTTOM

TBM#3: CUT SQUARE ON THE SOUTHEAST CORNER OF A FLAGPOLE BASE,

LOCÄTED ON THE NORTH END OF THE SITE ELEV. = 805.93

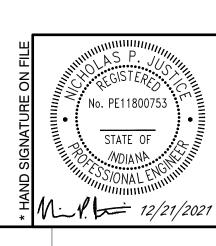
UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. INDIANA 811 ONE-CALL PUBLIC UTILITY LOCATE SERVICE TICKET NUMBERS 2103244667 AND 2103244762 WERE ISSUED FOR THIS SITE.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, THE CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, AND SANITARY SEWER. ANY CONFLICTS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND THE APPROPRIATE AUTHORITIES.

FOR BIDDING





ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROA INDIANAPOLIS, INDIANA 4

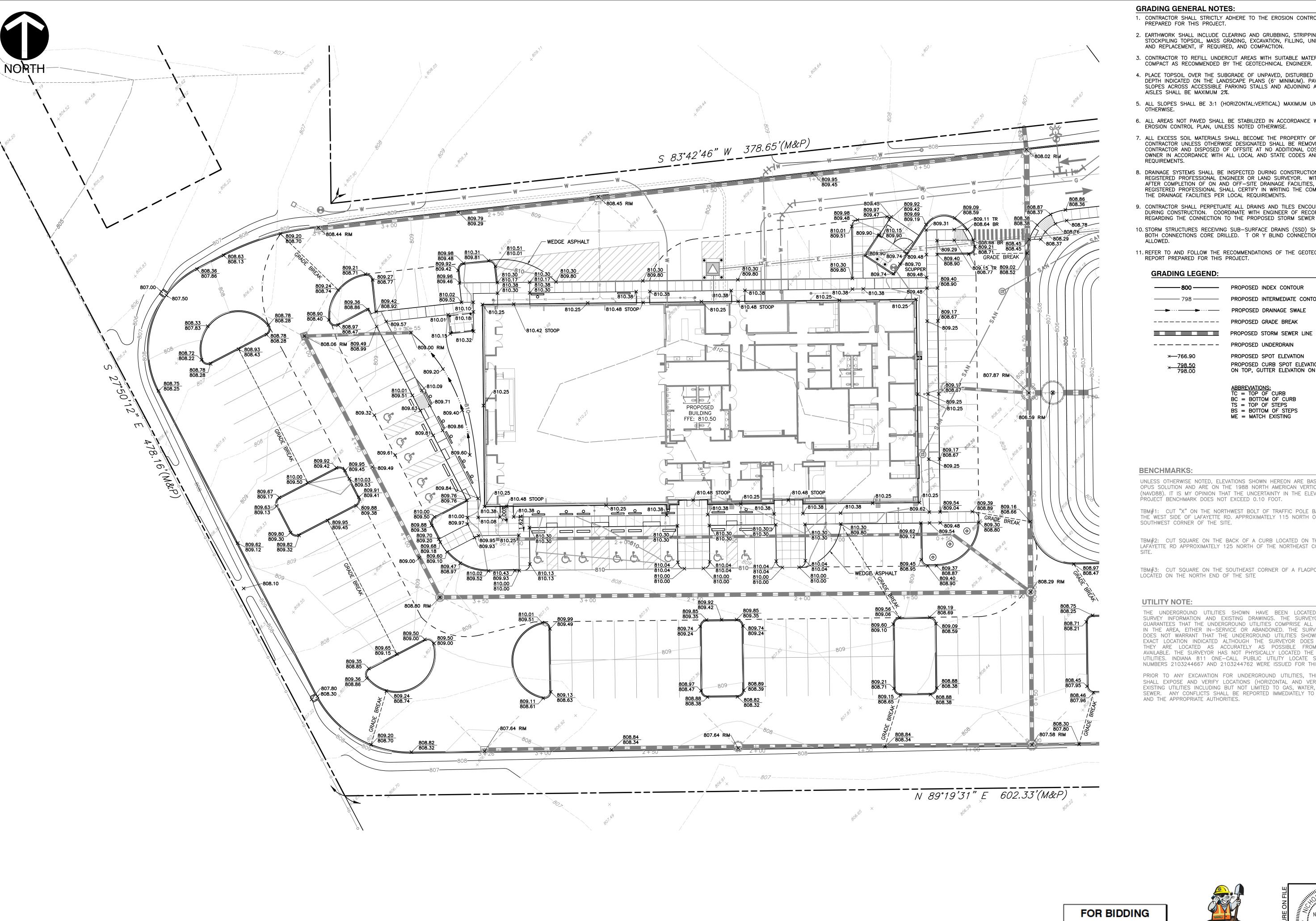
Civil & Environmental Consultants, Inc. 530 EAST OHIO STREET, SUITE G

INDIANAPOLIS. INDIANA 46024 PH: 317.655.7777 FAX: 317.655.7778

PURPOSES ONLY

TOPOGRAPHIC SURVEY COMPLETED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.; PROJECT NUMBER: 310-295, DATED: SEPTEMBER 28, 2021.

REFERENCE



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PROPOSED INTERMEDIATE CONTOUR →··· →··· → PROPOSED DRAINAGE SWALE ---- PROPOSED GRADE BREAK PROPOSED STORM SEWER LINE ---- PROPOSED UNDERDRAIN ×--766.90 PROPOSED SPOT ELEVATION PROPOSED CURB SPOT ELEVATION; TOP OF CURB

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ON TOP, GUTTER ELEVATION ON BOTTOM

BENCHMARKS:

UNLESS OTHERWISE NOTED, ELEVATIONS SHOWN HEREON ARE BASED UPON AN OPUS SOLUTION AND ARE ON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

TBM#1: CUT "X" ON THE NORTHWEST BOLT OF TRAFFIC POLE BASE, LOCATED ON THE WEST SIDE OF LAFAYETTE RD. APPROXIMATELY 115 NORTH OF THE SOUTHWEST CORNER OF THE SITE. ELEV. = 805.42

TBM#2: CUT SQUARE ON THE BACK OF A CURB LOCATED ON THE WEST SIDE OF LAFAYETTE RD APPROXIMATELY 125 NORTH OF THE NORTHEAST CORNER OF THE

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ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROA INDIANAPOLIS, INDIANA 4

TBM#3: CUT SQUARE ON THE SOUTHEAST CORNER OF A FLAGPOLE BASE, ELEV. = 805.93

UTILITY NOTE:

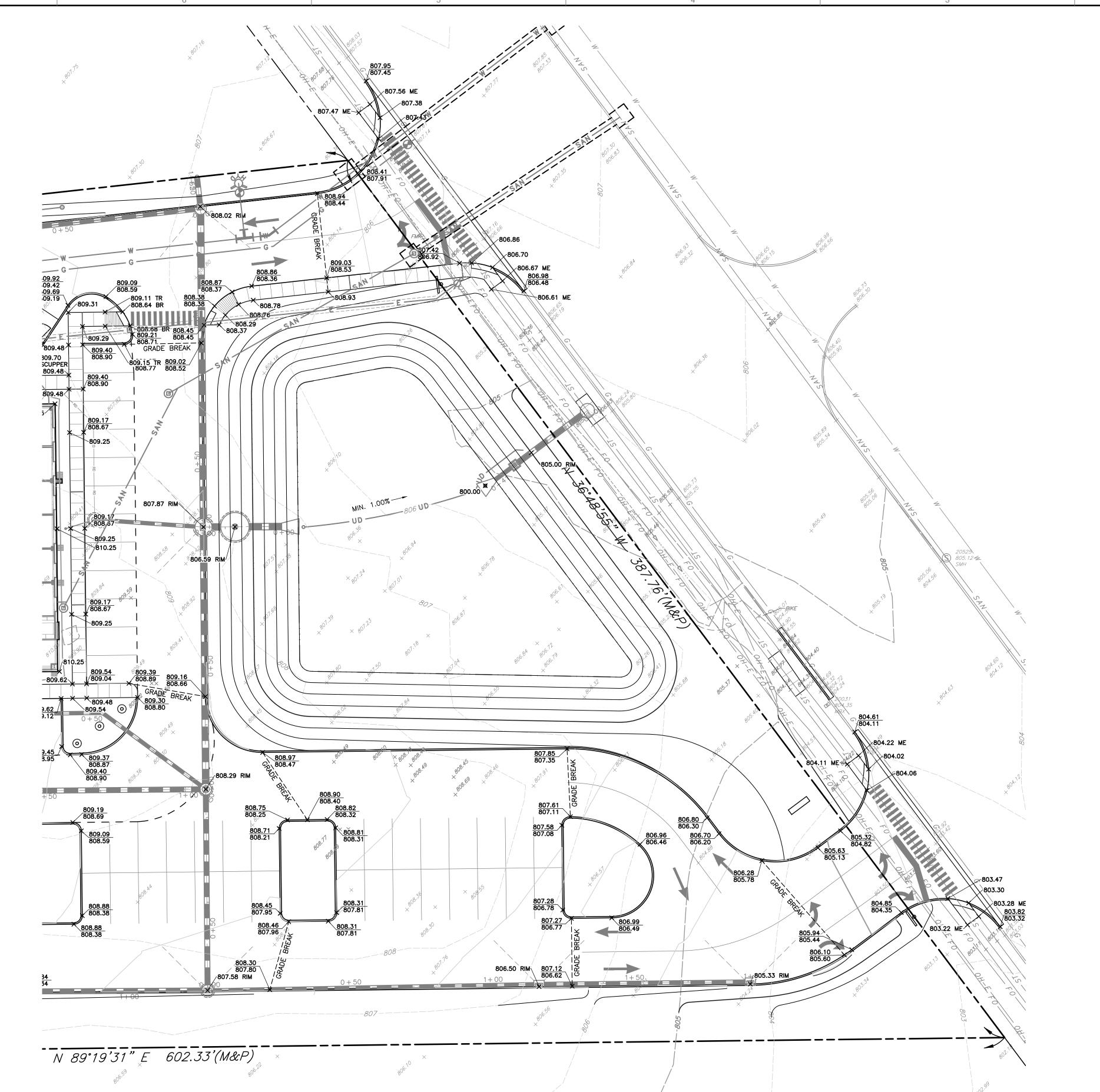
THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. INDIANA 811 ONE-CALL PUBLIC UTILITY LOCATE SERVICE TICKET NUMBERS 2103244667 AND 2103244762 WERE ISSUED FOR THIS SITE.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, THE CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, AND SANITARY SEWER. ANY CONFLICTS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND THE APPROPRIATE AUTHORITIES.

No. PE11800753 STATE OF . MDIANA. Mil. 12/21/2021

C301 SHEET 9 OF -





GRADING GENERAL NOTES:

1. CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION CONTROL MEASURES PREPARED FOR THIS PROJECT.

2. EARTHWORK SHALL INCLUDE CLEARING AND GRUBBING, STRIPPING AND STOCKPILING TOPSOIL, MASS GRADING, EXCAVATION, FILLING, UNDER CUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.

3. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACT AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

4. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TOA DEPTH INDICATED ON THE LANDSCAPE PLANS (6" MINIMUM). PAVEMENT SLOPES ACROSS ACCESSIBLE PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2%.

5. ALL SLOPES SHALL BE 3:1 (HORIZONTAL:VERTICAL) MAXIMUM UNLESS NOTED

6. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PLAN, UNLESS NOTED OTHERWISE.

7. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.

8. DRAINAGE SYSTEMS SHALL BE INSPECTED DURING CONSTRUCTION BY A REGISTERED PROFESSIONAL ENGINEER OR LAND SURVEYOR. WITHIN 30 DAYS AFTER COMPLETION OF ON AND OFF-SITE DRAINAGE FACILITIES, THE REGISTERED PROFESSIONAL SHALL CERTIFY IN WRITING THE COMPLIANCE OF THE DRAINAGE FACILITIES PER LOCAL REQUIREMENTS.

9. CONTRACTOR SHALL PERPETUATE ALL DRAINS AND TILES ENCOUNTERED DURING CONSTRUCTION. COORDINATE WITH ENGINEER OF RECORD REGARDING THE CONNECTION TO THE PROPOSED STORM SEWER SYSTEM.

10. STORM STRUCTURES RECEIVING SUB-SURFACE DRAINS (SSD) SHALL HAVE BOTH CONNECTIONS CORE DRILLED. T OR Y BLIND CONNECTIONS ARE NOT

11. REFER TO AND FOLLOW THE RECOMMENDATIONS OF THE GEOTECHNICAL

REPORT PREPARED FOR THIS PROJECT.

GRADING LEGEND:

 798 	PROPOSED INTERMEDIATE CONTOUR
	PROPOSED DRAINAGE SWALE
	PROPOSED GRADE BREAK
	PROPOSED STORM SEWER LINE
	PROPOSED UNDERDRAIN
≻ 766.90	PROPOSED SPOT ELEVATION
798.50	PROPOSED CURB SPOT ELEVATION; TOP OF CURB

ABBREVIATIONS: TC = TOP OF CURB BC = BOTTOM OF CURBTS = TOP OF STEPS
BS = BOTTOM OF STEPS ME = MATCH EXISTING

ON TOP, GUTTER ELEVATION ON BOTTOM

BENCHMARKS:

UNLESS OTHERWISE NOTED, ELEVATIONS SHOWN HEREON ARE BASED UPON AN OPUS SOLUTION AND ARE ON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

TBM#1: CUT "X" ON THE NORTHWEST BOLT OF TRAFFIC POLE BASE, LOCATED ON THE WEST SIDE OF LAFAYETTE RD. APPROXIMATELY 115 NORTH OF THE SOUTHWEST CORNER OF THE SITE.

ELEV. = 805.42

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TBM#2: CUT SQUARE ON THE BACK OF A CURB LOCATED ON THE WEST SIDE OF LAFAYETTE RD APPROXIMATELY 125 NORTH OF THE NORTHEAST CORNER OF THE

TBM#3: CUT SQUARE ON THE SOUTHEAST CORNER OF A FLAGPOLE BASE, LOCÄTED ON THE NORTH END OF THE SITE

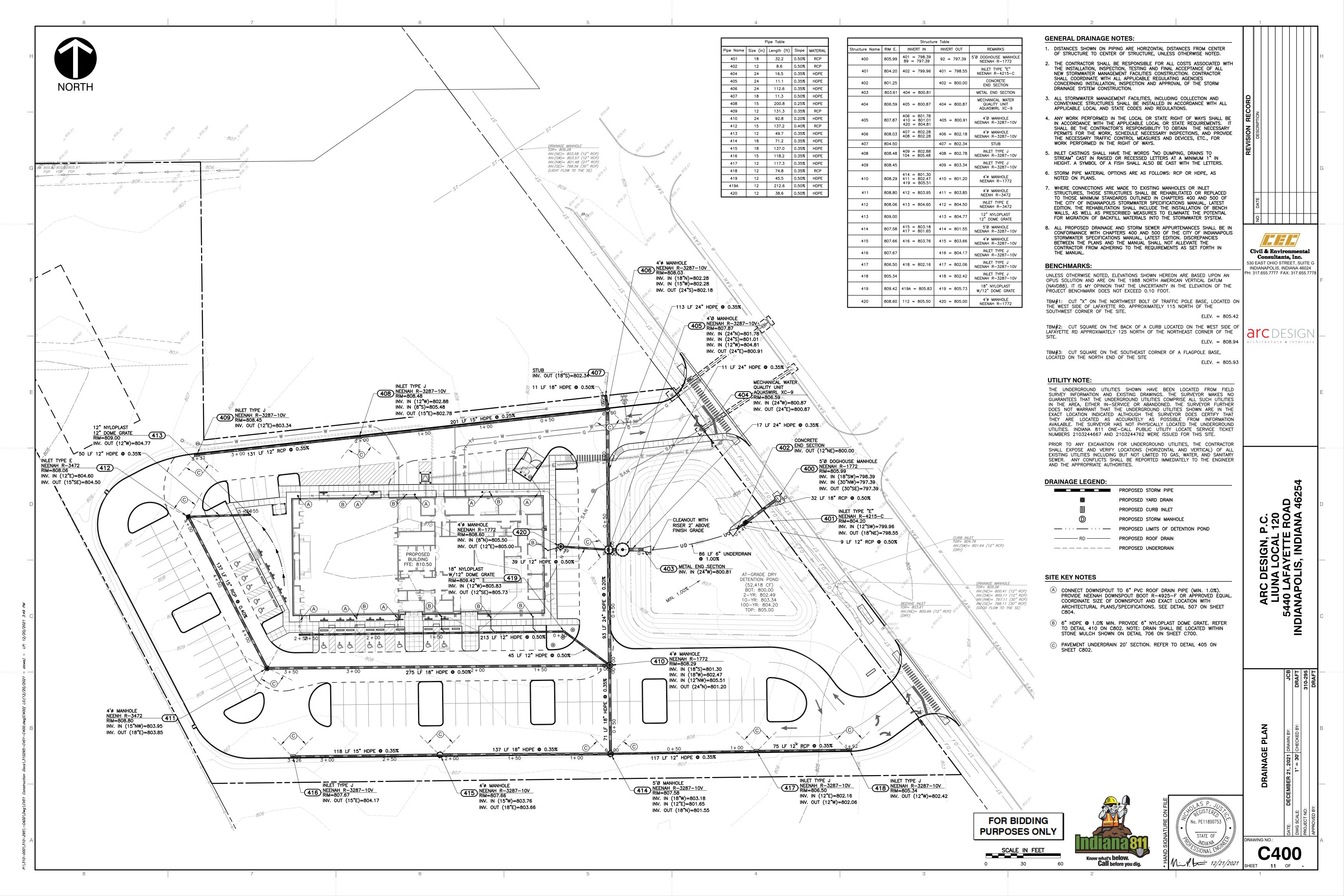
ELEV. = 805.93

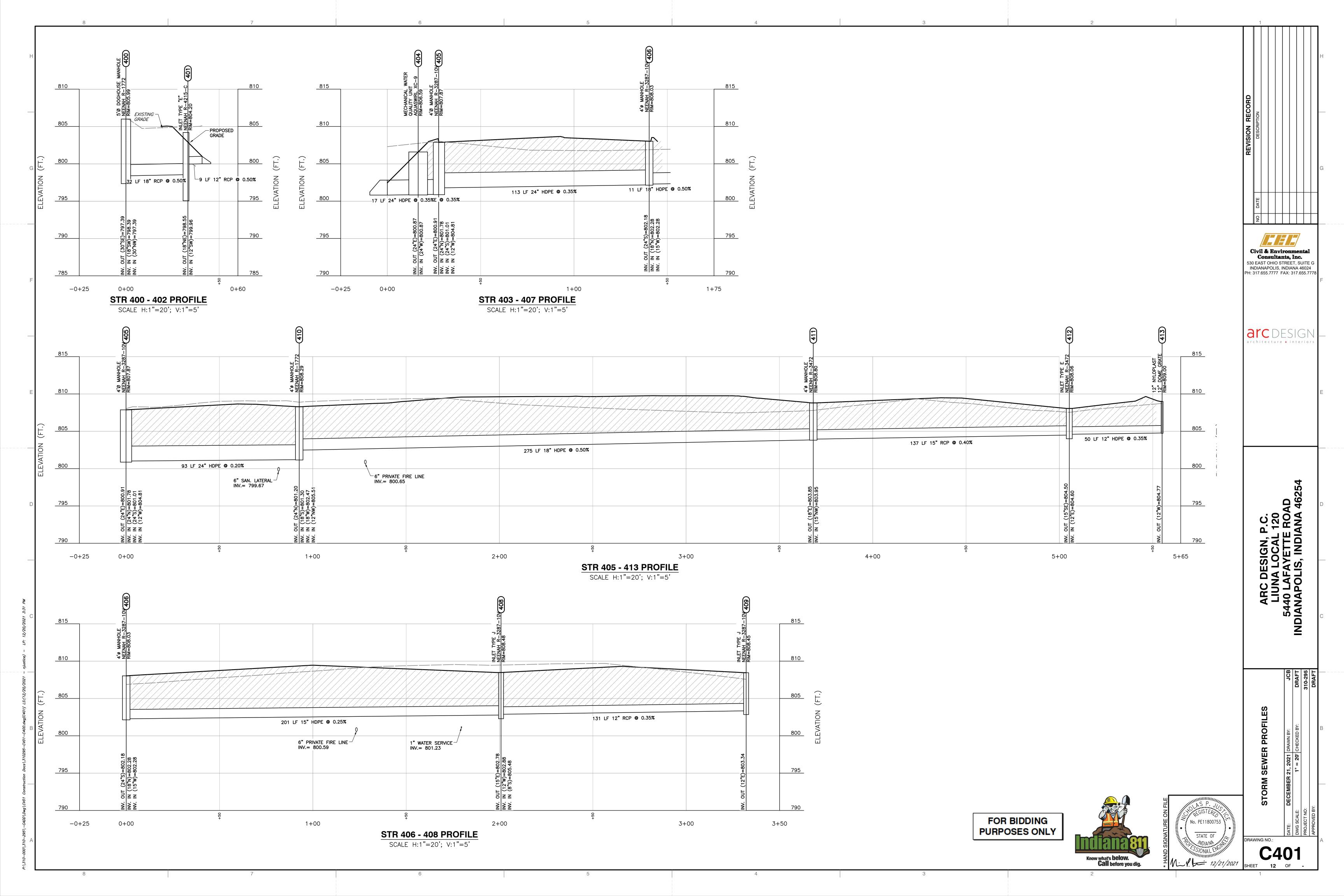
UTILITY NOTE:

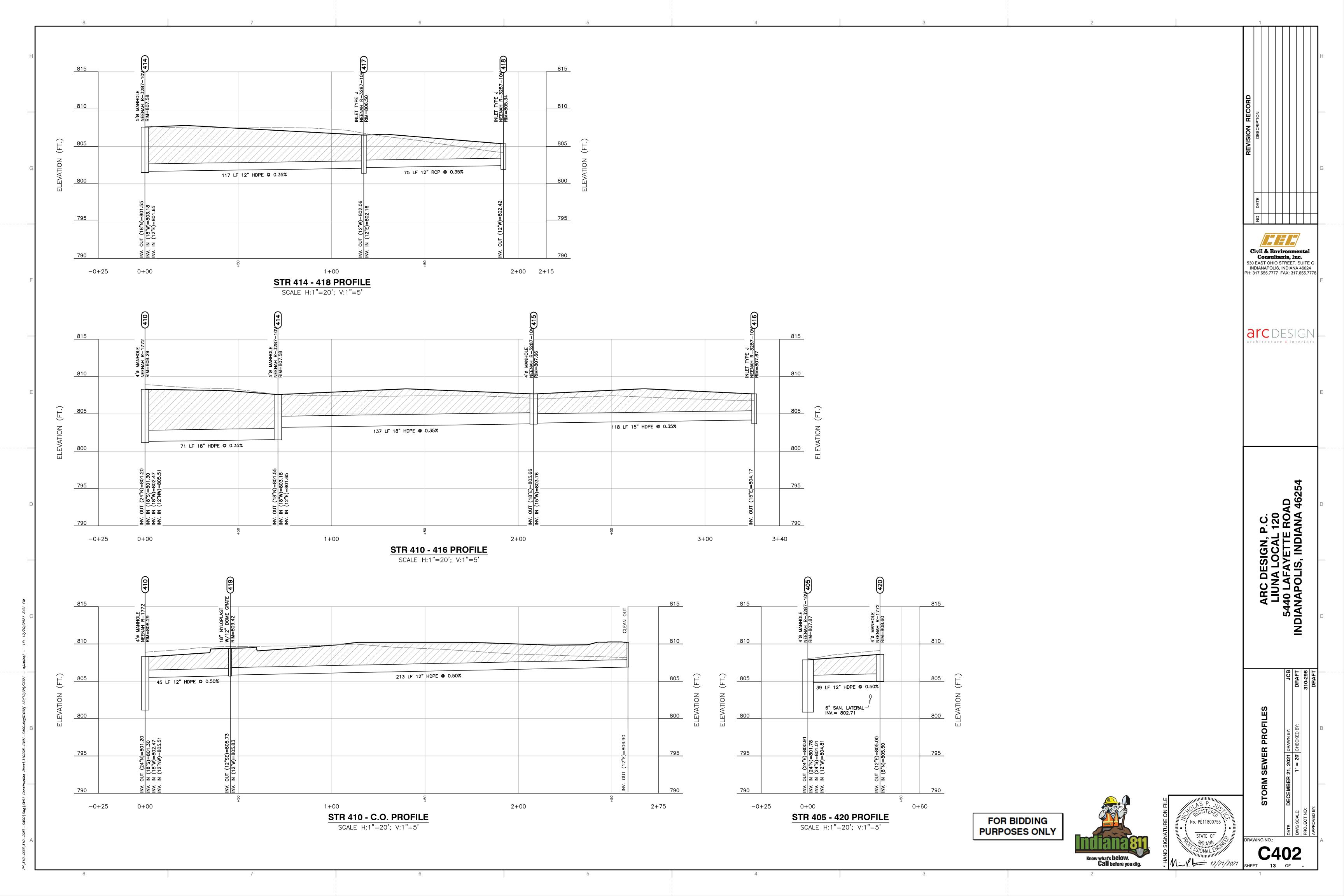
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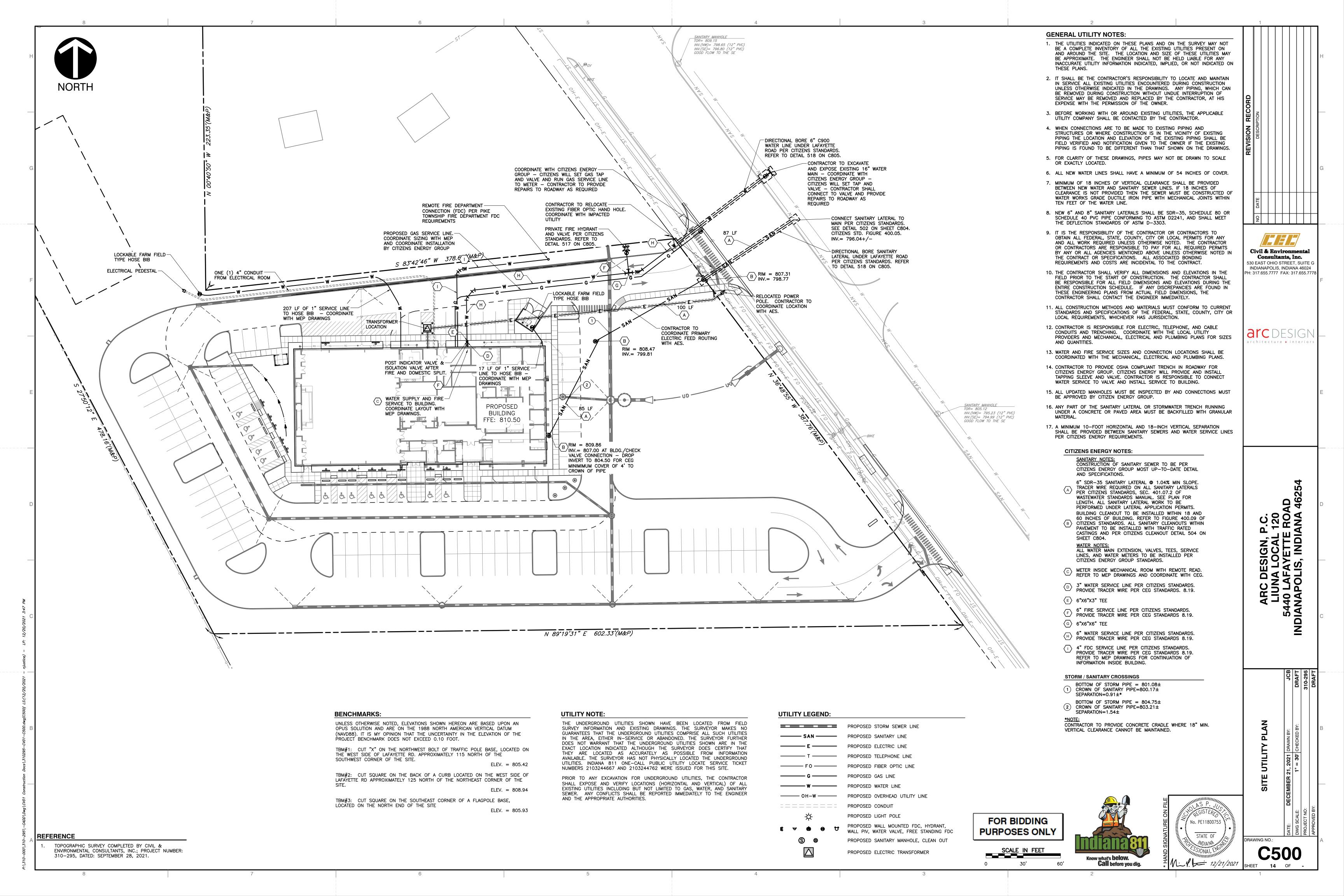
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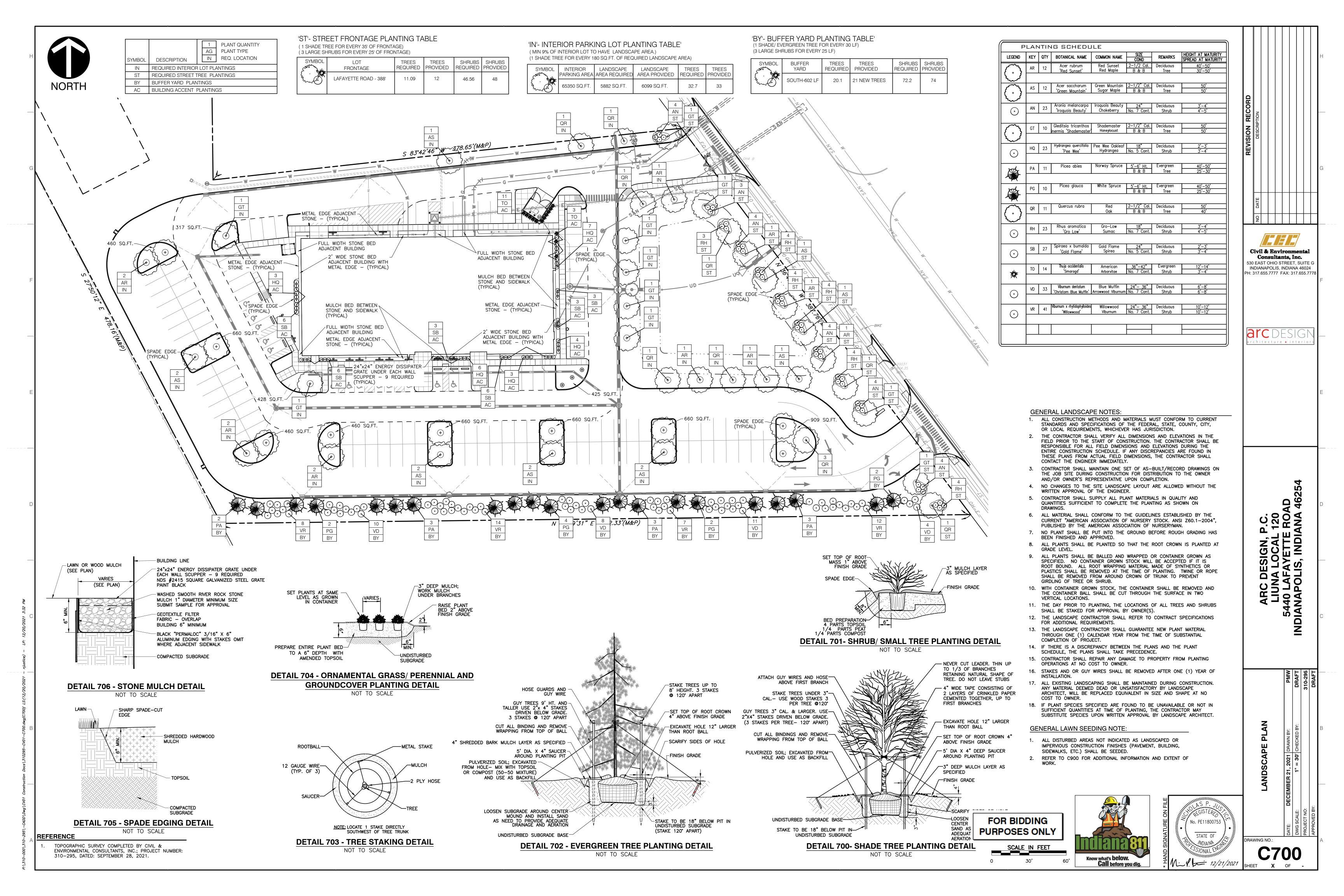


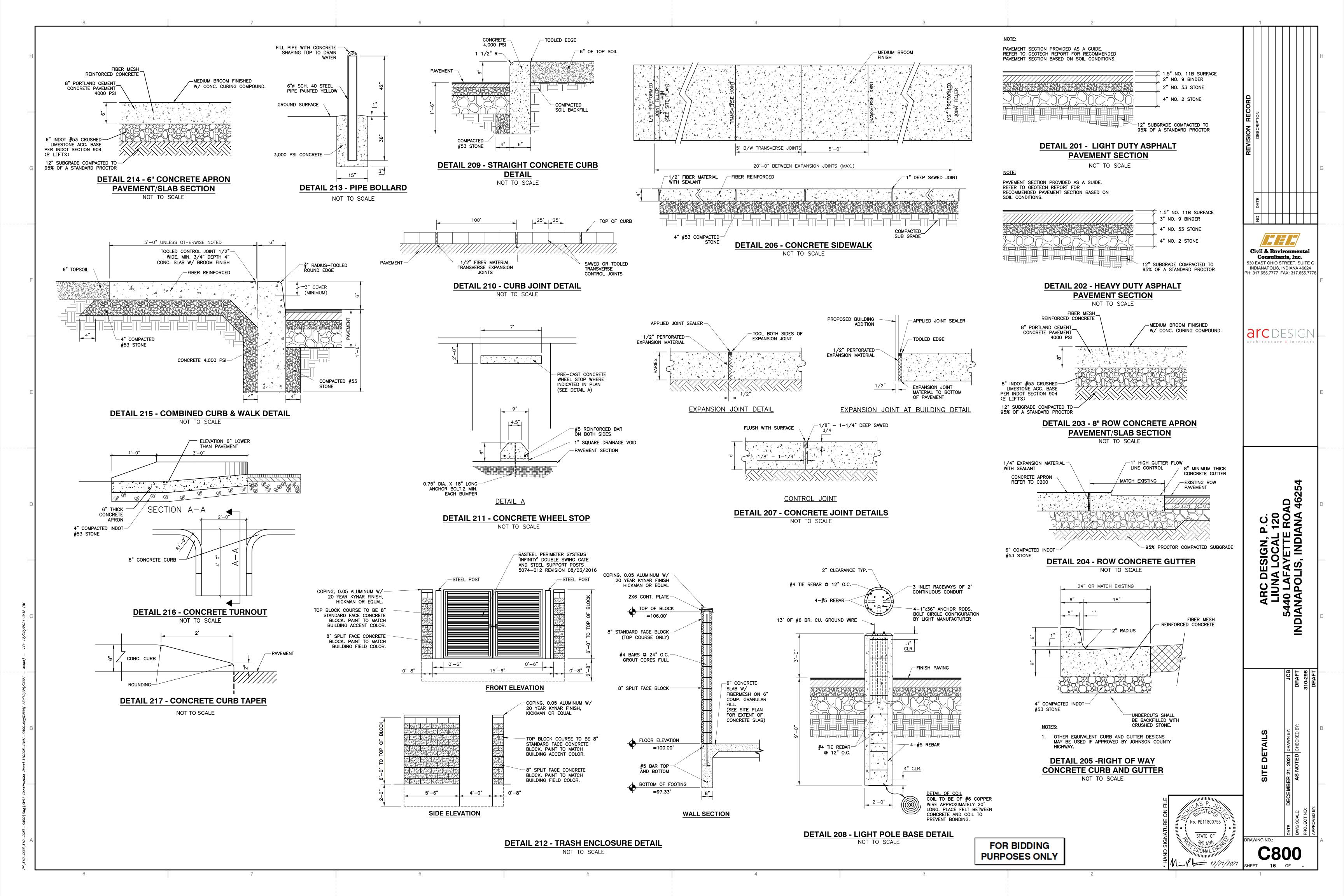


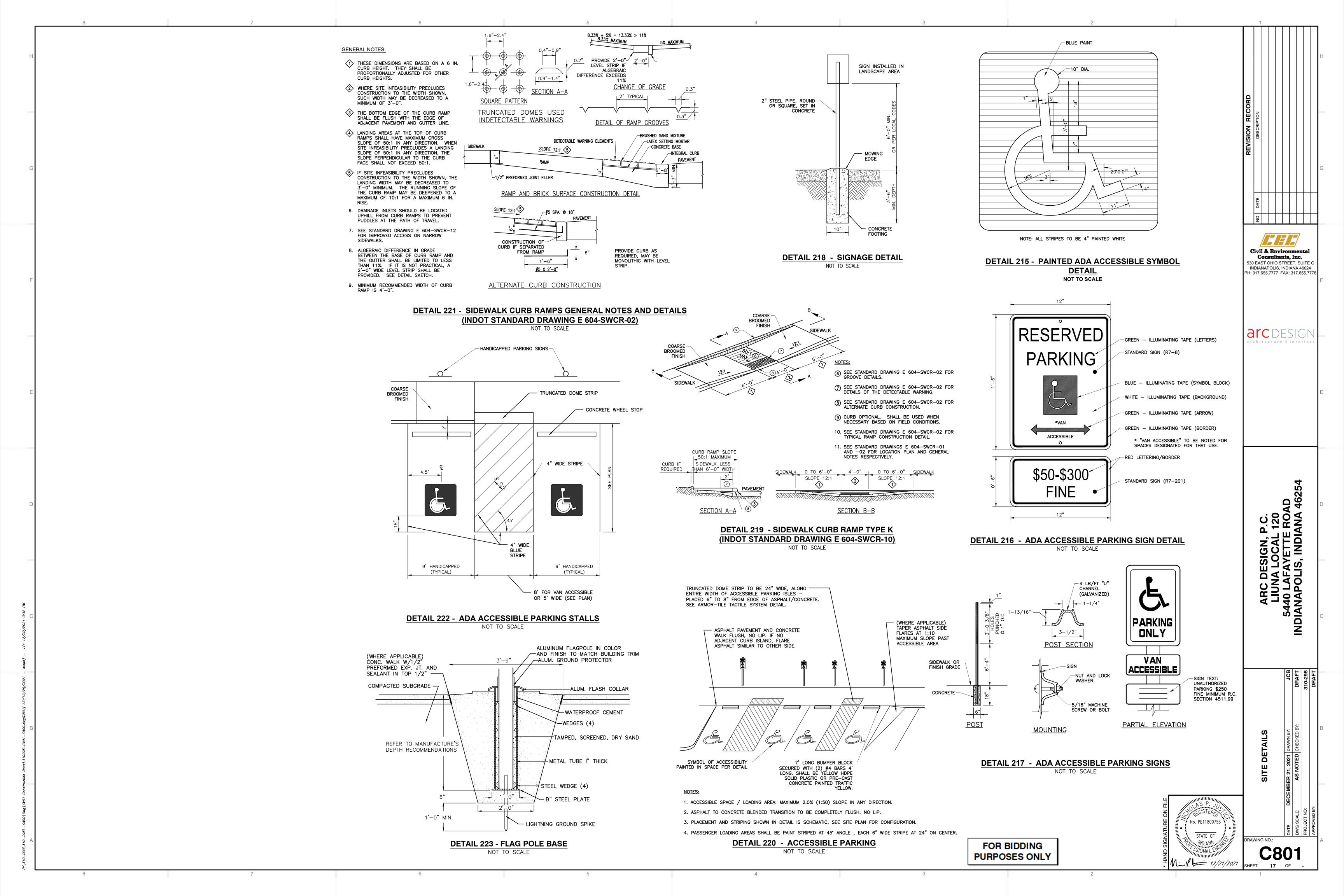


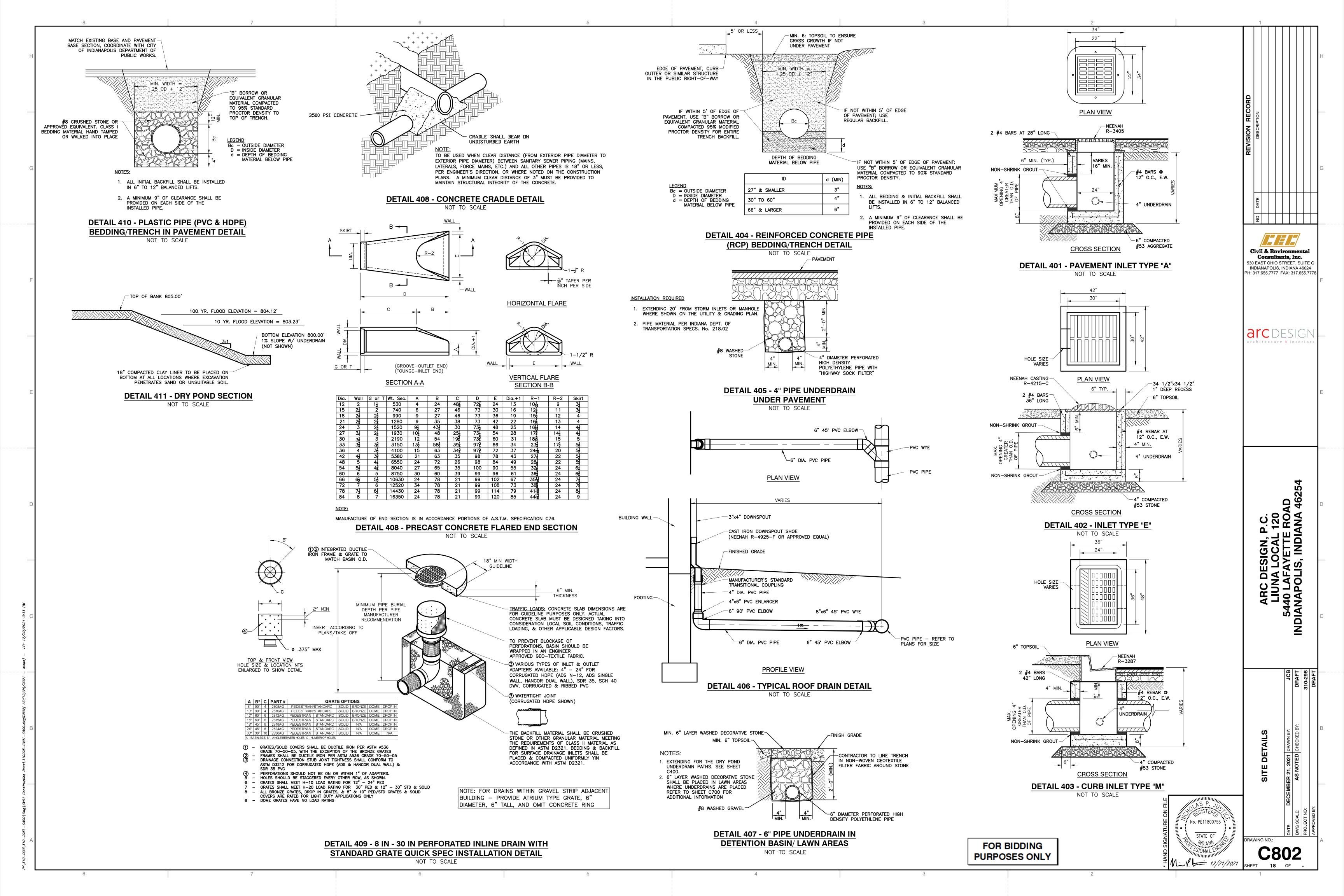








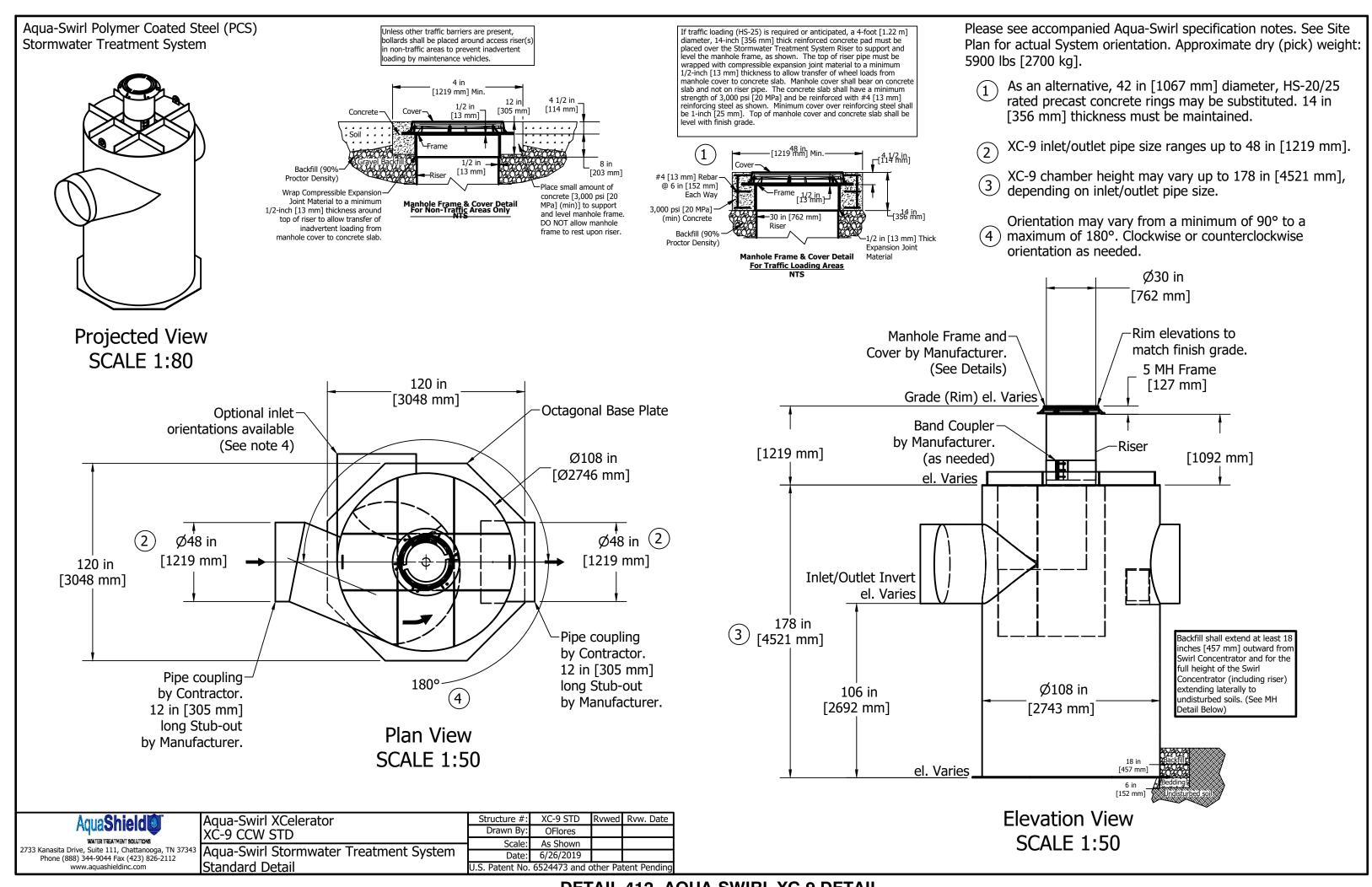




DETAIL 413 - OUTLET CONTROL

STRUCTURE

NOT TO SCALE



DETAIL 412- AQUA-SWIRL XC-9 DETAIL NOT TO SCALE

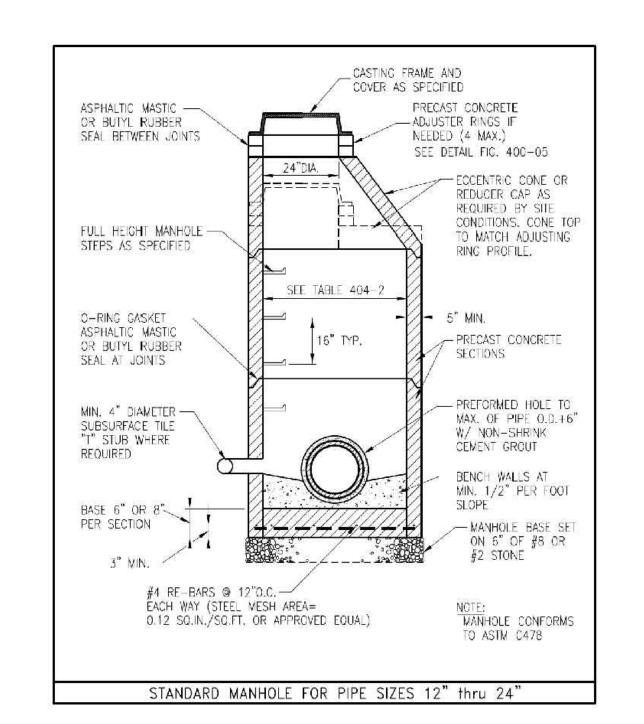


FIGURE 400-01: Standard Manhole for Pipe Sized 12" thru 24" NOTE: BENCH WALLS SHALL CONFORM TO SECTION 404.06 OF THE CITY OF INDIANAPOLIS STORMWATER SPECIFICATIONS MANUAL. THE BENCH WALL SHALL FORM A DEFINED CHANNEL, TO A MINIMUM HEIGHT OF 80-PERCENT OF THE INSIDE DIAMETER OF THE INLET AND OUTLET PIPES TO FORM A "U" SHAPED CHANNEL, CONSTRUCTED AT A MINIMUM 1/2 INCH PER FOOT SLOPE TO THE MANHOLE WALL.

City of Indianapolis Storm Water Specifications Manual

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DETAIL 415- STORM MANHOLE PIPE SIZES 12"-24" NOT TO SCALE

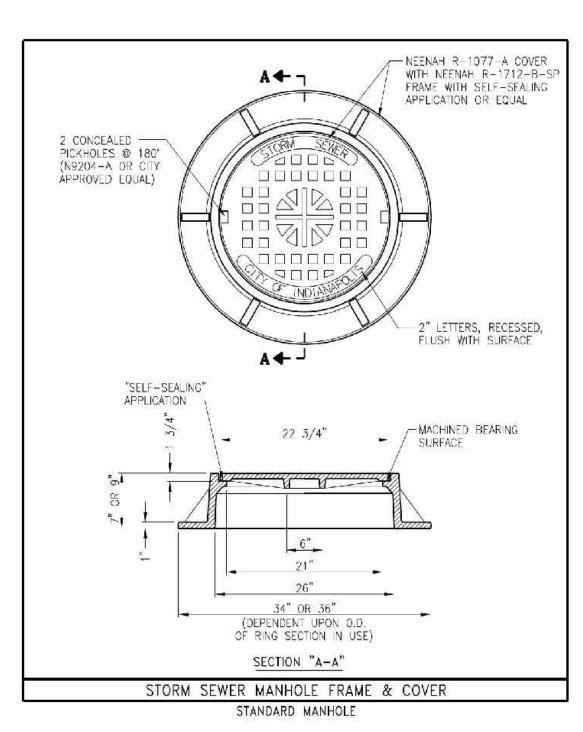


FIGURE 400-11: Storm Sewer Manhole Frame & Cover

*NOTE: INLET CASTINGS SHALL HAVE THE WORDS "NO DUMPING, DRAINS TO STREAM" CAST IN RAISED OR RECESSED LETTERS AT A MINIMUM 1" IN HEIGHT. A SYMBOL OF A FISH SHALL ALSO BE CAST WITH THE LETTERS.

City of Indianapolis Storm Water Specifications Manual

> **DETAIL 414- STORM SEWER MANHOLE** FRAME & COVER NOT TO SCALE

Appendix page A4-11

January 2011 - FINAL

FOR BIDDING PURPOSES ONLY



RAWING NO.: **19** OF -

DETAIL

Civil & Environmental

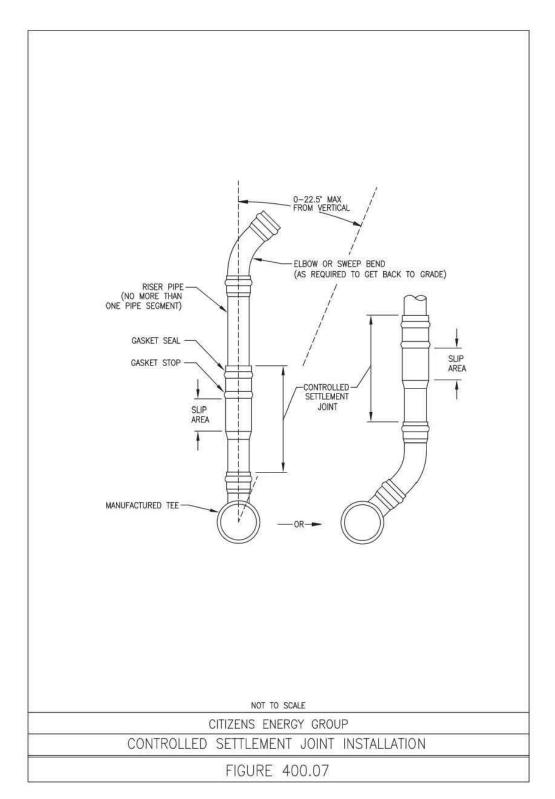
Consultants, Inc.

530 EAST OHIO STREET, SUITE G

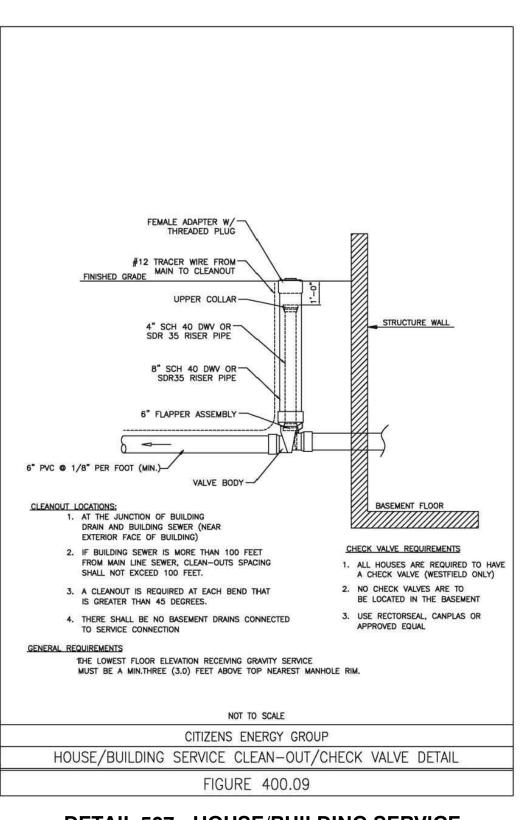
PH: 317.655.7777 FAX: 317.655.777

INDIANAPOLIS. INDIANA 46024

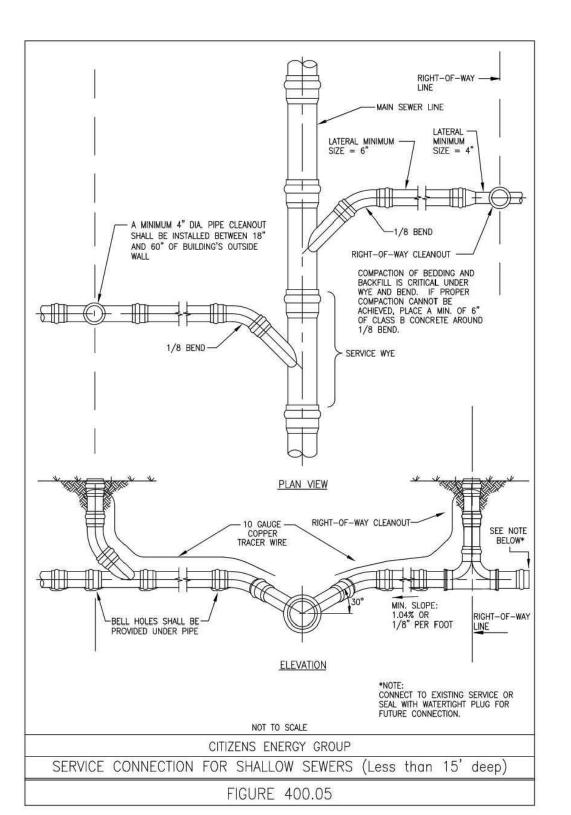
ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROAD INDIANAPOLIS, INDIANA 462



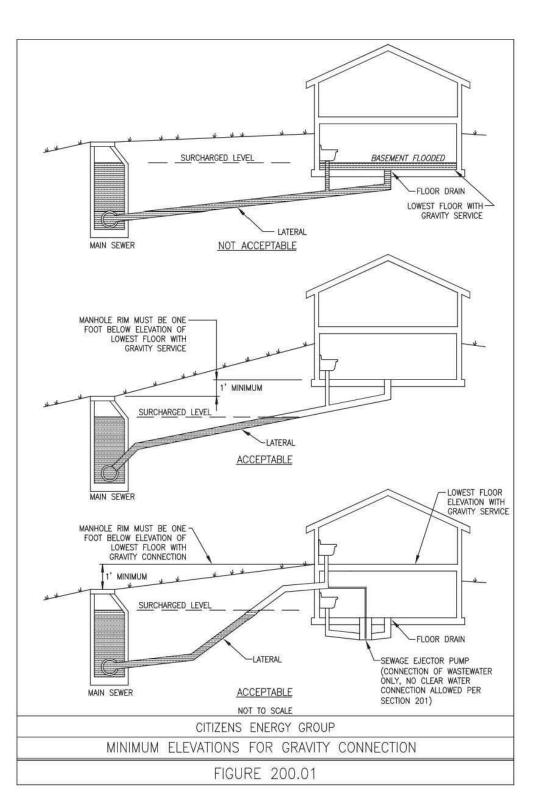
DETAIL 503 - CONTROLLED SETTLEMENT JOINT INSTALLATION DETAIL NOT TO SCALE



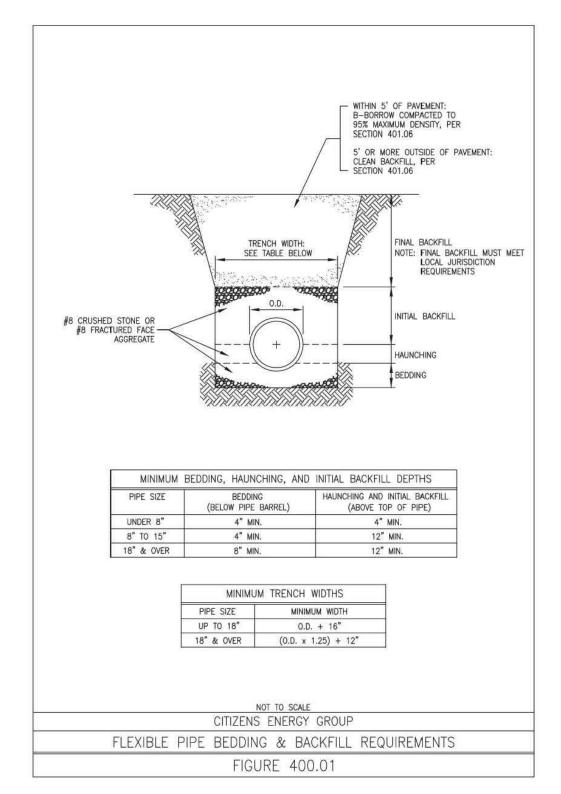
CLEAN-OUT/CHECK VALVE DETAIL NOT TO SCALE



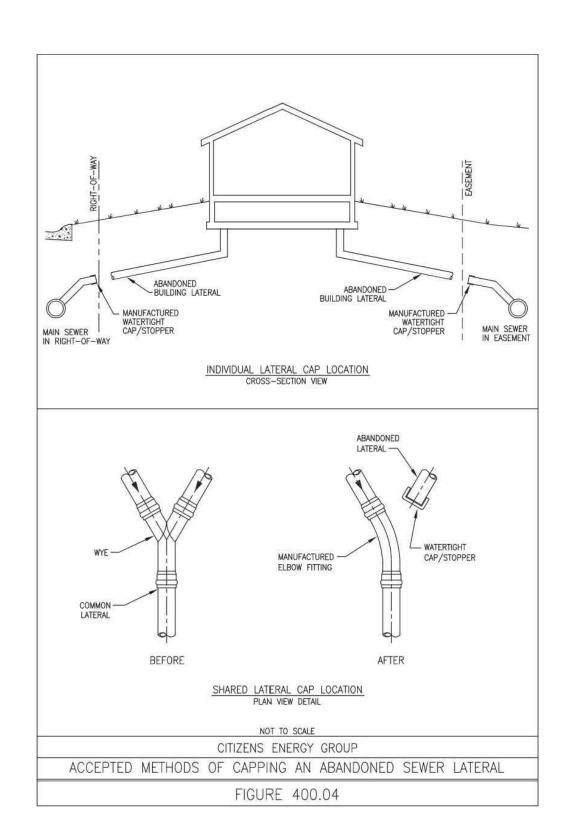
DETAIL 502 - SERVICE CONNECTION FOR SHALLOW SEWERS (LESS THAN 15' DEEP) **DETAIL** NOT TO SCALE



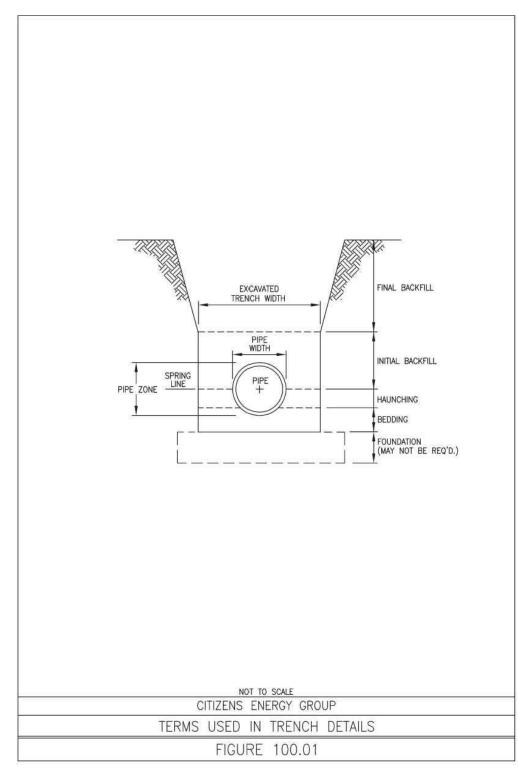
DETAIL 506 - MINIMUM ELEVATIONS FOR GRAVITY CONNECTION NOT TO SCALE



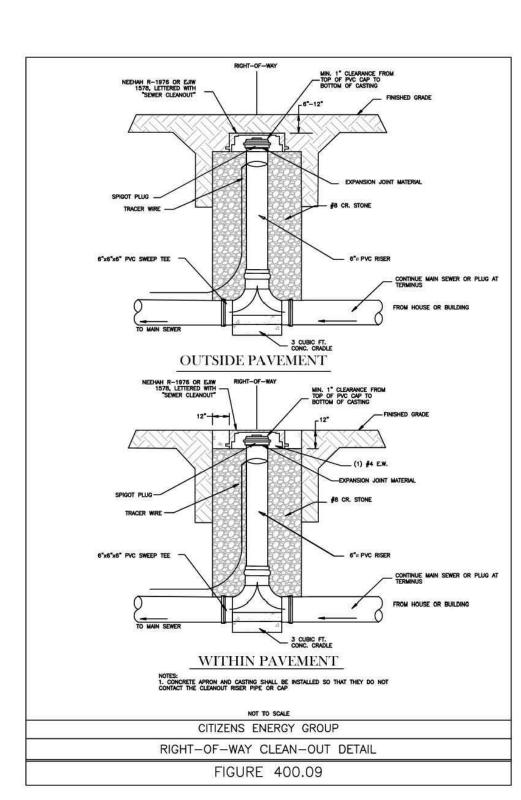
DETAIL 501 - FLEXIBLE PIPE BEDDING & BACKFILL REQUIREMENTS DETAIL NOT TO SCALE



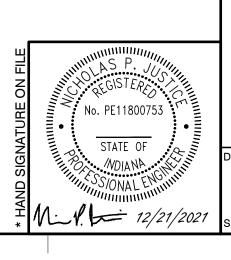
DETAIL 505 - ACCEPTED METHODS OF CAPPING AN ABANDONED SEWER LATERAL NOT TO SCALE



DETAIL 500 - TERMS USED IN TRENCH DETAILS NOT TO SCALE



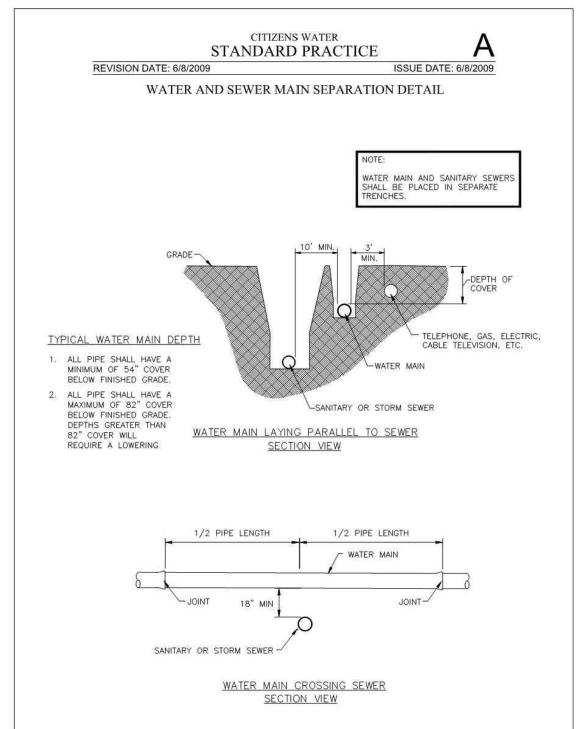
DETAIL 504 - RIGHT-OF-WAY CLEAN-OUT DETAIL NOT TO SCALE

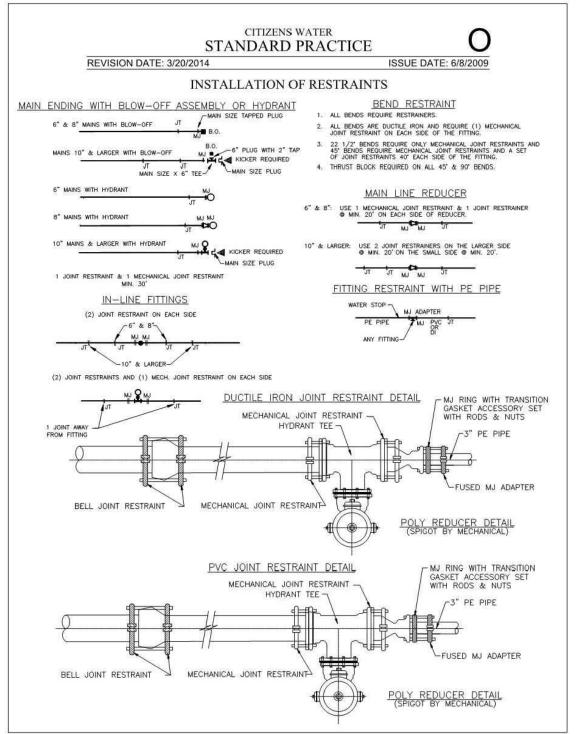


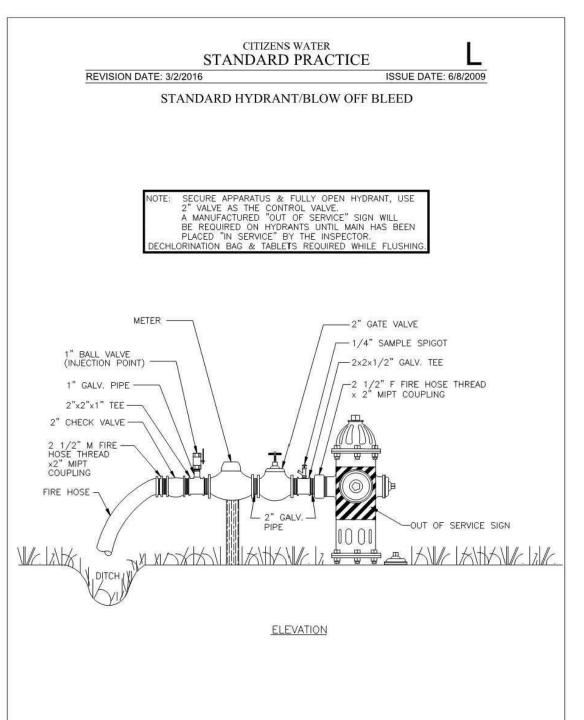
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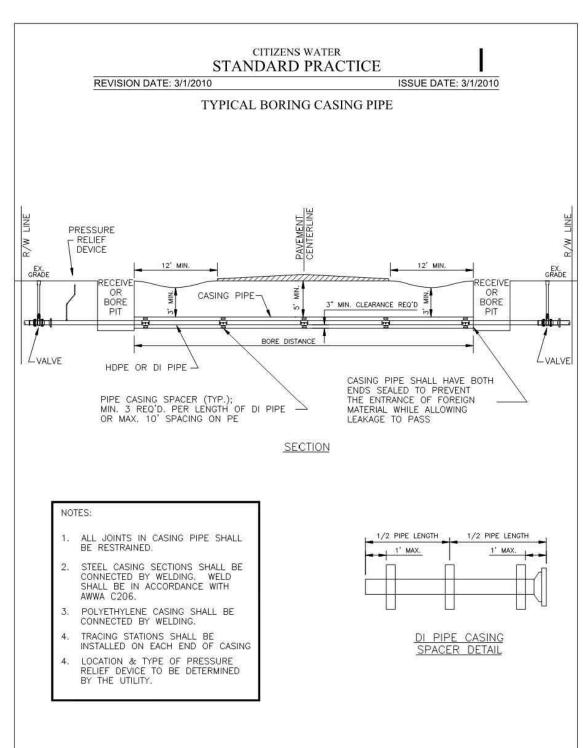
Civil & Environmenta Consultants, Inc. 530 EAST OHIO STREET, SUITE G INDIANAPOLIS, INDIANA 46024 PH: 317.655.7777 FAX: 317.655.7778

DETAIL 507 - HOUSE/BUILDING SERVICE

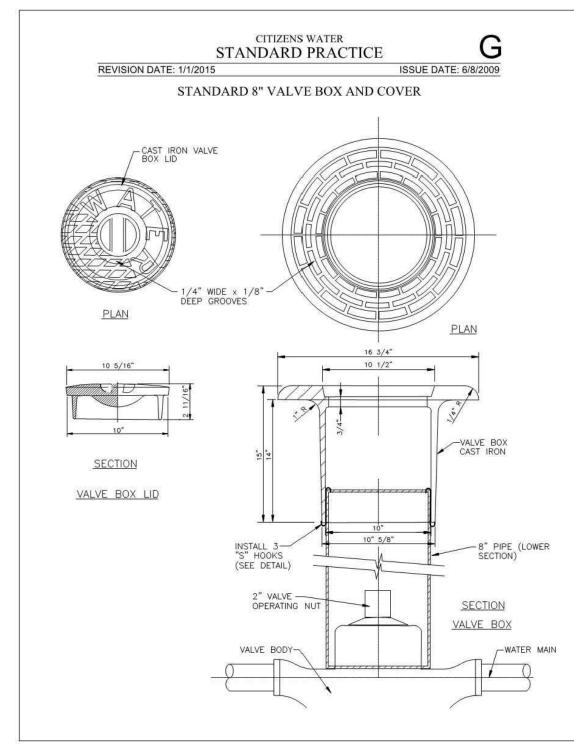




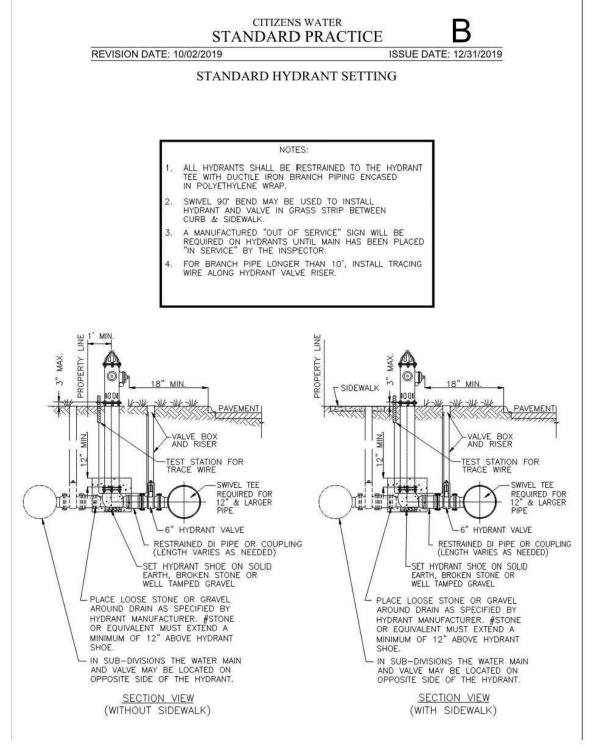




DETAIL 518 - TYPICAL BORING CASING PIPE DETAILNOT TO SCALE



COVER DETAIL NOT TO SCALE



DETAIL 517 - STANDARD HYDRANT SETTING FOR 6" & 8" WATER MAIN SIZES DETAIL NOT TO SCALE

No. PE11800753 STATE OF WDIANA. Nil 12/21/2021

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SITE DETAILS

DRAWING NO.:

C805

SHEET 21 OF -

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DETAIL 515 - INSTALLATION OF RESTRAINTS DETAIL 514 - STANDARD HYDRANT/BLOW OFF DETAIL 516 - WATER AND SEWER SEPARATION DETAIL 513 - STANDARD 8" VALVE BOX AND DETAIL BLEED DETAIL DETAIL NOT TO SCALE NOT TO SCALE NOT TO SCALE

These material requirements are minimum requirements and are in part restatements of requirements set forth within the referenced standards, with noted exceptions. The Engineer shall be ultimately responsible for designing and selecting the appropriate material for each specific application. Information from the referenced specifications has been the engineer, contractor, and manufacturer must also assume the responsibility of familiarizing themselves with these requirements. The City will not assume responsibility for noncompliance with the referenced specifications as a result of information not

Each length of pipe or culvert, subsurface drainage tile, and each manholes and box inlet structure shall be marked per the requirements of each respective ASTM Standard referenced within this

401.03 Certification of Materials The Department shall reserve the right to require material certification from the manufacturer prior to or during construction of the storm water drainage facilities as deemed necessary to ensure the material supplied conforms to the prescribed requirements. Provisions for obtaining this certification shall be the responsibility of the permit applicant. The City of Indianapolis does not assume the responsibility for the expense of obtaining material certification.

401.04 Material Testing and Inspection

The Department shall reserve the right to require the manufacturer, at and Inspection the expense of the manufacturer, to perform those minimum inspections and tests set forth in each ASTM specification referenced herein. These inspections and tests will be required to ensure that the pipe or culvert material supplied conforms to prescribed requirements. This testing may be conducted by ne quality control section of each individual manufacturer, or may be overseen or conducted by a qualified independent private testing laboratory. The manufacturer shall be defined as the producer of those materials required by this standard having direct responsibility and authority for the satisfaction of those minimum material specifications set forth herein. In those instances where independent inspection and testing are deemed necessary by the Department, the responsibility for the expense of these services will be arranged on a case basis

401.05 Jacking and Boring Operations

Jacking and boring operations shall be in full conformance with the City of Indianapolis Sanitary District Standards for Design and Construction of Sanitary Sewer (latest revision)

The pipe materials accepted for jacking and boring shall be as follows:

Class 50, 51, 52, or 54 ductile iron pipe in conformance with AWWA C 151, and cast iron pipe in conformance with AWWA C151.

Steel Pipe

Electric—fusion, arc—welded steel pipe in accordance with ASTM A 139, grade B, or

3. Reinforced Concrete Pipe

Reinforced concrete pipe of 30-inch inside diameter and over may be jacked, and shall be Class III or higher with gasketed, tongue and groove joints. All pipes shall have stee reinforcement concentric with the pipe wall, and additional reinforcement at the end of the pipe. The pipe shall be in accordance with ASTM C 76, and shall have a minimum 8-day compressive strength of 5000 psi. Joint steel shall extend as deep as possible into the bell and spigot without destroying continuity of the pipe joint. Bentonite fittings of sufficient size and frequency shall based upon an evaluation of site conditions by the contractor, with consideration criteria for final acceptance of the installed system by the Department. A steel be used in lieu of tongue and groove.

4. Other Materials

operations on a case basis by the Department, provided sufficient specifications and documentation of the accepted use of the alternative material has been reviewed and approved by the Department.

Other materials such as HOBAS fiberglass pipe will be approved for jacking and boring

SECTION 402 PIPE MATERIALS 402.01 Introduction

The materials used in the construction of storm sewers and open culverts shall be in full conformance with those guidelines set forth below.

For the purpose of this Manual, a storm sewer shall be defined as:

A network of pipe conduits and precast concrete manhole and/or box inlet structures, which collect and convey surface and subsurface (soil) water through gravity flow from a specified geographical area. A arayity flow system utilizes elevation gradients to cause water flow. Subsurface drainage tiles, building floor drains, downspout outlets, roof conductors and sump pump lines are not considered as part of the requirements for storm sewers. Section 406 of this Chapter should be referenced for requirements relating to the connection of subsurface drainage tile systems to the enclosed storm sewer system. Storm water conveyance systems which route an xisting natural or man—made stream channel, open ditch, or storm sewer around or through a developing site shall be considered a storm sewer by this Department, and shall comply with the An open culvert shall be defined as a conduit open on both ends, intended to provide for free Open culverts do not generally contain "in—line" manholes, surface inlets or catchbasins. The term in—line" refers to a precast concrete manhole or box inlet as required by Section 404 of this Manual, which encompasses the entire diameter of the pipe conduit.

The definition of various classes of pipe materials shall be as follows:

1. Pipe Material Class No. 1 - Public Drainage Facilities (minimum 75 year design service life): All public facilities shall be constructed of Class No. 1 materials. Public Facilities shall mean any storm water facility located within the public right-of- way or a drainage easement, either existing or proposed, as required by any ordinance, rule, regulation, or policy of the City of Indianapolis, its departments, Boards, or

By way of example, but not limitation, the ability to require the granting of drainage easements is provided by Chapter 561

Section 10 $\frac{1}{2}$ -42, and within platted subdivision by the Subdivision Control Ordinance. The Department will require the granting of drainage easements for those storm water facilities located outside of the public right-of-way, which drain greater than five (5) acres of off-site storm water runoff. Off-site shall mean that property not under the same ownership as the parcel containing the storm water facilities. The granting of a drainage easement to the City of Indianapolis does not create a responsibility for the City to maintain the drainage facilities located within the easement

2. Pipe Material Class No. 2 - Open Culvert Facilities (minimum 50 year service life): Open culverts, except those driveway culverts located within the public right—of—way shall be constructed of Class No. 2 materials. Open culverts shall be defined as those drainage conduits which are open on both ends, and intended to provide for free passage of surface water runoff under highways, streets, roads, drives, shoulders, railroads, or other embankments.

3. Pipe Material Class No. 3 — Private Drainage Facilities (minimum 35 year design service life): All privately owned and maintained storm water facilities may be constructed of Class No. 3 pipe materials. Private drainage facilities shall mean any storm water system located outside any public right—of—way or drainage easement, either existing or proposed, as required by any ordinance, rule, regulation, or policy of the City of inapolis, or Marion County, or outside of any property owned by the City of Indianapolis, its departments, Boards, or agents. Pipe materials accepted by the Department depending upon varying class and service life

402.02 Class 1 Pipe Materials REQUIRED SERVICE LIFE - 75 YRS

> Reinforced concrete pipe Reinforced concrete horizontal elliptical pipe

Precast reinforced concrete box sections Fully bituminous coated fully paved corrugated steel pipe:

14 gauge aluminum coated Type II, 12"-36"

14 gauge aluminum coated Type II or precoated galvanized, 12"—36" 12 gauge aluminum coated Type II or precoated galvanized, 42" and larger Fully bituminous coated, half paved steel helical ribbed pipe (Type IR):

12 gauge aluminum coated Type II, 42" and larger 16 gauge aluminum alloy helical ribbed pipe (Type IR) High density polyethylene pipe (HDPE), 12"-36" Polyvinyl chloride pipe (PVC), 12"-36"

402.03 Class 2 Pipe Materials REQUIRED SERVICE LIFE - 50 YRS

Reinforced concrete pipe Reinforced concrete elliptical pipe Precast reinforced concrete box

Half bituminous coated with payed invert, corrugated steel pipe: 14 gauge precoated galvanized steel pipe 14 gauge aluminum Coated Type II corrugated steel pipe

14 gauge aluminum alloy helical ribbed pipe (Type IR) 14 gauge corrugated aluminum alloy pipe Steel structural plate pipe, pipe arches and long-spans Corrugated aluminum alloy box culvert

Corrugated galvanized steel box culvert Residential driveways and commercial and industrial entrance/exit drives in public R/W: Concrete, 12"-30"

All Class 2 materials, 36" and larger

402.04 Class 3 Pipe Materials REQUIRED SERVICE LIFE - 35 yrs

Reinforced concrete pipe Reinforced concrete elliptical pipe Precast reinforced concrete box sections 16 gauge metal pipe:

Corrugated steel pipe and pipe arch Precoated galvanized steel pipe and pipe arch Aluminum Coated Type II corrugated steel pipe and pipe arch Aluminum Coated Type II steel helical ribbed pipe (Type IR)

Corrugated aluminum alloy pipe and pipe arch Aluminum alloy helical ribbed pipe (Type IR) Steel structural plate pipe, pipe—arches, and long spans Corrugated aluminum allov box culvert Corrugated galvanized steel box culvert

High density polyethylene pipe (HDPE), 12"-60" Polyvinyl chloride pipe (PVC), 12"-36"

NOTE: The minimum pipe diameter for all pipe material (Class 1, 2 and shall be 12", except for Class II

The above materials are the minimum allowed. If a longer service life is desired, some materials will need

Existing drive culverts which have reached the end of their effective service life and are proposed to be extended shall be replaced with those alternate open culvert materials specified by this Chapte Precast storm sewer manholes or box inlets will be required between steel pipes of equal size and shape but differing metal types. Section 404 of this Chapter should be referenced for additional requirements relating to placement of precast storm To satisfy minimum structural requirements, aluminum—alloy pipe, aluminum coated steel pipe, precoated steel pipe, and galvanized steel pipe materials shall confirm to the gauge requirements of Tables 501—6, 501-7, 501-8, and 501-9 within Chapter 500 of this Manual.

The minimum gauge of aluminum—alloy pipe, aluminum coated steel pipe, precoated steel pipe, and galvanized steel pipe shall be the greater of those minimum gauges outlined above, or those minimum 403.07 Reinforced Concrete Pipe (RCP) gauges required to satisfy structural limitations of the manual. The structural design of all pipe materials shall be in accordance with the most restrictive of either manufacturer's recommendations, or AASHTO structural design requirements.

The selected pipe material (from the above list) should be identified on the submitted plans.

402.05 Bituminous Coating's and Paving's

material for corrugated metal pipes referenced herein.

When used with coated pipe of 36 inch and larger diameter, corrugated metal connecting or coupling bands he bituminous material for coating and paving of corrugated metal pipe shall be in full conformance with the Indiana Department of Transportation Standard Specifications. When applied to the pipe, the bituminous material shall be free from impurities and the metal shall be free from grease, dust, moisture, or other deleterious material. The following two processes have been adopted from the Indiana Department of Transportation Standard Specifications and may be used for application of the bituminous

1. When the pipe is not preheated, the temperature of the asphalt at the time of immersion shall be 400-degrees F +/-5 degrees F. The duration of the immersion in the asphalt shall be in accordance with the following: Thickness - 0.052 0.064 0.079 0.109 0.138 0.168 (inches)

Immersion - 2.0 2.5 3.0 5.0 6.5 8.0 Time for First Dip

2. When the pipe is preheated it shall be brought to a temperature of 300-degrees F and the asphalt shall be heated to a temperature of 380-degrees F \pm before the pipe is dipped In either of the above processes, the pipe shall be dipped a second time or more if necessary, to give a minimum thickness of 0.05 of an inch. If payed invert is specified for circular pipe or pipe-arch, the pipe shall be fully or half coated smooth pavement. Except where the upper edges intersect the corrugations, the pavement shall have a minimum thickness of 1/8 of an inch above the crests of the corrugations. For circular pipe the pavement shall be applied to the lower 1/4 of the circumference. For pipe-arches the pavement shall be applied to the lower 40 percent of the inside periphery. Polymer precoated corrugated steel pipe shall be in full conformance with AASHTO M245 (or ASTM Designation A762) and AASHTO M246 (or ASTM Designation A742) Grade 10/10. Bituminous coated and smooth lined galvanized corrugated steel pipe shall be coated as required herein and shall be lined on the inside of the pipe so that a smooth surface will be formed completely filling the corrugations to a minimum thickness of 1/8" above the crests and a maximum of ½" above the crest. The interior lining shall be applied by a centrifugal or other approved od and shall be free from sags and runs. The lining material shall meet the requirements of Fiber-bonded corrugated metal pipe shall be in full conformance with Section 908.08 of the Indiana Department of Transportation Standard Specifications, latest revision.

SECTION 403 MATERIAL SPECIFICATIONS

This section outlines requirements for the manufacture of storm sewer and open culvert materials according o applicable American Association of State Highway and Transportation Officials (AASHTO) and American Society for Testing and Materials (ASTM) specifications. These material requirements are in part restatements of requirements set forth within the referenced standard, with noted exceptions. A summarization o information from the referenced ASTM and AASHTO specifications has been included within this section for the convenience of the reader, however, the designer, contractor, and manufacturer must also assume the responsibility of familiarizing themselves with these specifications as they apply to those guidelines set forth herein. The Department will not assume responsibility for noncompliance with the referenced specifications as a result of information not provided by this Manual. Each storm sewer pipe or open culvert material has been separated into sections which will generally contain the following information: production and material standards; pipe joint replacements; criteria for rejection of damaged materials; and material markings.

403.03 Galvanized Structural Plate Pipe, Pipe Arches, Arches, Long-Spans, and Box Culverts

 Production and Material Standards Galvanized structural plate culverts must be formed from galvanized structural plate in conformance with ASTM A 761, and ASTM A 796.

Steel sheet used for flat plate shall be galvanized by the hot—dip process according to ASTM A 444. Repair of damaged hot-dip galvanized coatings shall be in conformance with ASTM A 780

2. Rejection of Damaged Galvanized Structural Plates Galvanized structural plates possessing the following defects may be rejected for installation: dents or bends in the metal; lack of integrity; illegible markings as specified herein on the galvanized sheet; ragged or diagonal sheared edges

3. Galvanized Structural Plate Markings For galvanized structural plate products, each plate shall be identified on the inside with the following information as a minimum: name of manufacturer; specified zinc-coated thickness; specified coating weight (mass); identification showing heat number and coating lot number (may be omitted if fabricator's records tie the coating lot number to a specific heat number and manufacturer); and ASTM designation.

Exterior field applied coatings of asphaltic mastic or tar base material shall be required for all

galvanized structural plates with less than five (5) feet of cover in conformance with AASHTO M 243. 403.05 High Density Polyethylene Pipe (HDPE)

For corrugated metal pipe products, each corrugated sheet used in the fabrication of annular pipe, and each 2 to 5 feet of coiled sheet used in fabrication of helical pipe must be identified with the following information: name of sheet manufacturer; alloy and temper; specified thickness; ASTM designation; and heat number.

 Production and Material Standards for HDPE Corrugated High Density Polyethylene Type S (HDPE) pipe shall be manufactured in accordance with AASHTO M 294. and ASTM F2306. The flexibility factor of HDPE pipe shall not exceed 0.095.

Ribbed Polyethylene pipe shall be in accordance with ASTM F

894 for the specified sizes, meeting the requirements for RSC 100 or RSC 160. Pipe manufactured under this specification shall have a minimum Cell Class of 334433C in accordance with ASTM D 3350. Smooth wall Polyethylene pipe shall be in accordance with ASTM F 714 for the specified sizes. Pipe manufactured under this specification shall have a minimum Cell Class of 35434C in accordance with ASTM D 3350. All polyethylene pipe and fittings shall be made from high molecular weight high density polyethylene material meeting the applicable Cell Class requirements. All polyethylene material used in storm sewer pipe manufacture shall be virgin resin.

High Density Polyethylene pipe shall possess male and female pipe ends which allow the construction of overlapping, gasketed pipe joints, in conformance with the requirements of ASTM D 3212. The gasket material shall conform to all requirements of ASTM F 477. As an alternative, pipe joints utilizing external coupling bands will be accepted, provided the minimum AASHTO requirements for satisfying soil tightness are also achieved.

MANUFACTURED WYES, TEES, ELBOWS, OR ADAPTERS WILL NOT BE ACCEPTED FOR USE IN PLACE OF PRECAST STORM SEWER MANHOLES AND BOX INLETS UNLESS PREVIOUSLY APPROVED BY THE 404.01 Introduction For the purpose of this Manual, a storm sewer manhole shall mean: PRECAST MANHOLES AND BOX INLETS WILL BE REQUIRED WITHIN HDPE STORM SEWER SYSTEMS AT CHANGES IN GRADE, ALIGNMENT, SIZE, AND PIPE MATERIAL TYPE, AS OUTLINED WITHIN CHAPTER 500 OF THIS MANUAL UNLESS PREVIOUSLY APPROVED BY THE DEPARTMENT.

3. Rejection of Damaged HDPE High Density Polyethylene pipe possessing the following defects may be rejected for installation ations from straight centerline; elliptical shape in pipe intended to be round; illegible markings as required herein; deep or excessive gouges or scratches on the pipe wall; fractures, punctures, or cracks passing through the pipe wall; damaged or cracked ends where such damage would prevent making a satisfactory joint.

4. HDPE Pipe Markings

For high density polyethylene pipe products, each length of pipe shall be clearly marked with the following information as a minimum: manufacturer's name or identification symbol; nominal pipe size;

403.06 Polyvinyl Chloride Pipe (PVC)

. <u>Production and Material Standards</u> Polyvinyl Chloride (PVC) profile wall gravity flow storm sewer pipe shall be the integral wall bell and spigot type with elastomeric seal joints and smooth inner walls in accordance with AASHTO M 304. A minimum Cell Class of 12454C or 12364C as set forth by ASTM D 1784 shall be required. Smooth wall PVC pipe shall be in accordance with ASTM F 679 or AASHTO M 278 for the specified sizes, and shall have a minimum Cell Class of 12364C for pipes meeting specification ASTM f 679, or 12454C for pipes meeting specification AASHTO M 278. Cell class properties shall be as set forth by ASTM D 1784.

2. PVC Joints Flexible, gasketed joints shall be compression type so that when assembled, the gasket inside the bell is compressed radially on the pipe spigot to form a soiltight seal. The assembly of joints shall be in accordance with the pipe manufacturer's recommendations. and ASTM D 3212. The gasket shall onform to the requirements of ASTM F 477. All field—cutting of pipe shall be completed in a nec trim manner using a hand or power saw. PRECAST MANHOLES AND/OR BOX INLETS WILL BE REQUIRED WITHIN PVC STORM SEWER SYSTEMS AT ALL CHANGES IN GRADE, ALIGNMENT, SIZE, AND PIPE MATERIAL TYPE, AS OUTLINED WITHIN CHAPTER 500 OF THIS MANUAL MANUFACTURED WYES, TEES, ELBOWS, OR ADAPTERS WILL NOT BE ACCEPTED FOR USE IN PLACE OF MANHOLE OR BOX INLET STRUCTURES UNLESS PREVIOULSLY APPROVED BY THE DEPARTMENT

. <u>Rejection of Damaged PVC</u> Polyvinyl Chloride Pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape in pipe intended to be round; illegible markings as required herein; deep or excessive gouges or scratches of the pipe wall; fractures, punctures, or cracks passing through the pipe wall; damaged or cracked ends where such damage would prevent making a satisfactory joint.

. PVC Pipe Markings For polyvinyl chloride pipe products, each length of pipe must be marked with the following ation as a minimum: name of manufacturer; tradename or trademark; nominal pipe size; production/extrusion code; material and cell class designation; and ASTM designation.

Production and Material Standards Reinforced concrete pipe shall be Class III, IV, or V in accordance with ASTM C 76, latest edition. A minimum "B" wall thickness will be required. Elliptical reinforced concrete pipe shall be a minimum Class HE-II in full conformance with the reauirements of ASTM C 507 orced concrete pipe shall meet all requirements of AASHTO M86 for the specified diameter and strength classes. Fliptical reinforcement shall be permitted only by written approval of the Department ongitudinal reinforcement shall be continuous and all reinforcement shall have a minimum concrete cover of 3/4-inch. Upon request by the Department the manufacturer shall furnish certification on the type of cement aggregate, and steel used in the pipe furnished. Lift holes will not be allowed for reinforced concrete pipe less than 36-inches in diameter. A maximum of two (2) lift holes may be provided for each section of reinforced concrete pipe 36-

inches in diameter and larger. Lift holes must be repaired in a clean, workmanlike manner using a conical shaped precast concrete plug, properly sealed into place using mastic or non— shrink cement grout. Compliance with the Indiana Department of Transportation Standards and Specifications for completion of lift hole repair shall be required. Concrete pipe shall be furnished with a bell or grove on one end of a unit of pipe, and a spigot or tongue on the adjacent end of the adjoining pipe. All joints shall have a groove on the spigot for placement of a rubber gasket in conformance with ASTM C 443. The gasket shall be a continuous ri

which fits snugly into the annular space between the overlapping surfaces of the assembled pipe joint to form a flexible soiltight seal. As an alternative, mastic joints installed in conformance with Manufacturer's recommendations will be accepted by the Department outside of the public right-of-way, however, mastic concrete pipe couplings shall be wrapped with a '1' wide strip of non-woven geotextile fabric around the entire pipe diameter. Joint mastic material can be lost over time due to the external hydrostatic pressures of groundwater, allowing the migration of backfill materials into the storm sewer system through the open joint.

3. Rejection of Damaged RCP Individual sections of reinforced concrete pipe may be rejected because of any of the following: fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint; defects that indicate proportioning, mixing, and molding not in compliance with Section 10.1 of ASTM C 76; surface defects indicating honey—combed or oper exture; damaged or cracked ends where such damage would prevent making a satisfactory joint; any continuous crack having a surface width of greater than 0.01 in., and extending for a length of 12 in. or more, regardless of position in the wall of the pipe; visible spacers or longitudinal reinforcement used to position the reinforcing cage shall not be cause for rejection or reinforced

Each length of reinforced concrete pipe must be marked with the following information as a minimum: date of manufacture; ASTM class of pipe and specification designation; size of pipe; tradename or the manufacturer; and plant identification.

Production and Material Standards

of the box sections are not

Precast reinforced concrete box sections for open storm drainage culverts must be manufactured from a homogenous concrete mixture conforming to the test and design requirements of ASTM C1433. Box sections must be cured in such a manner that the specified compressive strenath of the concrete is achieved in 28-days or less. Compressive strength tests must be conducted in accordance with Section 10 of ASTM C 1433 prior to shipment. Reinforced concrete box sections are divided into three design types, dependent upon varying earth dead load and HS20 and Interstate live loading conditions. Each type of box section must be designated by type, span, rise and design earth cover. Precast reinforced concrete sections manufactured in accordance with ASTM C1433will also be accepted by the Department, under those minimum cover conditions for which this standard is intended to apply.

Reinforced Concrete Box Joints Precast reinforced concrete box sections shall be produced with male and female ends, designed to allow box sections to be laid together in a continuous line. Reinforced concrete box joints shall be sealed using either trowelable grade butyl rubber or asphaltic mastic to form a soiltight seal. Reinforced concrete box joints shall be wrapped around their entire diameter with a 1' wide non-woven geotextile fabric wrap.

3. Steel Reinforcement of Concrete Box Sections The minimum cover of concrete over the steel reinforcement shall be 1-inch. The inside steel reinforcement shall extend into the male portion of the joint. The outside steel reinforcement shall extend into the female portion of the joint. The clear distance of the end reinforcement steel

wires must not be less than $\frac{1}{2}$ -inch or more than 2-inches from the end of the box section. 4. Rejection of Damaged Concrete Box Sections Individual box sections may be rejected because of any of the following: fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint; honeycombed or open texture that would adversely affect the function of the box sections; the ends

normal to the walls and center line of the box section, within the specified acceptable tolerances. 5. Reinforced Concrete Box Section Markings For reinforced concrete box sections, each length of a reinforced concrete box must be marked with the following information as a minimum: box section span and rise; ASTM table number; maximum and minimum design earth cover; specification designation; date of manufacture; name of trademark of manufacturer, and; orientation of the top of the structure.

403.09 High Impact Polypropylene or High— Density Polyethylene Plastic Facilities

The plastic shall be resistant to environmental stress cracking and maintain adequate stiffness through higher temperatures experienced during installation and service. The chambers shall be designed to exceed the American Association of State Highway and Transportation Officials (AASHTO) recommended Load and Resistance Factor Design (LRFD) for earth loads and HS-20 live loads, with consideration for impact and multiple presence when installed per the manufacturer' minimum requirements. The plastic chambers shall have a design life of 75 years. All underground detention facilities shall be designed with a positive gravity outfall or a certification from a licensed geotechnical engineer;

that the permeability of the surrounding soils will dissipate water at a rate required for the detention that no adverse impact to any subsurface systems (including septic systems) will be experienced, and that the underground detention facility will not be subject to ground water surcharge during any

Any facility that allows exfiltration within a "Well—Head Protection Areas" needs prior approval from the Department of Public Works Office of Environmental Services. If the system is designed to use the storage volume of the stone surrounding the structure, a 40 percent porosity factor shall be utilized for the surrounding washed #8 stone. All storm water shall be routed through a Storm Water Best Management Practice (BMP) meeting City No storm water shall be routed through the detention facility until the Storm Water Best Management Practice (BMP) is installed and fully functional and all construction érosion control for disturbed areas are installed to ensure no sediment build—up in the underground detention storage facility. The erosion control methods and BMP"s must be inspected after each rain event and repaired or cleaned where necessary. The O&M Manual for all BMP"s located prior to the underground detention storage facility require the BMP"s to be inspected (4) times per year and cleaned as necessary to ensure maximum performance relative to

A reinforced concrete cylinder or reinforced concrete vault as detailed herein, placed below ground at varying points along a storm sewer pipe system, to provide access for maintenance and/or as a point of entry for surface or subsurface water flows. Manholes and precast concrete box inlets may be constructed as catchbasins, in which the outlet pipe is installed 24-inches above the manhole base so that sediment and other debris may be "caught" before entering the storm sewer pipe system. A storm sewer manhole, or precast concrete box inlet must be installed at the end of each line segment; at all changes in grade, size, materials, and/or alignment of the storm sewer pipe line; at all pipe intersections; and at intervals not greater than those specified herein Precast reinforced concrete or prefabricated corrugated metal wyes, tees, and elbows of the same diameter as the storm sewer or culvert pipes will be accepted at horizontal alignment changes within storm drainage systems of 48-inch inside diameter or larger, provided precast or poured-in-place manholes or box inlets are also provided at the required maximum interval of 800 48-inch vertical precast reinforced concrete or prefabricated corrugated metal tees may be used in place of precast or poured-in-place manholes or box inlets within 48-inch to 144-inch inside diameter reinforced concrete or corrugated metal storm drainage systems. Corrugated metal tees and risers shall be of the same material type and gauge as the connecting pipe, prefabricated by the pipe manufacturer, possessing continuous welded seams properly recoated with zinc galvanizing compound. Precast or prefabricated wyes or tees may be utilized for attachment of lateral storm sewer or subsurface tile lines to 48—inch inside diameter or larger drainage systems, however, at least one manhole structure as specified herein must be provided a minimum distance of 250 feet from the

Catchbasins to be maintained by the City of Indianapolis shall be located within easily accessible ledicated easement or right—of—way areas of sufficient size to facilitate the required maintenance of Chapter 100 of this Manual should be referenced for minimum required easement locations and

In order to provide for adequate access to the enclosed storm sewer drainage system manholes or precast concrete box inlets shall be provided at the following maximum intervals:,

Size of Pipe (inches) Maximum Distance (feet) 12 thru 18 21 and larger

Figures 400-01 through 400-04 of the Standard Details should be referenced for an illustration of accepted manhole and precast box inlet construction. The Department will accept the following types of storm sewer structures according to those standards and specifications

404.02 Monolithic (Cast-in- Place) Storm Sewer Structures

Monolithic pour storm sewer manhole and box inlet structures may be approved on a case basis by the Department provided plan specifications showing at a minimum the concrete mix, steel einforcement details, pipe connections and manhole or box inlet dimensions are submitted and approved prior to construction. Substantial field changes of the approved construction drawings shall be certified by design consultant, and receive approval of the Department prior to completion of the proposed Failure to comply with this specification may necessitate the removal and reconstruction of that portion of the storm water facility.

404.03 Precast Storm Sewer Manhole Structures

Precast reinforced concrete storm sewer manholes including bases, risers/barrels, cones and flat slabs shall constructed of either wet or dry cast Class A concrete meeting or exceeding the requirements of ASTM C 478, latest revision. Precast reinforced concrete storm sewer manholes shall be manufactured, tested and marked in accordance with ASTM C 478, and may be constructed with the base and the first riser section as one complete precast unit, or as a separate base and riser section for diameters 60" and larger. Alternative construction methods for connections to existing storm sewer lines will be approved on a case basis by the Department Precast reinforced concrete manhole cones shall be the eccentric cone type. Precast reinforced concrete flattop slabs may be used in place of eccentric ones, provided a minimum of 6-inches of soil depth over the concrete slab is provided for establishment of permanent vegetation, in those areas where permanent vegetation is deemed necessary. Lift holes must be repaired in a clean, workmanlike manner using a conical shaped precast concrete plua.

properly sealed into place using mastic or non-shrink cement grout. As an alternative, lift holes may be repaired with 100 percent non-shrink epoxy grout; then smoothed and covered, both inside and out, with a trowelable grade butyl rubber backplaster material to ensure a watertight seal. Joints between precast storm sewer manhole elements shall be sealed utilizing one of the following alternatives: 1) An approved rubber gasket manufactured and installed in accordance with ASTM C 443, latest edition, 2) Trowelable grade butyl rubber, or 3) A ½-inch diameter non— asphaltic mastic (Kent Seal or approved equal) conforming to AASHTO M 198 and Federal Specifications SS-521-A. All precast reinforced concrete storm sewer manholes shall be steam or heat and water mist cured and shall not be installed until at least five (5) days after casting. Exceptions to this "5-day" rule shall be considered by the Department on a case basis after written notification and submittal of subject structure test data verifying conformance to the 28-day specified compressive strength. 404.04 Precast Concrete Box Inlets and Catchbasins

Precast concrete box inlets and catchbasins constructed in accordance with Indiana Department of Transportation (INDOT) Standard Specifications will be accepted for use. Inlet and catchbasin Type "A" *, Type "B", Type "C", Type "E", Type "J", Type "K", and Type "M" may be used. Alternative precast or poured-in-place box inlet types will be accepted provided all standard specifications of the Indiana Department of Transportation, City of Indianapolis, Department of Transportation (IDOT), and this Department are fully met or exceeded. The structural design of precast concrete box inlets and catchbasins shall be in full conformance with the requirements of ASTM C 890. *A MAXIMUM DEPTH OF 4 FEET FROM THE BOTTOM OF CASTING TO THE OUTLET PIPE INVERT SHALL BE ALLOWED FOR TYPE "A" PRECAST BOX INLET STRUCTURES MORTARED BRICK OR BLOCK WILL NOT BE AN ACCEPTED METHOD OF BOX INLET OR MANHOLE CONSTRUCTION

The concrete base of reinforced concrete monolithic pour or precast manholes shall be of 6 inch minimum thickness for 4 foot diameter structures, and of 8 inch minimum thickness for larger diameter structures, and shall be constructed of Class A concrete having companying strength of 4000 psi The wall and base thickness of precast concrete box inlet structures shall be as specified by the Indiana Department of Transportation Standard Specifications, and must also be constructed of Class A concrete having a minimum compressive strength of 4000 psi. having compressive strength of 4000 psi.

The concrete base of reinforced concrete monolithic pour or precast manholes shall be of 6 inch minimum thickness for 4 foot diameter structures, and of 8 inch minimum thickness for larger diameter structures, and shall be constructed of Class A concrete having compressive strength of 4000 psi. The wall and base thickness of precast concrete box inlet structures shall be as specified by the Indiana Department of Transportation Standard Specifications, and must also be constructed of Class A concrete having a minimum compressive strength of 4000 psi. Bench walls shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flows through the manhole or box inlet. The bench wall shall form a defined channel, to a minimum height of 80-percent of the inside diameter of the inlet and outlet pipes to form a "U" shaped channel, constructed at a minimum ½— inch per foot slope to the manhole wall. Where a flow channel is constructed as an integral part of the pre—cast base, it shall be shaped and formed as described above, with the exception that the bottom of the flow channel may be formed from the bottom of inlet and outlet pipes if the pipe wall thickness is not greater than one (1) inch. For cast—in—place flow channels, the bottom invert of all pipes entering a manhole shall be at least three (3) inches above the top of the base slab to the outlet invert so the finished sewer channel may be installed and shaped. For connections to existing storm sewer structures, flow channels shall be shaped, as specified herein. it were a new manhole or box inlet structure

Precast Adjusting RingsWhere one (1) solid riser or barrel section cannot be used, final adjustments in elevation of the casting frame and grate for precast manholes shall be accomplished by the use precast concrete adjusting rings of a minimum nominal thickness of two (2) inches, as shown in Figure the Standard Details, and conforming to ASTM C 478. The maximum number of adjusting rings shall be four (4), with the total height not exceeding 12". A water tight seal shall be provided between the precast manhole and riser ring, each adjoining riser ring and between the riser ring and casting by the use of either two (2) rows of ½ inch extrudable preform gasket material, non-asphaltic mastic, or trowelable grade butyl rubber, as shown in Figure 400-05 of the Standard Details. Concrete adjusting rings shall conform to ASTM C 478 and be free from voids, cracks, and other defects, adjusting ring shall be from the same manufacturer as the manhole cone section to assure compatibility and a watertight seal per Figure 400-05.

For precast concrete box inlets, the adjustment of casting frame and Concrete Box Inlets and grate shall be accomplished using precast concrete spacers of a minimal Precast Spacers nominal thickness of six (6) inches. The maximum number of spacers allowed shall be four (4). A water tight seal shall be provided between each component of the precast box inlet and precast concrete spacers by use of non-asphaltic mastic, or trowelable grade butyl rubber. The adjustment of casting elevation for precast concrete box inlets may be accomplished using solid concrete block and mortar to a maximum height of six (6) inches. This

type of casting adjustment shall be completed in conformance with the following: 1. No joint shall exceed 3/8 of an inch in width, and as nearly as practicable, adjoining courses shall break joints at ½ unit intervals.

2. Minimum constructed wall thickness shall be six (6) inches. 3. Mortar for laying brick shall be composed of one (1) part masonry cement and two (2)

4. Both the inside and outside of the adjustment area shall be plastered to at least $\frac{1}{2}$ of an inch thick using the above mortar mix, or a mixture composed of one (1) part of a combination of Portland cement and hydrated lime and two (2) parts mortar sand. The lime portion of this mix shall not exceed ten (10) percent of the sand. Plaster coats shall be smooth, clean, and

The maximum inside diameter of pipe allowed to connect to precast box inlet walls shall conform to Table 404-1 below. Table 404-2 outlines those minimum manhole diameters for storm sewer pipes entering or exiting a storm sewer manhole at the given range of angles.

TABLE 404-01: Maximum Pipe Inside Diameters for Precast Box

Straight Skew/Corner Structure

Connection(2)

18" / 12"

Connection(1) Long Wall/Short Wall Long Wall/Short Wall

24" / 15"

Long Wall/Short Wall Long Wall/Short Wall

FOOTNOTE TO TABLE 404-1:

404.09 Box Inlet and Manhole Dimensions

1. Straight—out connections should not be made to either precast box inlet wall touched by a skew/corner connection unless sufficient box inlet wall area remains on each side of the connecting pipe to ensure structural integrity of the precast box.

2. A maximum of two (2) skew/corner connections will be allowed for each precast box inlet.

TABLE 404-02: Minimum Manhole Diameter's Pipes Entering/ Pipes Entering/ Leaving at Leaving at

FOOTNOTE TO TABLE 404-2:

404.10 Pipe Connections

1. Pipe sizes from 12-inches to 24-inches shall be installed as per Figure 400-1.

3. Precast reinforced concrete pipes equal to and greater than 48 inches in diameter may be installed The number and entrance angle of pipe connections, with consideration given to outside pipe diameter(s), shall be limited to those guidelines established by Tables 404-1 and 404-2 to ensure maintenance of the structural integrity of the manhole or box structure. If at any time the structural integrity of the manhole or box inlet cannot be maintained, a cast-in-place structure will

2. Pipes equal to and greater than 36-inches, up to 48-inches in diameter, shall be installed as per

and section dimensions shall be submitted to the Department for review and approval prior to MANHOLE STEPS SHALL BE PROVIDED IN ALL STORM SEWER STRUCTURES 48-INCHES IN DIAMETER OR LARGER AS REQUIRED TO ALLOW ADEQUATE ACCESS FOR COMPLETION OF INSPECTIONS, CLEANING AND THE MAXIMUM DISTANCE FROM GRADE TO THE FIRST MANHOLE STEP SHALL BE 24"; THE MAXIMUM DISTANCE BETWEEN STEPS SHALL BE 16", AND THE MAXIMUM DISTANCE FROM THE LAST STEP TO THE STRUCTURE BENCHWALL SHALL BE 24" Manhole steps shall be made from a steel reinforcing rod encapsulated in a copolymer polypropylene resin. The manhole steps shall equal or exceed OSHA requirements. Manhole steps, manufactured by M.A. Industries, Inc., PS-1-PF, Clay & Bailey Mfg. Co., or equal or previously approved are Steps shall conform to the requirements of ASTM C 478 and be manufactured using steel rods

encased in polypropylene plastic. Steps shall be factory installed when the manhole is manufactured.

Inlet and outlet pipes shall extend through the box inlet or manhole walls a sufficient distance to allow for placement of grouting material around the pipe diameter both inside and outside of the structure wall, preventing leakage around the pipes outer surface. Inlet and outlet pipes shall not extend through the nlet or manhole wall to such a degree that flow is obstructed. Holes for connection of storm sewer pipes shall be preformed by the manufacturer, or field cut or drilled. Preformed holes shall be the method preferred by the Department. At no time shall the pipe hole exceed the outer pipe diameter plus six (6)-inches (0.D. + 6"), to ensure a proper connection is achieved. Should e contractor elect to use manhole or box inlet structures with preformed thin wall "knock—outs", the balance of the "knock—out" area not occupied by the pipe connection and all remaining unused "knock—outs" shall be filled with 4000 psi Class A concrete to a finished wall thickness not less than that required by these standards. The use of preformed "knock-outs" shall not relieve the manufacturer from compliance with the reinforcement, dimension, and strength requirements specified herein. The annular space between the pipe and the precast manhole or box inlet wall shall be filled inside and outside with a grout mixture composed of 2 parts of No. 23 fine aggregate and one part of Portland As an alternative, pipe connections to manholes utilizing an approved rubber gasket manufactured and

installed in accordance with ASTM C 923 will be accepted by the Department.

Unless otherwise approved, perforated subsurface drainage tiles, footer drains, or sump pump lines shall attach at a storm sewer manhole or box inlet structure. At these connections, precast or drilled holes shall be provided to a maximum of 2—inches larger than O.D. of the connecting line. These connections shall be made in a clean workmanlike manner, and properly sealed using either an approved mortar mix,

Where connections cannot be made to a manhole or box inlet structure, blind "T" connections to storm sewer pipe structures will be allowed on a case basis by the Department, provided a cut or core—drilled connection hole, with a minimum 6—inch inside diameter cleanout connection, is also provided. To relieve hydraulic groundwater pressure from around the enclosed storm sewer system, the Department may equire provision of perforated subsurface drainage tile "T" stubs, with filter fabric wrap, to be installed with manhole and precast box inlet structures greater than four (4) feet in depth. These subsurface drainage nes shall be an approved subsurface drainage tile material, with end caps, and shall extend a minimum of 10-feet in each direction from the manhole structure, placed just above the bench wall, as illustrated within Figures 400-01, and 400-02 of the Standard Details.

404.12 Rejection of Damaged Box Inlet and Manholes

Precast reinforced concrete manholes, risers and tops, and precast box inlets which possess any of the following defects shall be subject to rejection: fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint; defects that indicate imperfect proportioning, mixing and molding; surface defects indicating honeycombed or open texture; damaged ends, where such damage would prevent making a satisfactory joint; the internal diameter of the manhole section shall not vary more than one (1) percent from the nominal diameter; not clearly marked date of manufacture, tradename, size designation part number, and ASTM number; having a deviation more than 1/4 inch from the straight edge at any point across the top of the manhole cone section or riser ring; having any visible steel bars along the inside or outside surface of the manhole except for reinforcement stirrups or spacers used to position the cage during manufacture, and reinforcement bars visible at the manhole structure end, provided these reinforcement bar ends are properly grouted in conformance with applicable ASTM specifications.

SECTION 405 CASTINGS, FRAMES AND COVERS

405.01 Introduction The design engineer will be required to determine the feasibility of use and placement of each casting type, based upon required square footage of open area needed for proper conveyance of estimated storm

Storm sewer manhole covers shall be a solid lid casting as detailed within Figure 400-06 of the Standard Details. The words "Storm Sewer" and "City of Indianapolis" must be imprinted onto solid lid covers for those manholes placed within the public right-of-way or permanent drainage easements.

All castings shall also conform to the following requirements:

Casting shall be of uniform quality, free from blow holes porosity, hard spots, shrinkage, distortion or other defects. They shall be smooth and well—cleaned by shot blasting or other

approved method. All castings shall be manufactured true to pattern; component parts shall fit together in a satisfactory manner. Round frames and covers shall be of non-rocking design or shall have machined

horizontal bearing surfaces to prevent rocking and rattling under traffic. All Castings shall be fully interchangeable.

All weights shall not deviate from the tolerances permitted by ASTM standards, as specified within ASTM A 48, "Standard Specifications for Gray Iron Castings.

All castings shall be manufactured in accordance with ASTM A 48 Class $35\ B$, and shall have a minimum tensile strength of 35,000 psi. Storm sewer manhole covers shall have the words "storm sewer" cast in recessed letters two (2) inches in

All storm water inlets and catch basins shall have the words "No Dumpina, Drains to Stream", or similarly

approved message, cast in raised or recessed letters at a minimum of 1" in height. In addition, a symbol of a fish shall also be cast with the letters. CURB INLET CASTINGS WHICH POSSESS OPEN BACKS OR HAVE GRATE BARS PARALLEL TO TRAFFIC FLOW (ARE NOT "BICYCLE SAFE") WILL NOT BE ACCEPTED BY THE DEPARTMENT

SECTION 406 SUBSURFACE TILES

406.01 Introduction Subsurface tile as specified herein may be used to convey subsurface water collected in sump pits and footer drains to an acceptable drainage outlet, provided these drainage tiles are properly sized to accept these flows, and connections to the existing storm water facility are made as specified herein Subsurface tiles will not be considered adequate to accept other types of surface water flows, intended to be collected by an enclosed storm sewer system. Under those instances where surface inlets are to be provided within a subsurface tile line, the minimum requirements for storm sewer size and pipe material outlined within Section 401 of this Chapter shall apply.

406.02 General Requirements

The following requirements shall be adhered to as a part of all subsurface tile installations:

The water inlet area of perforated subsurface drainage tiles shall be at least one (1) square inch per foot of conduit length. Round perforations shall not exceed 3/16—inch in diameter, except where fabric filters or other filtration protection is provided. Slotted perforations shall not exceed 1/8-inch in width.

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cement joints per both the referenced ASTM Standards and the manufacturer's recommendations. Pre-formed wyes, tees, elbows and other special pipe fittings will be accepted for use provided they are manufactured and installed per ASTM and manufacturer requirements Solvent cement joints of polyvinyl chloride sewer pipe and fittings shall be installed using those methods and materials outlined within ASTM D 2564, ASTM F 493, and ASTM F 656. The recommended procedure for installation of solvent cement joints within Appendix X1 of ASTM F SUBSURFACE TILE SYSTEMS ARE REQUIRED TO BE PROVIDED WITH A "Y" CLEANOUT CONNECTOR AT A MINIMUM INTERVAL OF 400 FEET

2. <u>Tile Markings</u> All polyvinyl chloride and polyethylene subsurface drainage tile specified herein shall be marked per the respective ASTM Standards.

The Department shall reserve the right to require the Contractor to provide written certification from the manufacturer that each subsurface tile material proposed to be used as required herein has been sampled, tested, and inspected in accordance with the provisions of each ASTM

4. Minimum size The minimum size for all subsurface drains will be 6"

All subsurface tile that drains to an open ditch or swale must provide animal guards as per

406.03 Accepted Materials

The Department will accept those materials listed within Table 406-1 below, which meet or exceed the minimum requirements and ASTM specifications set forth herein, for installation of subsurface drainage

TABLE 406-01: Subsurface Drain Tile Materials MATERIAL TYPE ASTM DESIGNATION CORRUGATED POLYETHYLENE ASTM F405 TUBING AND FITTINGS

> CORRUGATED POLYETHYLENE ASTM F667 TUBING AND FITTINGS 8-24INCH

CORRUGATED POLYETHYLENE ASTM F667 TUBING AND COMPATIBLE FITTINGS

POLYVINYL CHOLRIDE(PVC) ASTM F949 CORRUGATED SEWER PIPE WITH SMOOTH INTERIOR

WALLS AND FITTINGS, 4-18INCH POLYVINYL CHLORIDE(PVC) ASTM D2729

SEWER PIPE AND FITTINGS POLYVINYL CHLORIDE(PVC) ASTM D3034

1. The ASTM Specifications referenced shall mean the latest revision. Copies of th pecifications can be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

2. Polyethylene pipe under this specification may be provided as a corrugated single wall, or double walled with a corrugated outer wall and smooth inner wall. All public infrastructure using HDPE must use double wall pipe. All public infrastructure using PVC should meet ASTM 3034 specifications, at a minimum. DOUBLE WALLED CORRUGATED POLYETHYLENE TILE MANUFACTURED UNDER SPECIFICATION ASTM F 667 AND PVC TILE MANUFACTURED UNDER SPECIFICATION ASTM E 949, ASTM D 3033, AND ASTM D 3034 WILL BE REQUIRED FOR INSTALLATION OF SUBSURFACE DRAINAGE TILE WITH LESS THAN 18" OF EARTH OR EQUIVALENT COVER

406.04 Limited Cover Installations

Installation of subsurface tiles shall be in accordance with the requirements of this Manual, and those quidelines set forth within ASTM F 449, "Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control." Subsurface tiles shall be properly bedded with a #8 gravel envelope. Except as specified herein, a minimum depth of 12-inches (1 foot) of earth or equivalent cover above the top of the tile will be required. Chapter 500 of this Manual should be referenced for further information relating to the installation of subsurface tiles.

SECTION 407 PIPE END TREATMENTS

Protection of storm sewer pipe and open culvert ends is required to ensure maintenance of free-flowing inlets and outflows, to prevent flotation of the structure, and to protect against a migration of backfill materials. End treatments will include, but may not be limited to, stabilization of surrounding embankments, and provisions for end sections, footing supports, and end anchors.

407.02 Embankment Protection

Embankment slopes surrounding storm sewer pipe and open culvert ends shall be graded and stabilized with permanent vegetation cover at no greater than a 3 (horizontal) to 1 (vertical) slope. Seeding specifications and additional erosion control measures necessary to facilitate the establishment of permanent vegetation as specified within Chapter 600 of this Manual will be required. Embankment slopes steeper than 3 (horizontal) and 1 (vertical) may be stabilized with hand placed rock rip-rap of sufficient size to withstand the anticipated stream flow velocities, with provision of granular edding or approved geotextile as subgrade support. Alternative embankment stabilization methods such as reinforced concrete wingwalls and slope walls will be approved on a case basis by the Department.

407.03 End Protection The following end protection will be required by the Department for each pipe material type specified:

End sections for concrete pipe shall be precast concrete, with end footing support. The formulation of the concrete mix. Portland cement, agaregates, and reinforcing steel used in the onstruction of reinforced concrete end sections, headwalls, and slope walls shall be in ful conformance with the requirements of ASTM C 76. The pipe hole of precast concrete end sections shall be formed with a groove or tongue, for receipt of the reinforced concrete pipe end. Figure 400-07 of the Standard Details should be referenced for an illustration of standard dimensions of precast concrete end sections.

Plastic (PVC and HDPE) The open ends of high density polyethylene and polyvinyl chloride storm sewer pipes shall be protected using flared, prefabricated steel end sections. The connecting bands of steel end sections shall be formed to fit the standard outside diameter of the plastic pipe, so that a tight connection is achieved. Poured-in-place, reinforced concrete slope-walls may be utilized as an equal alternative to flared, prefabricated steel end sections. The formulation of the concrete mix. Portland cement, aggregates, and reinforcing steel used in the construction of reinforced concrete slope walls shall be in full conformance with the requirements of ASTM C 76. This method of hermoplastic pipe end protection will be preferred by the Department.

3. Corrugated Metal (CMP) The open ends of corrugated metal pipes shall be protected using flared, prefabricated steel end sections. The connecting bands of steel end sections must be formed to fit the standard outside diameter of the corrugated metal pipe to achieve a tight connection. Tables 407–1, 407-2, and 407-3 should be referenced for an illustration of the standard dimensions of steel EIGHTEEN (18) INCH TOE PLATE EXTENSIONS WILL BE REQUIRED FOR ALL METAL END SECTIONS

4. Box Sections and Structural Plate Arches Reinforced concrete box sections and structural plate arch culverts shall be provided with sufficient reinforced concrete end anchors, footing supports, headwalls, and/or embankmen protection as required to ensure stability of the surrounding embankments, and maintenance of the structural integrity and hydraulic performance of the culvert structure. JSE OF POURED-IN-PLACE REINFORCED CONCRETE HEADWALLS AS END TREATMENT IN THE RIGHT-OF-WAY WILL BE ALLOWED ONLY AS APPROVED ON A CASE BASIS

407.04 Culvert End Anchors and Footing Supports

For pipes larger than 60", the applicable INDOT standard details and specifications shall be used for pipe end anchors. The formulation of the concrete mix, Portland cement, aggregates, and reinforcing steel used in the construction of reinforced concrete end sections, headwalls, and slope walls shall be in full ormance with the requirements of ASTM C Eighteen inch (18") toe-plate extensions will be required for all galvanized steel end sections.

CHAPTER 500 INSTALLATION OF STORMWATER FACILITIES SECTION 501 STORM SEWER PIPE AND OPEN CULVERT INSTALLATION

Storm sewer pipes and open culverts shall be laid to the lines and grade shown on the approved construction drawings, unless otherwise approved by the Department The design plans and specifications submitted to the department for issuance of a stormwater permit shall nclude a detailed trench drawing showing placement of the storm sewer pipe or open culvert within the trench, trench walls, type and depth of bedding and backfill materials, and compaction levels in conformance with those guidelines set forth herein. The standard proctor density referenced herein is intended to mean the maximum dry density of a backfill material as determined by those methods set forth within ASTM D 698. The percent standard proctor density efers to a ratio of the in—place dry density of a backfill material, determined by those methods set forth within ASTM D 1556, to the maximum dry density (determined by Test Method 698). The resulting quotient must be multiplied by 100, and the value obtained must meet or exceed those minimum values specified

501.02 Point of Commencement and Direction of Laying

The point of commencement for laying of storm sewer pipe, open culverts, and subsurface drainage tiles should be the lowest point in the proposed line. Provisions for beginning construction at other than the lowest point in the proposed line shall be approved by the design consultant. All bell and spigot pipe shall

Each pipe shall be laid on an even firm bed throughout its length, so that no uneven strain will come to any single portion of the conduit. Particular care shall be taken to prevent the total load from bearing on the pipe sockets. To accomplish this, all bells of bell and spigot pipes shall be carefully placed into a receiving hole excavated into the pipe bedding material. All pipes shall be properly joined, utilizing the manufacturer's assembly marks, if provided. Adequate pressure shall be applied to the center of each tongue and groove pipe to ensure the proper joint seal is achieved.

501.03 Establishment of Line and Grade

professional engineer or land surveyor registered in the state of Indiana will be required to set or oversee the setting of, all bench mark stakes necessary for storm sewer pipe, open culvert, manhole, and subsurface drainage tile installation. Bench marks shall be set in strategic locations within the project in order to facilitate the installation of grade stakes. Horizontal and vertical control of storm sewer pipe structures, open culverts, manholes, and precast box inlets will be required to be provided with record drawings to be submitted to the Department upon completion of the project. The accepted method of establishing and following line and grade in conformance with the approved construction plans may be determined by the Contractor.

501.04 Jetting or Flooding of Backfill

Jetting or flooding of the backfill shall <u>not</u> be used without the approval of the Indianapolis Department of Public Works (DPW), or the Indiana Department of Transportation (INDOT), as jurisdiction allows, and this

501.05 Multiple Pipe Installations and Skewed Culverts

When two or more conduits are to be installed in parallel lines, the following minimum spacings for pipe, pipe-arch, and arches must be provided between the outer most portion of the pipe walls:

Р	IPE	PIPE-AR	CHES	ARCHES
Diam eter	Spacing	Span	Spacing	Spacing
Up to 24"	12"	Up to 36"	12"	2"
24" to 72"	½ Pipe O.D.	36" to 108"	1/3 Span	
Over 72"	36"	108" to 189"	36"	

Open culverts of 72" diameter and larger placed at a skew of greater than 15-degrees must have the surrounding embankment contoured to provide side support along the total length of the pipe structure.

501.06 Steep Slope Applications

Use of flange bolted ductile iron pipe, reinforced concrete pipe with poured-in-place concrete anchors (1 per pipe section), or banded corrugated metal pipe with poured—in—place concrete anchors (1 per pipe section) shall be required on those slopes greater than 15-percent (15%) to prevent joint separations and consequent system failures. Due to the potential abrasive forces of flow within systems possessing fifteen (15) percent or greater slopes, corrugated metal pipes and pipe—arches used in these applications shall possess a minimum metal thickness of 0.109 inches (12 gage), in addition to the required bituminous coating and invert paving specified within Chapter 400 of this Manual.

501.07 Material Handling

stormwater facilities. All pipe shall be unloaded with care. Corrugated metal pipe shall not be rolled or dragged over gravel or rock, and shall be prevented from striking or resting upon rock or other hard objects during installation. Great care must be taken to prevent pipe coatings or wrappings from being damaged. Each section of pipe shall be carefully examined for cracks and other defects prior to nstallation. Pipe or fittings found to be cracked, broken, or otherwise defective either before, during, or after installation, shall be removed and replaced with sound material. All pipes gaskets and other fittings shall be thoroughly cleaned prior to installation. Failure to properly ction materials and appurtenances during all phases of installation and acceptance may result in a faulty completed system which will require replacement. No portion of a storm sewer pipe, open culvert, manhole, inlet, orsubsurface tile system may be nstalled indirectly onto frozen ground or with frozen backfill material.

501.08 Minimum Construction Cover

Until such time as a minimum of four (4) feet of compacted fill material has been placed over installed storm sewer pipe or open culvert sections, the contractor shall not use heavy equipment in such a way

501.09 Trench Box Pulling and Sheeting

of the storm sewer pipe or open culvert.

When required by the Occupational Safety and Health Act (OSHA) to protect life, property, or the work, sufficient protective measures shall be utilized in accordance with CFR 1926. Upon completion of the work, all temporary forms, shores, and bracing, other than as specified herein, shall be removed. The minimum equired density of structural backfill shall not be reduced during trench box pulling. All voids left by the removal of sheeting shall be carefully filled with properly compacted bedding material. Any damage to pavement or other structures due to sheeting, shoring, or bracing shall be repaired by the Contractor at his own expense. The City of Indianapolis, Department of Capital Asset Management, will not assume any liability for the actions of the developer, or his agent(s), in the performance of the required sheeting, shoring and bracing operations. Sheeting and bracing which is to remain in place shall be cut off at the elevation of 1.5 feet above the top

501.10 Trench Dewatering

Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom prior to installation of the stormwater facility in conformance with Section 715 of the Indiana Department of Transportation Standard Specifications. The Contractor shall provide, install, and operate sufficient trenches, sumps, pumps, hoses, piping, wellpoints or other means necessary to depress and maintain he groundwater level below the base of the excavation. The Contractor shall be responsible for diverting or removing surface runoff and other accumulations of surface water from excavations. The City will not assume any liability for the actions of the developer, or iis agent(s), in the performance of the required dewatering operations. If pipe structures cannot be installed under trench conditions as outlined herein, all installation activities shall be terminated until acceptable conditions can be achieved. The Department shall reserve the right to terminate installation activities unde those trench conditions which are not in conformance with this Manual. Under no circumstances shall surface water and/or groundwater be discharged to, disposed of, or allowed to flow into the City of Indianapolis sanitary sewer system without approval from the Department

Sanitary sewers, combination sewers, and stormwater conduits which are to be abandoned shall be bulkheaded with mortar and an eight (8) inch thick solid concrete brick wall. Sanitary sewers, combination with sand or Cellular Concrete and plugged, unless otherwise indicated on the approved construction plans. Service shall be maintained within sanitary and combination sewers until the Department shall order bulkheads placed. Bulkheads shall be placed within stormwater conduits at the discretion of the design consultant. No timber bulkheads shall be allowed. Unless otherwise specified, all abandoned manholes, catch basins and inlets shall be removed to a depth of three (3) feet below the proposed or established ground elevation, or existing street grade, whichever is lower.

501.12 Trench Installations

For trench installations, the supporting soil beneath the pipe structure shall be defined as the foundation The pipe bedding is that portion of the backfill material which is shaped to contact the sides and bottom of the conduit, to prevent lateral displacement, and for establishment of design grades. Initial backfill shall be defined as that material placed from the pipe springline (1/2 the outside vertical pipe height) to 2) inches over the crown of the pipe. Regular backfill shall be that material placed from the initial backfill to the around or road surface. Bedding and backfill material classes referenced within this chapter shall be defined as follows:

Class I Angular, six (6) to forty (40) millimeters (1/4 to 1 $\frac{1}{2}$ inch) graded stone such as crushed stone. Indiana Department of Transportation (INDOT) Classification No. 5, No. 8, and No. 9, and No. 53. A No. 8 gravel possessing a minimum 50% mechanical crush count, and meeting the following nomin sizes and percents passing will be considered an equivalent Class I material: 100% passing 1" sieve; 75-95% passing 3/4" sieve; 40-70% passing $\frac{1}{2}$ " sieve; and 0-15% passing No. 4 sieve.

Class II Coarse sands and aravel-sand mixtures with a maximum particle size of forty (40) millimeters (1-1/2 inches), including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. Indiana Department of Transportation (INDOT) Classification for "B" borrow

Class III Fine sand and clay gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures Soil types GM, GC, SM and SC (ASTM D 2487) are included in this class. These materials will not be accepted as pipe bedding.

Class IV Silt, silty clays and clays, including organic— clays and silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH and CL (ASTM D 2487) are included in this class. These materials will not be accepted as pipe bedding.

These materials shall be utilized for installation of stormwater facilities in accordance with and in the manner specified by this chapter. Whenever pipe trenches are inadvertently excavated below the designed bedding bottom, the SECTION 502 INSTALLATION OF PRECAST MANHOLES AND BOX INLETS Contractor shall fill the over—excavated area with Class I or Class II granular bedding material, compacted and shaped to form a firm, uniform trench base. In those cases where a firm foundation is not encountered at the required grade, the unstable material shall be removed to such depth that when replaced with suitable Class I or Class II material, compacted, and properly shaped, to produce a uniform and stable foundation along the entire length of the pipe. Bell holes shall be properly excavated for bell and spigot pipe, so that the entire barrel of the pipe rests directly upon the bedding material. All rocks, boulders and stones 6—inches in diameter and larger encountered in trenches shall be removed. Boulders or rocks are not to be used for any portion of the trench backfill. All PVC and HDPE pipes to be installed with perforations that are meant to infiltrate or exfiltrate must use #8 stone as bedding and backfill material. All approved storm systems can use class bedding and backfill materials with the following compaction requirements. INDOT Classification No.5 No.8, and No 9 must be at least hand tamped or walked into place. INDOT Classification No.53 must be mechanically compacted to 95% Proctor.

Except as provided herein, the minimum trench width for storm sewers of 42-inch or equivalent diameter and smaller shall be 1.25 times the outside diameter (Bc) of the pipe plus 12-inches, and in no case shall provide less than nine (9) inches between the edge of the pipes and the trench wall. The minimum trench width for storm sewers larger than 42-inch or equivalent diameter shall be 1.25Bc + 24 502.04 Placement of Adjusting Rings and Spacers inches, and in no case shall provide less than twelve (12) inches between the edge of the pipe and trench For flexible conduits, the lateral resistance of in-situ soils shall be of sufficient stiffness to provide the required pipe support. Where unstable trench sidewall conditions exist, or where trench depth dictates the use of a moveable trench box, the design consultant must determine the width of compacted bedding and backfill material necessary to provide adequate pipe or culvert side support. The trench widths derived by these equations provide a minimum only. Exceptions to these minimums apply 502.05 Connections To Manholes only to concrete pipes located at least 5' outside of the edge of pavement. Under these conditions, th

design consultant must assume responsibility for determining the appropriate minimum trench width based

upon a structural evaluation of the pipe material.

Figures 501-1 through 501-10 should be referenced for an illustration of storm sewer pipe and open culvert bedding and backfill materials required by the Department for each pipe material class. For the purpose of these specifications, the DOT pavement zone shall be defined as that area within five (5) feet of any edge of pavement, curb, gutter, sidewalk, or similar structure in the public right—of—way. Bedding and backfill requirements for each type of pipe material are summarized as follows:

1. Corrugated Metal Pipe (CMP) (Figure 501-1, 501-02)

Corrugated Metal Pipe (CMP) conduits shall be provided with Class I or Class II granular bedding 503.01 Introduction material from three (3) to six (6) inches (based upon pipe diameter) below the pipe barrel, to twelve (12) inches above the crown of the pipe. Class I material shall be shovel sliced or otherwise carefully placed and mechanically comp ensure proper compaction and complete filling of all voids. Class II material shall be compacted to 40-percent Standard Proctor Density as a minimum, except where the edge of the pipe trench is ocated within the DOT pavement zone as specified herein, where Class II material shall be compacted to 95-percent Standard Proctor Density. Bedding shall be placed in 6" to 12" balanced lifts.

From the pipe springline, corrugated metal pipe conduits shall be backfilled with Class I or Class II Initial backfill shall be placed in 6" to 12" balanced lifts.

Corrugated metal pipes located outside the applicable DOT pavement zone may be backfilled from twelve (12) inches above the crown with clean material, as shown in the Standard

2. Reinforced Concrete Pipe (RCP) (Figure 501-5, 501-6, 501-9 and 501-10)

Reinforced Concrete Pipe (RCP) conduits shall be provided with Class I or granular bedding material. Class II material shall be shovel sliced or otherwise carefully placed and mechanically compacted from three (3) to six (6) inches (based upon pipe diameter) below the pipe barrel, to 1/6th the outside pipe diameter (Bc). Class II material shall be compacted to 90- percent Standard Proctor Density, as a minimum, except where the edge of the pipe trench is located within the DOT pavement zone as specified herein, where Class II material shall be compacted to 95-percent Standard Proctor Density.

Initial and Regular Backfill

Reinforced concrete pipe conduits located within the applicable DOT pavement zone shall be backfilled from the haunch area with "B" Borrow backfill compacted to 95-percent Standard Proctor Reinforced concrete pipes located outside of the DOT pavement zone shall be backfilled from the haunch area with clean material as shown on the approved construction drawings

3. Plastic (PVC, HDPE) Pipe (Figure 501-4)

Bedding and Initial Backfill

Plastic Pipe conduits (PVC and HDPE) shall be provided with No. 8 crushed stone or approved Class I granular bedding material shovel sliced or otherwise carefully placed and mechanically compacted from four (4) to six (6) inches (based upon pipe diameter) below the pipe barrel, to a minimum of Bedding and initial backfill material shall be hand placed around the haunch and sides of the plastic pipe, to ensure proper compaction and complete filling of all voids. All bedding and initial backfill shall be placed in 6" to 12" balanced lifts.

Plastic pipe conduits located within the DOT pavement zone shall be backfilled from twelve (12) inches above the crown of the pipe with "B" Borrow backfill compacted to 95-percent Standard Plastic pipes located outside of the applicable Department of Transportation pavement zone shall be backfilled from twelve inches above the crown of the pipe with clean material as shown on the

4. Reinforced Concrete Box Sections (Figure 501-7)

Reinforced concrete box sections shall be placed on a minimum of six (6) inches of No. 8 crushed stone, or other approved equivalent Class I granular bedding material, "walked" or hand tamped into The regular backfill of reinforced concrete box sections located within the applicable DOT payement zone shall be with "B" Borrow backfill compacted to 95-percent Standard Proctor Density. Reinforced concrete box sections located outside of the DOT pavement zone shall be backfilled with clean material as shown on the approved construction drawings. The trench width for box sections shall be only as wide as is necessary to facilitate proper compaction of backfill material, provided the adjacent embankment material is structurally adequate to provide the necessary side support Verification of sufficient bearing strength of underlying soil foundation material, based upor manufacturer's recommendations, shall be required by the Department for all reinforced concrete box section installations. Soil boring report and bearing strength analysis shall be submitted with the drainage permit application.

5. Structural Plates (Figure 501-8)

The installation of structural plate pipe, pipe—arches and arches shall be in full conformance with ASTM A 807. Structural plates located within the applicable DOT pavement zone shall be backfilled with "B" Borrow packfill compacted to 95—percent Standard Proctor Density. Structural plates located outside of the DOT pavement zone shall be backfilled with clean material 503.07 Rodent Protection as shown on the Standard Details. A concrete footing that is either slotted to receive the corrugated shell, or mounted with aluminum receiving angles will be the only accepted method for placement of aluminum arches and box The size of footing pads and steel reinforcement shall be established by a professional engineer registered in the state of Indiana, based upon anticipated loading and soil—bearing capacity. The depth of the bottom of the footing shall be established a minimum of 18—inches below the anticipated scour depth. Additional requirements may be made by the Department based upon a Verification of sufficient bearing strength of underlying soil foundation material, based upon manufacturer's recommendations, shall be required by the Department for all multi-plate drainage structures possessing a span of greater than 15-feet. Soil boring report and bearing strength analysis shall be submitted with the drainage permit application.

501.15 Height of Cover Tables

Minimum and maximum height of cover tables for flexible pipe conduits (CMP, HDPE, PVC) are provided within Tables 501-1 through 501-9, which have been developed from the American Association of State Highway and ansportation Officials (AASHTO) Standard Specifications for Highway Bridges. The structural design of rigid pipe materials shall also be in accordance with the most restrictive of either manufacturers recommendations or AASHTO structural design methods. Structural design computations used to determine cover depths other than those specified herein shall be submitted to the Department for review and approval and shall be certified by professional engineer registered in the State of Indiana prior to submittal.

501.16 Embankment Installations

Enclosed storm sewer piping systems are typically installed in a trench condition where the pipe is installed in a relatively narrow trench excavated in undisturbed soil, and then covered with backfill extending to the ground surface. Storm sewers and open culverts may also be installed in an embankment fill situation, where the conduit is overlaid by a constructed embankment. For embankment installations, a minimum width of properly compacted bedding and backfill material is required to ensure that adequate stiffness of the pipe

The design consultant will be responsible for establishing the minimum embedment width for embankment installations, utilizing those bedding and backfill materials specified herein, in full conformance with those minimum standards set forth by the American Association for State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges, latest revision. Such factors as pipe stiffness, embedment stiffness, nature of in-situ soil, and anticipated construction and service loading shall be

The following information provides a summary of construction and installation procedures required by the Department for installation of storm sewer manholes and concrete box inlets. 502.02 Preparation of Base and Backfilling

The bottom of the excavation/trench for the manhole or box inlet shall be filled with a minimum of six (6) inches stone bedding to form a stable base. Where poor or unstable soil conditions exist, or over excavation has occurred, additional No. 2 stone or Class B concrete shall be used to form a stable base. Manhole and box inlet backfilling and compaction levels shall comply with the minimum requirements and specifications as outlined herein for the adjacent storm sewer pipe structure.

Precast manhole sections shall be placed and aligned to provide vertical sides. The completed manhole shall be rigid, true to dimensions and soiltight. The joints between manhole sections shall be properly sealed utilizing an approved rubber gasket in accordance with ASTM C 443, non-asphaltic mastic, or butyl rubber plaster material as specified within Chapter 400 of this Manual.

Precast concrete manhole and box inlet adjusting rings and spacers shall be installed as specified within Chapter 400 of this Manual. All adjusting ring and spacer joints shall be sealed utilizing one—half (½) inch diameter cords of extrudable preformed aasket material, non-asphaltic mastic, or butyl rubber plaster. This material shall be placed in joints and keyways and be of sufficient quantity to completely fill the joint cavity.

All storm sewer pipe connections to new or existing manholes and precast concrete box inlets shall be as outlined within Chapter 400 of this Manual. Connections of subsurface drainage tiles, or other

subsurface drainage lines, to manholes and box inlets shall be accomplished using either precast, or drilled holes, properly sealed with non—shrink cement grout or trowelable grade butyl rubber plaster. Where connections are made to existing manholes or box inlets, that structure shall be rehabilitated or replaced to those minimum standards outlined herein. This rehabilitation shall include the installation of bench walls, as well as prescribed measures to eliminate the potential for migration of backfill materials into

Where connections of subsurface tiles to the storm sewer system cannot be made at a manhole or box inlet structure, blind "T" connections to storm sewer pipe structures will be allowed on a case basis by the Department, provided the connection holes are properly cut or core—drilled, and a minimum 6-inch inside diameter cleanout connection is also provided.

SECTION 503 INSTALLATION OF SUBSURFACE TILES

The information outlined below is intended to summarize backfill materials and construction procedures accepted by the Department for the installation of subsurface drainage tiles. All subsurface tiles must be laid to the lines and grade shown on the approved construction drawings, unless otherwise approved

he following trench construction requirements shall be adhered to as a part of the installation of all

503.02 Trench Construction

subsurface drainage tiles.

The trench bottom shall be smooth and free of large (greater than three (3) inches in diameter) exposed rock. Where an unstable trench bottom is encountered, such as with silty or fine sandy soils, a firm trench bottom must be provided. Care must be taken to prevent silt or fine sand material from entering the tile system. This may be accomplished through the use of a envelope

of No. 8 gravel or comparable sized washed stone. Filter cloth barriers may also be required

nstable soil material shall be removed and replaced with a foundation and bédding of processec

2. <u>Trench Width</u> The trench width below the top of the tile must be sufficient to provide adequate clearance for

joining of tile ends with standard fittings, and for placement of required bedding materials. For placement of a gravel or washed stone envelope or filter as required, a minimum trench width of four (4) inches on both sides of the tile will be required.

Subsurface drainage tiles shall be designed and installed at a minimum grade of 0.1 percent, unless

503.03 Gravel Envelopes and Backfilling

otherwise approved by the Department.

stone or gravel.

In order to improve the flow of ground water into the subsurface drainage tile, washed stone or gravel envelopes will be required for all subsurface drainage tile installations. Subsurface tile gravel envelopes shall be of #8 gravel (INDOT Standard Specifications), or an approved washed stone equivalent. Gravel envelope material shall be clean, hard, and durable, with less than 5-percent passing the No. 200 sieve, not more than 30-percent passing the No. 60 sieve, and having a maximum size of 1 ½ inches. Figures 503—1 and 503—2 should be referenced for the required methods of installation and backfilling of subsurface drainage tile.

503.04 Minimum Cover Requirements

A minimum cover depth of eighteen (18) inches of earth or equivalent cover over the top of the tile will be required, except as allowed by Chapter 400 of this Manual. A temporary earth fill may be required over the subsurface drainage tile in order to provide adequate protection of this system during construction.

503.05 Minimum Levels of Workmanship

The following minimum levels of workmanship shall be adhered to as a part of the installation of all

1. <u>Handling of Subsurface Tiles</u> Suitable tools and equipment must be used for the safe and convenient handling and placement of subsurface drainage tiles. Plastic tile and fittings must be protected from deformation or structural deterioration due to extreme temperatures or Ultraviolet radiation. Each section of tile must be carefully examined for cracks or other defects prior to installation. Tile or fittings known to be defective must not be installed. Each section of subsurface drainage tile must be laid on an even firm bed throughout its length, as specified herein, so that no uneven strain will come to any single portion of the tile. Suitable bedding material must be provided so that side walls are continuously and uniformly supported, and sufficient lateral restraint is provided to protect the tile against deflection and collapse during

2. <u>Effect of Low Temperatures</u> Extreme care must be taken during cold weather installations to prevent cracking of the tubing during placement in the trench, and backfilling.

Joints and Fittings All drainage tile fittings shall be installed in accordance with those instructions furnished by the manufacturer. Coupling bands shall be used at all joints and fittings, at all changes in direction, changes in diameter, junctions with other tile lines, and at the ends of tile lines Hand-cutting of holes for tile connections shall be considered permissible, provided are is taken when making the connection not to create a means of obstructing flow, catching debris, or allowing soil to enter the tile line.

A minimum length of twenty (20) feet of polyvinyl chloride (PVC) or double walled high density polyethylene (HDPE) pipe meeting the material specifications of this Manual shall be used at the surface outlet end of all subsurface drainage tiles, with at least two—thirds of the pipe length embedded in the bank to provide adequate support. Animal guards shall also be provided as per section 503.07.

ne outlet end of the subsurface drain tile must be equipped with an animal guard to protect the system from entry and damage by rodents or other animals. Where tiles are connected to old existing tile lines that may serve as animal runs, an animal guard must be installed within the newly constructed line to restrict

503.08 Location of Existing Tiles

All plans and specifications submitted to the Department for review and approval shall delineate, when possible, the approximate location of existing agricultural or other subsurface drainage tiles. All existing subsurface drainage tiles shall be perpetuated across the construction site. Extreme care must be taken to prevent damage to these existing lines. Any existing tile lines that are inadvertently damaged or cut during construction shall be repaired or replaced.

SECTION 504 OPEN CHANNEL CONSTRUCTION

The cross—sectional configuration of stormwater conveyance channels may be vee—shaped, parabolic or trapezoidal. Typical open channel cross-sections and linings are illustrated within Figure 504-1. Open channels shall be constructed to the line, grade, and cross-section shown on the approved construction lans. Earthen fills beneath rock rip—rap lined channels shall be compacted to 95—percent Standard

504.02 Open Channel Stabilization

The types of treatments used to stabilize open channels may vary with flow velocities and individual site conditions within the following guidelines:

Grass-lined Channels The grass mixture chosen for stabilization of open conveyance channels shall be based

upon specific site conditions; i.e., drainage tolerance, shade tolerance, and mainte requirements. Grass-lined stormwater conveyance channels shall be permanent seeded within seven (7) days after finish grading. To facilitate vegetative establishment, the flowline of grass lined stormwater conveyance channels shall be protected utilizing an approved erosion control blanket designed and installed according to the applicable manufacturer's specifications. The maximum allowable side—slope of grass lined channels shall be 3 (horizontal) to 1 (vertical). The bottom width of trapezoidal grass-lined channels shall not exceed fifteen (15) feet. unless rock rip-rap low flow channels are provided to prevent meandering. arass-lined channels, intended to convey continuous trickle flows such as for retention pond outlets, an enclosed storm sewer, subsurface tile with gravel envelope, or rock rip—rap low flow channel will be required.

2. Rock Riprap-lined Channels

stone as a granular envelope, as follows:

504.03 Controlling Surface and Subsurface Wetness in Open Channels

The maximum allowable side-slope of rock riprap lined open conveyance channels shall be 1 ½ (horizontal) to 1 (vertical), unless otherwise approved.

To prevent chronic wetness in the invert of open channels, subsurface tiles shall be installed a minimum of 1 ½ feet in depth (from the tile invert), with a #8 gravel or equivalent size washed

1. <u>Single and Double Family Residential Developments</u> Minor drainage collector swales in rear yards and between homes shall possess a maximum channel length of 400 lineal feet, unless subsurface tile is also provided. The maximum vegetated open channel side slope shall be 3 (horizontal) to 1 (vertical). The required channel slope and invert treatment for minor drainage collector swales shall be as follows: grass lined swale if slope is 1% or greater and length is less than 400 feet; subsurface drainage tile if channel slope is between 0.5% and 1.0%, and or length is greater than 400 feet. The minimum channel slope shall be 0.3%. For relatively large open channels and perennial streams, minimum channel slopes and the provision of subsurface drainage shall be approved on a case basis by the

Commercial and Industrial Developments and Other Open Land Uses (Golf Courses,

<u>Parks, Recreation Areas)</u> The maximum length of minor drainage collector swales shall be 800 lineal feet, unless subsurface drainage is also provided. The maximum vegetated open channel side slope shall be 3 (horizontal) to 1 (vertical). The required channel slope and invert treatment for minor drainage collector swales shall be as follows: subsurface drainage tile for channel slopes between 0.3% and 0.5%. The minimum channel slope shall be 0.3%. For relatively large open channels and perennial streams, minimum channel slopes and other channel bank and invert treatments shall be approved on a case basis by the Department.

SECTION 505 DETENTION/RETENTION POND CONSTRUCTION 505.01 Introduction

Detention/retention facilities may be constructed as either a dry basin, or with a permanent water surface elevation. Dry basins may be utilized for flood control purposes only under those site conditions where stormwater quality issues are not required to be addressed. Dry detention basins may serve a variety of alternative uses, and may include grassed basins, which are also utilized for recreational purposes. Paved parking areas, permeable pavement, roof tops, and underground storage vaults for stormwater detention may also be approved on a case basis.

505.02 Dry Detention Basins

For grassed dry detention basins, the minimum accepted bottom slope shall be 1.0 percent (1%). ne maximum vegetated bank side—slope shall be 3 (horizontal) to 1 (vertical). Grassed bottom slopes and minor surface water collector swales within dry detention basins which possess a flow gradient of less than 1.0 percent (1%) shall be provided with subsurface tile installed with gravel backfill material (reference Section 503 of this chapter). Dry detention basins shall be provided with a subsurface tile or storm sewer system designed to convey continuous trickle flows through these facilities. This type of accommodation of low flows through dry detention basins is needed in order to facilitate maintenance of the basin.

505.03 Wet Detention/Retention Basins

Vegetated areas of wet detention/retention basins shall have earthen embankments constructed to a naximum slope of 3 (horizontal) to 1 (vertical). Earthen embankments armored with rock rip—rap shall not exceed 1 ½ (horizontal) to 1 (vertical). All earthen slopes shall be revegetated according to those guidelines set forth within Chapter 600 of this Manual, "Erosion and Sedimentation Control", Standard Practice No. 604.8. For wet retention basins, the bank cross—section shall be constructed as detailed within Figure 505—1 below, unless otherwise specified and approved by the Department. This method of construction will improve both the safety and water quality attributes of the proposed

Rock rip-rap may be used at the permanent pool elevation of wet detention/retention basins for prevention of bank erosion due to wave action, or extended detention time The constructed levee elevation shall provide for a minimum of one (1) foot of freeboard above the maximum anticipated flow depth through the emergency spillway. Any embankment constructed as a evee shall be constructed and maintained by the owner in accordance with FEMA regulations.

505.04 Minimum Freeboard Freeboard is a required horizontal and vertical distance between the computed 100YR water surface 100YR water surface elevation for all D/R facilities shall be a minimum ten (10) feet horizontally and two (2) feet vertically from the lowest ground elevation next to any permanent structure, such as a residential home or commercial building, for example. In addition, where construction of a

ergency spillway is required, the constructed levee elevation shall provide for a minimum of one

1) foot of freeboard above the maximum anticipated flow depth through the emergency spillway

during the design flow rate. Section 302.08 should be referenced for minimum emergency spillway

design flow rates. All emergency spillways shall outlet to an easement containing a channel with acceptable capacity.

505.05 Anti-Seep Devices For leveed detention/retention facilities which generate 3-feet or more of head pressure, the principal spillway outlet pipe structure shall be provided with anti-seep devices. The construction material to be utilized for these devices shall be of like material as the pipe structure, i.e. poured in place concrete, bolted aluminized steel, or polyethylene sheet with sewn rubber boot. As a general guide, anti—seep collars shall possess a minimum dimension of 5'x 5', and be spaced a maximum of 25' apart. For further design and construction information, reference should be made to standard United States Department of Agriculture, Soil Conservation Service (SCS) design The spacing of anti-seep collars shall be determined by the design consultant and, where required, be clearly shown on the plan/profile drawing's of the construction plans. The material used for edding and backfill of pipe structures through an earthen dam or levee shall be the same soil

505.06 Emergency Spillways

accordance with FEMA regulations.

505.07 Earthen Embankment Construction

Embankments and levees that in some way create a water impoundment shall be provided with an emergency flood overflow outlet. This overflow may occur, as an example, as the overtopping of roadway culverts, or flow around the ends of pond dikes or levees. The constructed levee elevation shall provide for a minimum of one (1) foot of freeboard above the maximum anticipated flow depth through the emergency spillway. All emergency spillways shall outlet to an easement containing a channel with acceptable capacity. Earthen, vegetated emergency spillways shall be excavated into original ground, and be evaluated for erodibility based upon soil characteristics, entrance and exit slopes, and the potential depth and velocity of flow. Additional erosion control measures within these spillways in the form of rock rip-rap or armored channels may be required on a case basis by the Department. Any embankment constructed as a levee shall be constructed and maintained by the owner in

material used in construction of the surrounding embankment.

Compaction levels of earthen levees shall reach 95—percent Standard Proctor Density, utilizing suitable soil materials, at appropriate moisture levels. Levees shall be provided with a core trench (cut-off trench) of compacted soil, to prevent the piping of water either beneath the levee, or

TABLE 501-04: Height of Cover for Ribbed Polyvinyl Chloride Pipe

				HEIGHT (OF COVER
SIZE (IN.)	ID (IN.)	OD (IN.)	MIN. WALL AREA (SQ. IN./FT.)	MIN (FT.)	MAX (FT.)
18	17.65	18.90	2.343	1.0	34.0
21	20.75	22.15	2.635	1.0	33.0
24	23.50	25.00	2.830	1.0	31.0
27	26.50	28.15	3.084	1.0	30.0
30	29.50	31.25	3 295	1.0	29 D

36 35.50 37.50 3.719 1.0 27.0

MEETS AASHTO M304, MINIMUM CELL CLASS ASTM D 1784, 12364C OR 12364C

FOOTNOTE TO TABLE 501-4 and 501-5:

*Minimum height of cover shall be twelve (12) inches for unimproved (unpaved) areas. *Minimum cover shall be measured from the valley of the corrugation of the pipe to either the

ground surface, the bottom of flexible pavement, or to the top of rigid pavement

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The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project site neatly, intact, and without physical damage. The transportation carrier shall use an appropriate method to ensure the pipe is properly supported, stacked, and restrained during transport. On-site, the pipe shall be stored on clean, level ground to prevent undue scratching or gouging.

The interior of the pipe shall be light colored to facilitate CCTV inspection. The pipe exterior may be colored per the manufacturer's standard color scheme with the exception of blue. Blue pipe shall not be used to avoid confusion with water pipes.

SECTION 302 – Sanitary Sewer Pipe Material

This Section applies to materials to be used for the construction of gravity sewers. 302.02 Allowable Pipe Materials

Vitrified Clay Pipe (VCP) for gravity sewer construction is not allowed. 302.03 Polyvinyl Chloride Pipe (PVC)

The minimum requirements for PVC are as follows:

Maximum size - Forty-eight (48) inches 2. Material

302.01 Introduction

a. Pipe installations up to twenty-five (25) feet deep

Polyvinyl Chloride (PVC) sanitary sewer pipe and fittings eight (8) inches through fifteen (15) inches in diameter shall be the integral wall bell and spigot-type with elastomeric seal joints and smooth walls conforming to ASTM D 3034 and a minimum of SDR 35. PVC sanitary sewer pipe and fittings eighteen (18) inches in diameter and larger shall be smooth wall conforming to ASTM F 679. All fittings shall be heavy walled fittings. Pipe shall have a minimum pipe stiffness of 46 psi when measured at 5% vertical ring deflection and tested in accordance with ASTM D 2412 and a minimum tensile strength of 34.50

a. Pipe installations over twenty-five (25) feet deep

PVC pipe materials shall be ASTM D 2241 (SDR 26 minimum) with minimum cell classification of 12454, AWWA C900 (DR 25 min), or AWWA C905 (DR 25 min). When pipe conforming to AWWA Standards is used, all fittings shall also be made of PVC.

3. Joints and Gaskets

a. Joints

Flexible gasketed joints shall be compression type so that when assembled, the gasket inside the bell will be compressed radially on the pipe spigot to form a watertight seal Joints shall be as follows:

• For pipe conforming to ASTM D 3034 and F 679, the joint shall meet the requirements of

• For pipe conforming to ASTM D 2241, AWWA C900, and AWWA C905, the joint shall meet the requirements of ASTM D 3139.

The assembly of joints shall be in accordance with the pipe manufacturer's b. Gaskets

4. Field Cutting of Pipe

All gaskets shall meet the requirements of ASTM F 477.

All field-cutting of pipe shall be done in a neat-trim manner using a hand or power saw, and the cut end shall be beveled using a file or wheel to produce a smooth bevel of approximately 15° and be a minimum depth of one-third (1/3) the pipe wall thickness or beveled as specifically recommended by the pipe manufacturer. Field cut pipe will only be allowed to be installed at manholes, at prefabricated tees and wyes

5 Rejection of Damaged Pipe PVC pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape; illegible markings as required; deep or excessive gouges or scratches of the pipe wall;

fractures, punctures, or cracks passing through the pipe wall; and damaged ends where such damage would prevent making a satisfactory joint.

Pipe Markings

For PVC pipe, each length of pipe must be marked per ASTM and AWWA requirements and at a minimum with the following: name of manufacturer, trade name or trademark, nominal pipe size, production/ex code, material and cell class designation, ASTM designation, and SDR number. In addition, the plain end of each pipe length shall have rings painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell.

7. Manufacture and Construction

a. Pipes Pipes shall be manufactured and tested in accordance with appropriate ASTM and AWWA standards to result in a solid wall pipe

Tees, wyes, and other fittings shall be heavy-walled and capable of withstanding the same stresses as the pipe to which they are connected. All fittings shall be fabricated from pipe meeting the requirements of

302.04 Closed Profile Large Diameter PVC

The minimum requirements for Closed Profile PVC pipe are as follows:

1. Maximum Size - Fifty-four (54) inches

Materials Pipe and fittings shall be made from polyvinyl chloride compounds which comply with the requirements as specified by ASTM F 1803 with a minimum cell classification of 12364. Minimum pipe stiffness shall be 46 psi when tested in accordance with ASTM D 2412. The actual inside and outside diameter of the pipes shall be in accordance with current manufacturer's literature, unless otherwise agreed to by the Department. Pipe shall be supplied in nominal lengths of fourteen (14) feet unless special sections are needed for construction in which case shorter or longer lengths may be used. Actual laying length shall be nominal plus or minus two

3. Joints and Gaskets

All pipe joints shall be of the bell and spigot type with elastomeric seals and conform to the requirements of ASTM D 3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe. Gasket material shall conform to the requirements of ASTM F 477.

4. Rejection of Damaged Pipe Pipe possessing the following defects may be rejected for installation: variation from straight centerline; elliptical shape; illegible markings as required herein; deep or excessive gouges or scratches of the pipe wall; fractures, punctures, or cracks passing through the pipe wall or wall profile; damaged ends where such damage would prevent making a satisfactory joint, voids in the pipe walls, or other noticeable defects in pipe

Each PVC closed profile wall pipe length and fitting shall be clearly marked per ASTM F 1803 and at a minimum with the following: manufacturer's name, nominal pipe size, cell classification, pipe stiffness -

46 PSI, and certification. Manufacture and Construction

> Manufacture pipe by the I-beam profile construction process to result in a non-porous, corrosion-resistant consistent structure.

b. Fittings Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding the same

stresses as the pipe to which they are connected. All fittings shall be fabricated from pipe meeting the requirements of these standards. Fabricated miter joints shall be reinforced by fusion heat welding. Closed Profile Large Diameter PVC Gravity Sewer shall be Lamson Vylon Pipe or an approved equal.

SECTION 303 - Sanitary Laterals

303.01 - Introduction

This Section applies to the materials to be used for the construction of laterals.

303.02 - Lateral Materials

The minimum requirements for laterals shall conform to the following

1. Allowable Pipe Materials:

2. Joints

Vitrified Clay Pipe (VCP) for lateral construction is not allowed.

a. For four (4) inch and six (6) inch laterals

Joints shall be solvent cement type for PVC or butt fused type for HDPE.

b. For eight (8) inch and larger laterals Joints shall be either flexible gasket push-on type or solvent cement type for PVC or butt fused type for

HDPE. Joints shall be installed in accordance with the manufacturer's recommendations

303.03 Controlled Settlement (Slip) Joints

The controlled settlement joint shall be a double gasketed joint made specifically for the purpose of allowing axial movement of the riser pipe for forces from 500 lb/ft to 1,970 lb/ft. The allowable movement within the joint shall be five and one-half (5½) inches. The controlled settlement joint shall be as manufactured by Plastic Trends Inc., or

SECTION 305 - Manhole Materials and Appurtenances

305.01 Introduction

This Section applies to the materials and specifications for manholes, wet wells, valve vaults, meter vaults and appurtenant structures.

305.02 Precast Sanitary Manholes

Precast manholes, including drop manholes, shall be per Figures 300.01 through 300.06 and the following:

Precast reinforced concrete manholes shall be manufactured, tested, and marked in accordance to ASTM C 478. Manhole sections shall not be installed until at least five (5) days after having been cast unless permitted in writing by the Department.

ASTM C 443, and one-half (1/2) inch diameter butyl rubber rope sealant per ASTM C 990.

All joints between precast manhole elements (excluding adjusting rings) shall have a rubber gasket per

No "see through" lift holes shall be allowed on precast concrete manholes.

4. Rejection of Damaged Manholes

Manholes possessing any of the following defects shall be subject to rejection:

a. Fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint;

 Defects that indicate imperfect proportioning, mixing and molding c. Surface defects indicating honeycombed or open profile; damaged ends, when such damage

would prevent making a satisfactory joint; d. The internal diameter of the manhole section shall not vary more than 1% from the nominal

e. Deviations more than one-quarter (1/4) inch from the straight edge at any point across the top of the manhole cone section or riser ring;

f. Visible steel bars along the inside or outside surface of the manhole except for reinforcement stirrups or spacers used to position the cage during manufacture, and reinforcement bars visible at the manhole structure end, provided these reinforcement bar ends are properly grouted in conformance with applicable ASTM specifications; and/or

g. Illegible or unmarked manhole sections not clearly marked with date of manufacture, Trade name, size designation part number, or ASTM number.

305.04 Monolithic (Cast-In-Place) Sanitary Sewer Structures

Precast manhole cones shall be as follows:

a. Eccentric offset type;

b. The top internal portion of the cone shall have a minimum four (4) inch uniform circumference to accept an internal chimney seal as shown in

c. The top of the cone shall be cast to accept the one of the precast adjusting rings as shown in Figure 300.08.

305.03 Drop Manholes

Inside or outside drop manholes shall be constructed consistent with the requirements of Section 305.02.

Monolithic pour structures will be approved on a case-by-case basis provided plans and specifications identifying the concrete mix, steel reinforcement details, pipe connections, and manhole dimensions are submitted and approved prior to construction. Substantial field changes of the approved construction drawings shall be certified by the Engineer, and receive approval of the Division prior to completion of the

305.05 Concrete Bases

Base sections for forty-eight (48) and sixty (60) inch diameter precast manholes shall be constructed with the base and first riser section as one complete integral (monolithic) precast unit

The concrete base shall be as follows: a minimum of six (6) inch thickness for forty eight (48) inch diameter. structures and a minimum of eight (8) inch thickness for larger diameter structures. Monolithic pour or precast manholes shall be constructed of Class A concrete having a compressive strength of 4000 psi. Precast manholes seventy-two (72) inches in diameter and larger with separate base sections shall utilize a gasketed joint between the base section and first riser section.

305.06 Flow Channels and Bench Walls

The channels shall be shaped and formed for a clean transition with proper hydraulics to allow the smooth conveyance of flow through the manholes. The bench wall shall be formed from the invert to a minimum height of 80% of the inside diameter of the inlet and outlet pipes to form a "U" shaped channel. The bench top shall be constructed at a one-half (1/2) inch per foot slope from the manhole wall. Refer to Figure 300.07 for typical details of flow channels in manholes.

Where a flow channel is constructed as an integral part of the precast base, it shall be shaped and formed as described above, with the exception that the bottom of the flow channel may be formed from the bottom

of inlet and outlet pipes if the pipe wall thickness is not greater than one (1) inch. For cast-in-place flow channels, the bottom invert of all pipes entering a manhole shallbe at least three (3) inches above the top of the base slab to the outlet invert so the finished sewer channel may be installed and shaped. For connections to existing sanitary sewer structures, flow channels shall be shaped as if it were a new

305.07 Manhole Adjusting Rings

Only concrete adjusting rings are allowed.

Concrete adjusting rings shall conform to ASTM C 478 and be free from voids, cracks, and other defects. The adjusting ring shall be from the same manufacturer as the manhole cone section to assure compatibility and a watertight seal per Figure 300.08. The minimum thickness of the concrete adjusting ring shall be four (4) inches

305.08 Steps

Steps shall conform to the requirements of ASTM C 478 and be manufactured using steel rods encased in polypropylene plastic. Steps shall be factory installed when the manhole is manufactured.

305.09 Sewer to Manhole Connectors

Sewer pipe connections to manholes shall be made with resilient rubber connectors manufactured in accordance with ASTM C 923. Connectors shall be secured to the manhole by either being cast-in or connected with an expandable stainless steel band. Connector shall be secured to the pipe with a stainless steel band. The stainless steel elements of the connector shall be totally nonmagnetic. Series 305 stainless steel. The connector shall be the sole element relied upon to assure a flexible, watertight seal from the sewer to the manhole. The connectors shall be as manufactured by Kor-N-Seal, Press Seal, A-Lok, or

305.10 Manhole Chimney Seal

Internal Manhole Chimney Seals shall consist of a flexible internal rubber sleeve, interlocking extensions, and stainless steel compression bands conforming to ASTM C 923. The seal shall remain flexible throughout a 25-year design life, allowing repeated vertical movement of the frame of not less than two (2) inches and repeated horizontal movement of the frame of not less than one-half (1/2) inch. The sleeve portion of the seal shall be a minimum double pleated with a minimum unexpanded vertical height of 8, 10, or 13 inches, respectively. The sleeve and extension shall have a minimum thickness of three-sixteenths (3/16) inches and shall be made from a high quality rubber compound conforming to the applicable requirements of ASTM C 923, with a minimum 1500 psi tensile strength, a maximum 18% compression set, and a hardness (durometer) of 48 ± 5. The area of the seal that compresses against the manhole frame/casting and the chimney/cone shall provide a watertight seal. The bands shall be fabricated from 16 gauge stainless steel with no welded attachments and shall have a minimum adjustment range of two (2) diameter inches. Any screws, bolts, or nuts used to lock the band in place shall be stainless steel. The internal seals shall be as manufactured by Cretex Specialty Products, NPC Specialty Products, or an approved equal.

305.11 Casting, Frames and Covers Castings shall be as follows:

Catalog Number

The frame and cover shall be as follows: a. Neenah R-1713-B-SP. or

b. East Jordan Iron Works Model 1022-1AGSMD. All castings shall have a machined bearing surface with Type F concealed pick holes.

Sanitary sewer manhole covers shall be a solid lid casting as detailed in Figure 300.09. The words "Sanitary

SECTION 601 - General Sanitary Sewer Testing

601.01 Introduction

This Section provides the testing requirements common to all sanitary sewer facilities.

601.02 General Testing Requirements

All testing shall be performed under the observation of the RPR. It is the Contractor's responsibility to schedule the testing. Test results obtained in the absence of the Division's RPR or Department will not be accepted. The Contractor shall be responsible for providing all testing equipment at no cost to the City. All pressure gages used shall be calibrated within one (1) year of use for any test. Calibration papers and test date information shall be made available at the request of the RPR, Division, or Department. The City of Indianapolis will not assume any liability for the actions of the Owner, Contractor, or their agent(s), in the performance of the required tests.

SECTION 602 - Gravity Sanitary Sewer Testing Requirements

602.01 Introduction This Section provides the testing requirements specific to gravity sanitary sewers.

All sanitary sewers twenty-four (24) inches and less shall be air tested by means of a low pressure air test per Section 602 03. All sewers larger than twenty-four (24) inches shall be joint tested per Section 602 04. All sanitary sewers constructed of flexible pipe (PVC and Centrifugally Cast Fiberglass Reinforced Polymer Mortar) shall be tested for deflection by means of a mandrel test per Section 602.06.

602.03 Low Pressure Air Test

602.02 General Requirements

All sewers twenty-four (24) inches and less shall be tested by means of a low-pressure air test to detect damaged piping and/or improper jointing. Testing shall be done per ASTM F 1417 for flexible and semi-rigid pipe and ASTM C 924 for RCP. The use of the low pressure air test for flexible and semi-rigid pipe larger that twenty-four (24) inches manner and all applicable safety procedures are followed. Do not enter, or allow anyone to enter, the manhole during

The low pressure air test shall be as follows:

1. Waiting Period: The air test may be done immediately after final backfill is placed in the trench. 2. Equipment: At a minimum, the following shall be provided:

a. Mechanical or pneumatic plugs;

b. Air control panel

c. Shut-off valve, pressure regulative valve, pressure relief valve, and input pressure gauge. The pressure regulator or relief valve shall be set no higher than 9 psig (6 psig for RCP) to avoid over pressurization d. Continuous monitoring pressure gauge having a range of 0 to at least 10 psi. The gauge shall be no less

e. To reduce the potential for sewer line over-pressurization, two (2) separate hoses shall be used to: i. Connect the control panel to the sealed line for introducing low pressure air; and

than four (4) inches in diameter with minimum divisions of 0.10 psi and an accuracy of ± 0.04 psi;

ii. Constantly monitor air pressure buildup in the line. If pneumatic plugs are utilized, a separate hose shall be required to inflate the pneumatic plugs.

Testing Procedures The Test Data Sheet per Appendix C shall be used when conducting the air test. The procedures for the low pressure

 a. Plug Installation After a segment of pipe has been backfilled to final grade, securely place and brace suitable test plugs in the ends of the sewer segment and in all lateral stubs included in the test. All plugs shall be securely restrained

and braced prior to and during the test b. Line Pressurization

Add air slowly to the test section until the pressure inside the pipe reaches 4.0 psig PLUS the necessary adjustment for groundwater (Maximum 2.0 psig adjustment for a 6.0 psig maximum total). The air pressure adjustment for groundwater shall be determined by the following:

Adjustment = Depth of Groundwater x 0.43 where: Adjustment = Adjustment added to the starting pressure of the low-pressure air test, psig. The

maximum adjustment shall be 2.0 psig. Depth of Groundwater = As measured above the top of pipe, feet. 0.43 = Conversion factor

Do not exceed 6.0 psig at any time during the low-pressure air test. The groundwater monitoring wells installed per Section 403.09 shall be used to determine the depth of

groundwater. If more than one well was installed, take the average depth of the nearest downstream and

nearest upstream monitoring locations. If the monitoring wells were not installed, the adjustment shall be 2.0

c. Pressure Stabilization

After a constant pressure of 4.0 psig (PLUS the necessary adjustment for groundwater) is reached, the air supply shall be throttled to maintain that internal pressure for at least two (2) minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.

d. Timing Pressure Loss

When temperatures have been equalized and the pressure stabilized at 4.0 psig (PLUS the necessary disconnected

The continuous monitoring pressure gauge shall then be observed while the pressure is decreased to no less than 3.5 psig (PLUS the necessary adjustment for groundwater). At this reading, or any convenient observed pressure reading between 3.5 psig and 4.0 psig (PLUS the necessary adjustment for undwater), timing shall begin. A timed pressure drop of either 1.0 psig or 0.5 psig shall be used. The PR shall determine the appropriate pressure drop. The allowable time shall be predetermined using either Table 600.01 or 600.02, depending on which pressure drop is used. When testing RCP sewers, a 1.0 psig pressure drop shall be used.

e. Time adjustment for laterals

No time adjustment for lateral lengths will be allowed.

f. Determination of Line Acceptance If the time shown for the designated pipe size and length elapses before the pressure drops (1.0 or 0.5 psig), the section of pipe being tested shall have passed the test. The test may be discontinued once the prescribed time has elapsed even though the pressure drop has not occurred.

g. Determination of Line Failure If the pressure drops before the appropriate time has elapsed, the air loss rate shall be considered excessive and the section of pipe being tested shall have failed the test. The Contractor shall be required to uncover, replace, or repair any section of sewer not passing the test. The method of repair shall be per approval of the Division and/or Department. Grouting is not an acceptable method of repair.

602.04 Joint Test All sewers greater than twenty-four (24) inches shall be joint tested using air or water under low pressure. All joints shall be tested. Testing procedures shall be per ASTM C 1103 and as follows

1. Waiting Period The joint test may be done immediately after final backfill is placed.

2. Equipment

Equipment used shall be made specifically for joint testing of pipelines.

Testing Procedures a. Joint Test Apparatus Installation

i. Clean the joint and interior joint surfaces.

ii. Move the joint test apparatus into the sewer line to the joint to be tested and position it over the joint. Make sure the end element sealing tubes straddle both sides of the joint and the hoses are attached. For the water test, the bleed-off petcock must be located at top dead center.

iii. Inflate end element sealing tubes with air in accordance with equipment and manufacturer's instructions.

b. Joint Air Test . Pressurize the void volume with air to 3.5 psi PLUS the necessary adjustment for groundwater above the top of pipe (maximum 2.0 psi adjustment for a 5.5 psi maximum total). Allow the air pressure and temperature to stabilize before shutting off the air supply. Start the timing of the test. The air pressure adjustment shall be per Section 602.03.3.b.

ii. Measure the pressure drop for five (5) seconds. iii. After the joint test is completed, exhaust void volume, then exhaust end element tubes prior to removal of the testing apparatus

Introduce water into the void volume until water flows evenly from open petcock. Close the

petcock and pressurize with water to 3.5 psi PLUS the necessary adjustment for groundwater

above the top of pipe (maximum 2.0 psi adjustment for a 5.5 psi maximum total). Shut off the water supply and start test timing. ii. Measure the pressure drop for five (5) seconds

iii. After the joint test is completed, exhaust end element tubes which will automatically release the water from the void volume, prior to removal of the testing apparatus.

d. Determination of Line Acceptance

If the pressure holds or drops less than one (1) psi for the five (5) second test time, the joint shall have

e. Determination of Line Failure

If the pressure drops one (1) psi or more during the five (5) second test time, the joint shall have failed the test. If the joint fails, the Contractor shall repair and retest as necessary. The method of repair shall be per approval of the Division and/or Department. Grouting is not an acceptable method of repair.

602.05 Water Infiltration Test

All gravity sanitary sewers shall be watertight and free from leakage. The rate of infiltration into the sanitary sewer system between any two adjacent manholes or the entire system shall not be in excess of 100 gallons per inch of pipe diameter per mile per day (100 gpd/in-dia/mi). The Contractor may be required to conduct a weir test to determine if the 100 gal/in/mi/day maximum allowable infiltration rate is being exceeded.

The weir test will be required if water is observed in the sewer at any time during the acceptance process. The weir test will be at the sole discretion of the RPR, Division, or Department. The Contractor shall be required to repair all visible leaks, even if the allowable infiltration requirements are met. The method of repair shall be per the approval of the Division and/or Department.

Grouting of the joint or crack to repair the leakage shall not be permitted. If the defective portion of the sanitary sewer cannot be located, the Contractor shall remove and reconstruct as much of the work as necessary to obtain a system that passes infiltration requirements.

602.06 Mandrel Deflection Test for Flexible Pipe

All sanitary sewers using flexible pipe shall be tested for deflection by means of a go/no-go mandrel gage or other methods as approved by the Department. The mandrel deflection test shall be as follows: 1. Waiting Period

The mandrel deflection test shall be done no sooner than thirty (30) days after final backfill has been placed.

Mandrels shall be constructed with nine (9) or ten (10) arms. Mandrels with fewer than nine (9) arms are not allowed. The Length (L) shall be measured between points of contact on the mandrel arm. The Diameter (D) mandrel dimension shall carry a tolerance of + 0.01 inches.

3. Allowable Deflection

The allowable deflection shall be based on the pipe type as follows:

a. PVC Pipe

b. Closed Profile PVC

The allowable deflection for PVC pipe shall be 5% of the base inside diameter as determined by ASTM D 3034 and F 679.

The allowable deflection for Closed Profile PVC shall be 5% based on the inside diameter as

determined on a case-by-case evaluation of the pipe design c. Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe

case-by-case evaluation of the pipe design

The allowable deflection for Centrifugally Cast Fiberglass Reinforced Polymer Mortar pipe made with polyester resin shall be 4% based on the inside diameter as determined on a

ii. Vinyl Ester Resin

The allowable deflection for Centrifugally Cast Fiberglass Reinforced Polymer Mortar pipe made with vinyl ester resin shall be 3% based on the inside diameter as determined on a case-by-case evaluation of the pipe design. The Contractor shall provide proving rings to check the mandrel. The proving rings shall be clearly labeled with the dimensions and ASTM Standard.

a. The mandrel shall be hand pulled through all sections of the sewer lines. b. Determination of Line Acceptance

If the mandrel can be hand pulled through the entire length of the section tested, the section shall

have passed the test. c. Determination of Line Failure

section of sewer not passing the mandrel test. 602.07 Air Test or Mandrel Test Failures To determine the location of any failure, a visual inspection by means of closed circuit televising (CCTV) is

recommended when the air or mandrel tests fail. The pipe shall be thoroughly cleaned before televising. I

If the mandrel cannot be hand pulled through the entire length of the section tested, the section

shall have failed the test. The Contractor shall be required to uncover, replace, or repair any

a CCTV inspection was conducted, then a digital copy of the inspection shall be submitted to the Division for

4. Testing Procedure

602.08 CCTV Inspection The Contractor shall clean and televise all sanitary sewers prior to acceptance by the utility. A digital copy of the inspection shall be submitted to the Utility for review. Deformed or damaged mainline pipe, laterals and joints, damaged controlled settlement lateral joints, infiltration, or any other conditions observed by the utility and deemed unacceptable shall be repaired by the contractor prior to acceptance.

SECTION 604 - Manhole Testing Requirements

604.01 Introduction

This Section provides the testing requirements for manholes. 604.02 General Requirements

All internal chimney seals shall be tested per Section 604.05.

correct any leaks that have been identified.

All manholes shall be tested for infiltration by means of a negative air (vacuum) pressure test per Section

604.03 Leakage All manholes shall be watertight and free from leakage. Each manhole shall be visually inspected for

manhole shall be repaired to the satisfaction of the Division and reinspected. 604.04 Negative Air (Vacuum) Test All manholes shall be tested for infiltration by means of a Negative Air (Vacuum)

Pressure Test. Testing shall be done per ASTM C 1244 1. Waiting Period If possible, each manhole shall be tested immediately after assembly and prior to backfilling. If the

test is done after backfilling, the Contractor shall be responsible for re-excavation to locate and

leakage by the Division's RPR after assembly and backfilling. If the manhole shows signs of leakage, the

The vacuum test shall be done BEFORE the chimney seal is installed and tested

Equipment used shall be made specifically for vacuum testing of manholes.

Testing Procedures

Equipment

a. Plug Installation

and plugs to prevent them from being drawn into the manhole. The test head shall be placed at the top of the manhole casting in accordance with the

 c. Air Evacuation A vacuum of ten (10) inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off.

The time for the vacuum reading to drop from ten (10) inches to nine (9) inches of mercury shall be

All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes

e. Determination of Manhole Acceptance

any or all sections of the manhole and retest.

manufacturer's recommendation

d. Timing Pressure Rise

reading drops one (1) inch, the manhole shall have passed the test. f. Determination of Manhole Failure

If the vacuum reading drops more than one (1) inch before the appropriate time has elapsed, the

manhole shall have failed the test. The Contractor shall be required to uncover, replace, or repair

If the time shown for the designated manhole depth and diameter elapses before the vacuum

604.05 Chimney Seal Leakage Test

Waiting Period

The leakage test shall be done AFTER the manhole has passed the vacuum test.

All internal chimney seals shall be tested using a leakage test. The leakage test shall be as follows:

2. Testing Procedures

a. Install the chimney seal and only the bottom expansion band per manufacturer's recommendation. Fully tighten the bottom band. Do not install the top expansion band.

b. Pulling the top of the seal away from the manhole frame, pour one (1) gallon of water behind the

c. Observe the bottom seal for a minimum of one (1) minute for leakage.

d. Drain the water by folding the top of the chimney seal down. e. If the chimney seal passes the test, install the top expansion band per manufacturer's

Determination of Chimney Seal Acceptance

If the bottom expansion band holds water without leaking, the chimney seal will have passed the

4. Determination of Chimney Seal Failure

If the bottom expansion band has any leakage during the test time, the chimney seal will have failed the test. The Contractor shall be required to remove, replace, or reposition the bottom expansion band and retest.

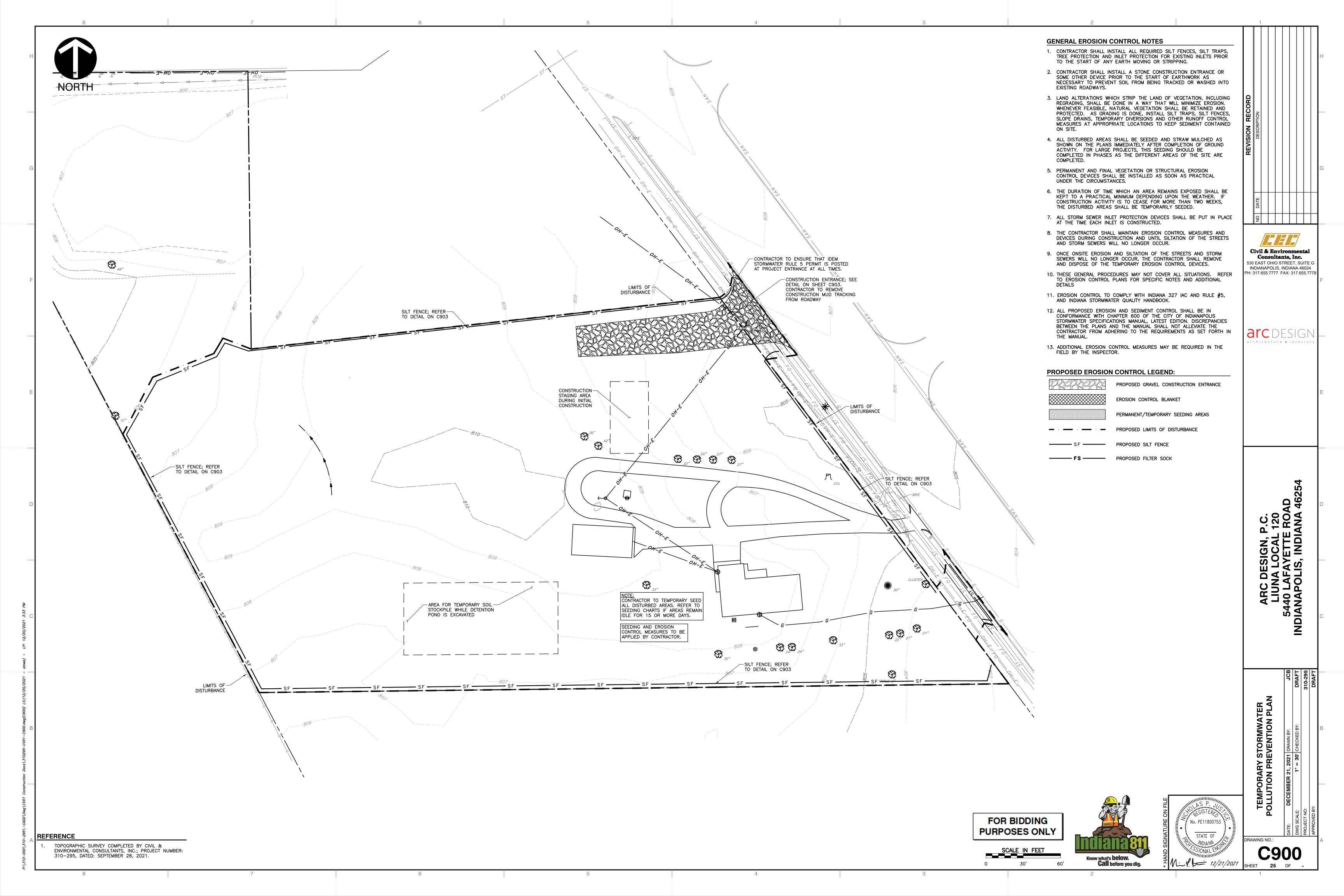
> Civil & Environment Consultants, Inc. 530 EAST OHIO STREET, SUITE O INDIANAPOLIS, INDIANA 46024 PH: 317.655.7777 FAX: 317.655.777

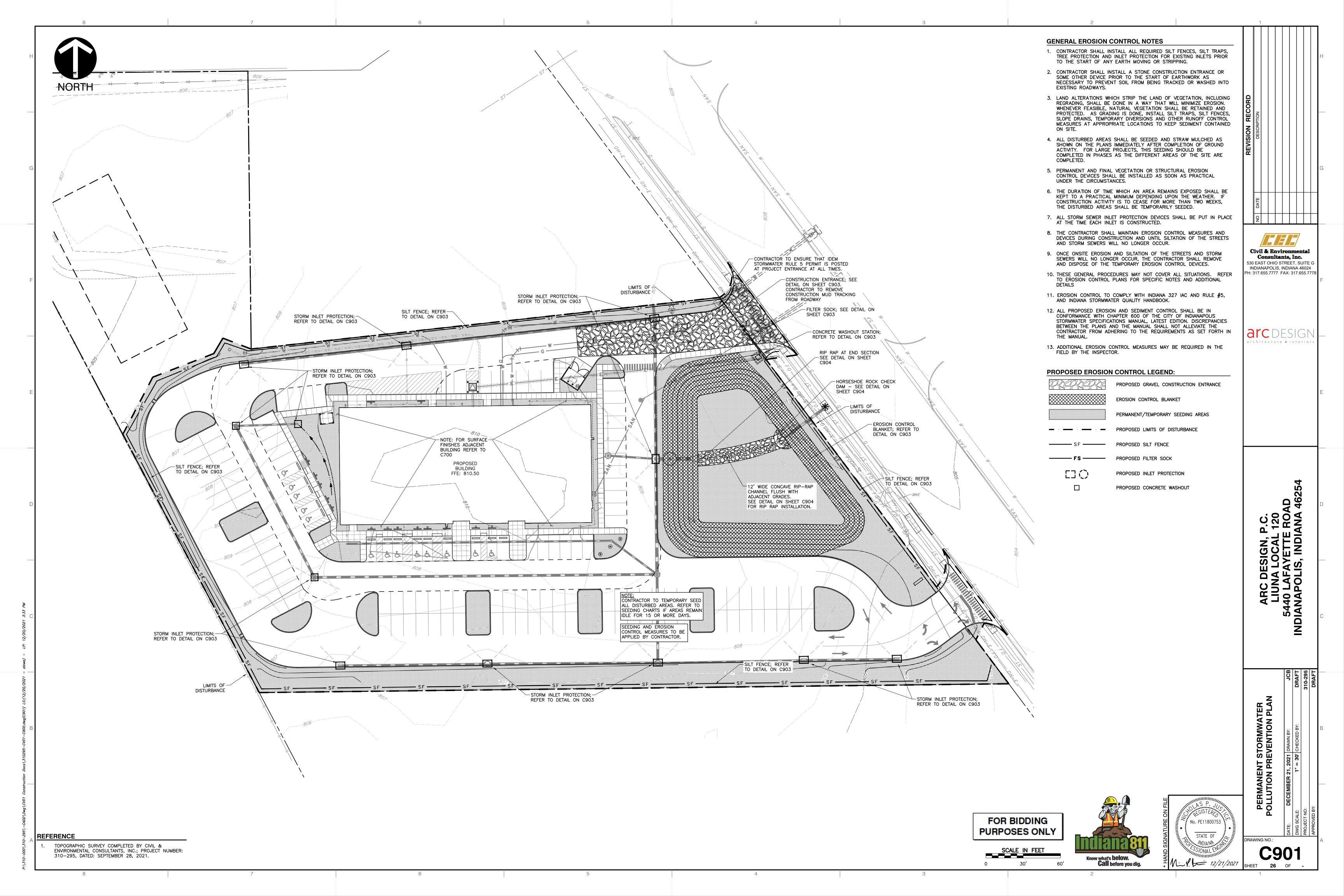
Sewer" and "City of Indianapolis" must be cast in recess letters two (2) inches in height onto solid lid covers.

PURPOSES ONLY

FOR BIDDING

STATE OF





(A1) PLAN INDEX

THE PROPOSED EROSION CONTROL MEASURES CAN BE FOUND ON SHEET C900. THE CORRESPONDING EROSION CONTROL DETAILS ARE SHOWN ON SHEET C902. THE REQUIRED EROSION CONTROL CHECKLIST ITEMS ARE LISTED ON THIS SHEET.

(A2) PLAN/PLAT SHOWING BOUNDARIES AND LOT NAMES

PLEASE REFER TO THE TOPOGRAPHIC SURVEY INCLUDED WITH THE SUBMITTAL.

(A3) PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF A NEW OFFICE BUILDING AND ASSOCIATED PARKING AND INFRASTRUCTURE. THE SITE IS LOCATED BETWEEN LAFAYETTE RD AND I-65, PIKE TOWNHSHIP, MARION COUNTY, INDIANA, (A4) VICINITY MAP

THE VICINITY MAP SHOWING THE PROJECT LOCATION CAN BE SEEN ON COVER SHEET.

(A5) LEGAL DESCRIPTION

A LEGAL DESCRIPTION IS SHOWN ON THE ALTA SURVEY INCLUDED WITH THIS SET. TOWNSHIP: 16N RANGE: 2E SECTION 12

LONGITUDE: 86°W 15' 39" LATITUDE: 39° N 51' 00"

(A6) LOT LOCATION AND SITE IMPROVEMENTS

THE PROJECT BOUNDARIES CAN BE SEEN ON SHEETS C200, AND C900.

(A7) HYDROLOGIC UNIT CODE

05120201120130

(A8) REQUIRED STATE OR FEDERAL WATER QUALITY PERMITS

NOT APPLICABLE.

(A9) STORMWATER DISCHARGE POINTS

STORM SEWER IN LAFAYETTE ROAD, FLOWING SOUTHEAST.

(A10) SITE WETLANDS, LAKES AND WATER COURSES

THERE ARE NO WETLANDS OR LAKES ON OR ADJACENT TO THE IMMEDIATE PROJECT BOUNDARY.

(A11) RECEIVING WATERS THE SITE DRAINS TO THE PROPOSED STORM SEWER SYSTEM THEN TO EXISTING STORM SEWER INFRASTRUCTURE IN LAFAYETTE RD. FROM THE MUNICIPAL SYSTEM, THE RUNOFF

TRAVELS TO FALCON CREEK, THEN DRY RUN, AND ULTIMATELY TO THE WHITE RIVER.

(A12) POTENTIAL DISCHARGES TO GROUNDWATER

THERE ARE NO SINKHOLES OR UNCAPPED ABANDONED WELLS LOCATED ON THE PROJECT SITE OR DOWNSTREAM OF THE PROJECT SITE. THE DRY DETENTION POND HAS POTENTIAL TO DISCHARGE TO GROUNDWATER.

0.80 CFS

1.62 CFS

(A13) 100 YEAR FLOODPLAIN, FLOODWAYS AND FRINGES

THE PROJECT SITE DOES NOT LIE WITHIN A 100 YEAR FLOODPLAIN.

(A14) ESTIMATED PEAK DISCHARGE

0.46 CFS

THE APPLICABLE STORM WATER RUNOFF RATES ARE LISTED BELOW. POST-DEVELOPED

100-YEAR 3.91 CFS

(A15) ADJACENT LANDUSE

THE EXISTING LAND USES ADJACENT TO THE SITE ARE AS FOLLOWS: NORTH: C1 (COMMERCIAL) WEST: DP

SOUTH: C1 (COMMERCIAL) EAST: D2 (DWELLING)

(A16) CONSTRUCTION LIMITS

THE OVERALL DISTURBED AREA IS APPROXIMATELY ±3.80 ACRES FOR THE LIUNA PROJECT HE OUTPARCEL TO BE USED FOR FUTURE DEVELOPMENT ACCOUNTS FOR 1.59 ACRES OF DISTURBANCE. REFER TO SHEET C900 FOR BOUNDARY.

(A17) EXISTING VEGETATIVE COVER THE EXISTING SITE CONSISTS OF 2 SMALL BUILDINGS WITH A PAVED LOOP DRIVEWAY.

(A18) SOIL MAF

(B2) STORMWATER QUALITY SEQUENCE

PRE-CONSTRUCTION ACTIVITIES:

- 1. SCHEDULE A PRE-CONSTRUCTION MEETING WITH CITY OF INDIANAPOLIS DEPARTMENT OF BUSINESS AND NEIGHBORHOOD SERVICES.
- 2. DESIGNATE A PERSON TO BE RESPONSIBLE FOR THE SITE INSPECTIONS AFTER EACH 1/2" RAIN AND
- A MINIMUM OF ONCE EACH WEEK. 3. CALL THE INDIANA UNDERGROUND PLANT PROTECTION SYSTEMS, INC. (HOLEY MOLEY) AT
- 4. ESTABLISH ONSITE LOCATION FOR OWNER/OPERATOR/CONTRACTOR PLACEMENT OF APPROVED PLANS AND RULE 5 NOI AND RULE 5 INSPECTIÓN DOCUMENTATION.

1-800-382-5544 TO CHECK LOCATIONS OF ANY EXISTING UTILITIES- MIN, 2 DAYS PRIOR BEFORE

- 5. INSTALL SILT FENCE AND OTHER EROSION CONTROL MEASURES AS INDICATED ON DRAWINGS.
- 6. INSTALL GRAVEL CONSTRUCTION ENTRANCE AS INDICATED ON DRAWINGS- ADD ADDITIONAL STONE AS NEEDED.
- 7. ESTABLISH CONSTRUCTION STAGING AREA FOR EQUIPMENT AND VEHICLES.

CONSTRUCTION ACTIVITY PHASING:

- 1. AFTER EROSION AND SEDIMENT CONTROL MEASURES ARE IN PLACE, BEGIN EARTHWORK OPERATIONS-ROUGH GRADING. DO NOT LEAVE LARGE AREAS UNPROTECTED FOR MORE THAN 15 DAYS.
- 2. CONSTRUCT CONCRETE WASH STATION BEFORE CONCRETE WORK IS TO COMMENCE ON SITE. REFER TO PLAN FOR LOCATION.
- 3. STRIP TOPSOIL AND STOCKPILE, START MASS GRADING OF PROPOSED DETENTION POND, AFTER COMPLETION OF MASS GRADING AND FINAL GRADING: SEED ALL DISTURBED AREAS, COMMON AREAS AND SWALES IMMEDIATELY AFTER GRADING IS COMPLETED.
- 4. INSTALL THE PROPOSED DETENTION POND SPILLWAY AND OTHER SAFETY MEASURES AND PLANTINGS AS INDICATED ON PLANS.
- 5. START BUILDING FOUNDATIONS
- 6. INSTALL SEWERS, ALL UTILITIES AND UNDERDRAINS. ADD INLET PROTECTION MEASURES AS INDICATED
- 7. INSTALL CONCRETE CURBS, PAVEMENT AREAS AND WALKS AS INDICATED ON PLANS.
- 8. PLACE TOPSOIL IN ALL TURF, AND LANDSCAPE AREAS.
- 9. INSTALL FINAL PAVEMENT AND FINAL GRADE AREA.
- 10. INSTALL LANDSCAPING AND FINAL SEEDING.
- 11. REMOVE ALL SEDIMENT CONTROL PRACTICES ONCE THE SITE IS STABILIZED.
- 12. NOTE: INSTALL TEMPORARY SEEDING AFTER A SPECIFIC STAGE OF CONSTRUCTION HAS BEEN COMPLETED (TEMPORARY OR FINAL) WHERE AREAS WILL BE IDLE OF CONSTRUCTION ACTIVITIES FOR A PERIOD OF 15 DAYS OR MORE.

(B3) CONSTRUCTION ENTRANCE INFORMATION

THE LOCATION OF THE CONSTRUCTION ENTRANCE IS ON SHEET C900.

(B4) SHEET FLOW SEDIMENT CONTROL

FILTER SOCK, TEMPORARY SEEDING AND EROSION CONTROL INLET PROTECTION WILL BE USED AS EROSION CONTROL MEASURES FOR SHEET FLOWS. THE LOCATION, DETAILS, AND SPECIFICATIONS FOR EACH STATED SEDIMENT CONTROL MEASURE IS ON SHEETS C900-C904.

(B5) CONCENTRATED FLOW SEDIMENT CONTROL

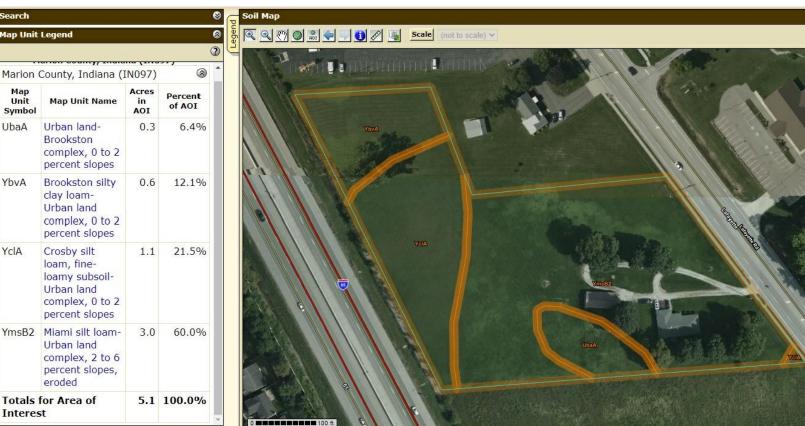
EROSION CONTROL BLANKET. AND RIP RAP APRONS WILL BE USED AS EROSION CONTROL MEASURES FOR CONCENTRATED FLOWS. THE LOCATION, DETAILS, AND SPECIFICATIONS FOR EACH STATED CONCENTRATED FLOW MEASURE IS ON SHEETS C900-C904.

(B6) INLET PROTECTION LOCATIONS AND SPECS

INLET PROTECTION WILL BE PLACED AT ALL INLETS. THE LOCATION, DETAILS, AND SPECIFICATIONS FOR INLET PROTECTION MEASURES ARE ON SHEETS C900-C904.

(B7) RUNOFF CONTROL MEASURES

FILTER SOCK, TEMPORARY SEEDING AND EROSION CONTROL INLET PROTECTION WILL BE USED TO CONTROL RUN OFF. THE LOCATION, DETAILS, AND SPECIFICATIONS FOR EACH STATED SEDIMENT CONTROL MEASURE IS ON SHEETS C900-C904.



(A19) LOCATION OF PROPOSED STORMWATER SYSTEMS

REFER TO SITE DRAINAGE PLAN SHEET C400.

(A20) OFF-SITE CONSTRUCTION PLAN RIGHT-OF-WAY RESURFACING AND DETENTION POND OUTLET PIPE.

(A21) SOIL STOCKPILE, BORROW AND/OR DISPOSAL

NO PERMANENT SOIL STOCKPILES ARE PLANNED FOR THIS DEVELOPMENT.

(A22 & A23) EXISITNG & FINAL SITE TOPOGRAPHY REFER TO EXISTING TOPOGRAPHIC SURVEY, AND SITE GRADING PLAN SHEET

ASSESSMENT OF STORMWATER POLLUTION PREVENTION PLAN CONSTRUCTION DETAILS FOR EACH STORMWATER QUALITY MEASURE. COMPONENT (SECTION B)

(B1) POTENTIAL CONSTRUCTION POLLUTANTS

POTENTIAL POLLUTANTS SOURCES RELATIVE TO A CONSTRUCTION SITE MAY INCLUDE. BUT ARE NOT LIMITED TO MATERIAL AND FUEL STORAGE AREAS, FUELING LOCATIONS, EXPOSED SOILS AND LEAKING VEHICLE/EQUIPMENT. POTENTIAL POLLUTANTS THAT MAY APPEAR AT THE SITE DUE TO CONSTRUCTION ACTIVITIES INCLUDE, BUT ARE NOT LIMITED TO DIESEL FUEL, GASOLINE, CONCRETE AND CONCRETE WASHOUT, SOLID WASTE, SEDIMENT, PAINT AND SOLVENTS, EQUIPMENT REPAIR PRODUCTS, ANTI-FREEZE AND FERTILIZER.

REFERENCE

TOPOGRAPHIC SURVEY COMPLETED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.; PROJECT NUMBER: 310-295, DATED: SEPTEMBER 28, 2021.

(B8) OUTLET PROTECTION SPECIFICATIONS

REFER TO PLANS FOR THE LOCATION, DETAILS, AND SPECIFICATIONS FOR OUTLET PROTECTION-SHEETS C900-C904.

(B9) GRADE STABILIZATION MEASURES

EROSION CONTROL BLANKETS WILL BE USED IN THIS PHASE ON GRADES GREATER THAN 3:1 AND/ OR EXPOSED TO CONCENTRATED FLOW. REFER TO CONSTRUCTION PLANS FOR LOCATIONS

(B10) STORMWATER QUALITY DETAILS

REFER TO CONSTRUCTION PLANS FOR LOCATION, DIMENSIONS, SPECIFICATIONS AND CONSTRUCTION

(B11) TEMPORARY SURFACE STABILIZATION

TEMPORARY SEEDING AND EROSION CONTROL MATTING WILL BE USED AS TEMPORARY SURFACE STABILIZATION MEASURES. REFER TO SHEETS C900 FOR SEEDING AREAS. CONTRACTOR TO SEED ALL DISTURBED AREAS. REFER TO SEEDING TABLES ON SHEET C904.

- 1. SELECT APPROPRIATE SEED MIXTURE AND APPLICATION RATE FROM TABLE ON SHEET C904. APPLY SEED UNIFORMLY
- 2. INSPECT 24 HOURS AFTER EACH RAIN EVENT AND OR AT LEAST ONCE EVERY SEVEN CALENDAR DAYS.
- 3. USE PHOSPHOROUS FREE FERTILIZER (12-0-12) UNLESS SOIL TESTING SHOWS A NEED.

(B12) PERMANENT SURFACE STABILIZATION

PERMANENT SEEDING WILL BE USED AS PERMANENT SURFACE STABILIZATION MEASURES. REFER TO SHEET C901 FOR SEEDING AREAS. CONTRACTOR TO SEED ALL DISTURBED AREAS. REFER TO SEEDING

- TABLES ON SHEET C904. 1. SELECT APPROPRIATE SEED MIXTURE AND APPLICATION RATE FROM TABLE ON SHEET C904.
- APPLY SEED UNIFORMLY 2. INSPECT 24 HOURS AFTER EACH RAIN EVENT AND OR AT LEAST ONCE EVERY SEVEN CALENDAR
- 3. USE PHOSPHOROUS FREE FERTILIZER (12-0-12) UNLESS SOIL TESTING SHOWS A NEED.

(B13) MATERIAL HANDLING AND SPILL PREVENTION

Expected materials that may appear at the site due to construction activities include, but are not limited to petroleum products, fertilizers, paint and solvents, and concrete. Materials shall be stored in the designated material storage area.

Spill prevention for vehicle and equipment fueling shall conform to the following practices: vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures. Limitations: Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with a Stabilized Construction Entrance/Exit. Implementation: Use offsite fueling stations as much as possible. Discourage "topping—off" of fuel tanks. Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use. Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area. Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the absorbent materials promptly and dispose of properly. Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. Train employees and subcontractors in proper fueling and cleanup procedures. Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level—grade area. Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills. Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended. Federal, state, and local requirements should be observed for any stationary above ground storage

Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site. Keep ample supplies of spill cleanup materials onsite. Immediately clean up spills and properly dispose of contaminated soils.

Spill prevention for solid waste shall conform to the following practices: Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors. Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures, and building construction. Packaging materials including wood, paper, and plastic. Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products. Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes. Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, Styrofoam and other package construction materials. Select designated waste collection areas onsite. Inform trash—hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight. Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy. Plan for additional containers and more frequent pickup during the demolition phase of construction. Collect site trash daily, especially during rainy and windy conditions. Remove this solid waste promptly since erosion and sediment control devices tend to collect litter. Make sure that toxic liquid wastes (sued oils, solvents and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designed for construction debris. Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor. Arrange for regular waste collection before containers overflow. Clean up immediately if a container does spill. Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas. Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding. Inspect construction waste area regularly. Arrange for regular

Spill prevention for concrete washout shall conform to the following practices: Store dry and wet materials under cover, away from drainage areas. Avoid mixing excess amounts of fresh concrete. Perform washout of concrete trucks offsite or in designated areas only. Do not wash out concrete trucks into storm drains, open ditches, streets, or streams. Do not allow excess concrete to be dumped onsite, except in designated areas. Locate washout areas at least 50 ft from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste. Wash out wastes into the temporary pit where the concrete can set, be broken up, and then disposed properly. Avoid creating runoff by draining water to a bermed or level area when washing concrete to remove fine particles and expose the aggregate. Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.

The cleanup parameters shall conform to the following practices: The developer shall be continually kept informed, maintain lists of qualified contractors and available Vac—trucks, tank pumpers and other equipment readily accessible for cleanup operations. In addition, a continually updated list of available absorbent materials and cleanup supplies should be kept on site. All maintenance personnel will be made aware of techniques for prevention of spills. They will be informed of the requirements and procedures outlined in this plan. They will be kept abreast of current developments or new information on the prevention of spills and / or necessary alteration to this plan. When spills occur which could endanger human life and this become primary concern, the discharge of the life saving protection function will be carried out by the local police and fire departments. Absorbent materials, which are used in cleaning up spilled materials, will be disposed of in a manner subject to the approval of the Indiana Department of Environmental Management. Flushing of spilled material with water will not be permitted unless so authorized by the Indiana Department of Environmental Management.

Spill prevention for vehicle and equipment maintenance shall conform to the following practices: Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles. Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles / equipment offsite should by done in conjunction with a stabilized construction entrance / exit. Out door vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and water courses. Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over and impermeable surface in a dedicated maintenance area. Place a stockpile of spill cleanup materials where it will be readily accessible. All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices. Use absorbent materials on small Remove the absorbent materials promptly and dispose of properly. Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately. Keep vehicles and equipment clean: do not allow excessive buildup of oil and arease. Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite. Train employees and subcontractors in proper maintenance and spill cleanup procedures. Drip pans or plastic sheeting should by placed under all vehicles and equipment placed on docks, barges, other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour. Properly dispose of used oils, fluids, lubricants, and spill cleanup materials. Properly dispose of or recycle used batteries. Do not place used oil in a dumpster or pour into a storm drain or water course. Properly dispose of used oils, fluids, lubricants, and spill cleanup materials. Don not bury tires. Repair leaks of fluids and oil

Spill prevention for fertilizers shall conform to the following practices: Fertilizer's used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Spill prevention for paint and solvents shall conform to the following practices: All containers will be tightly sealed and stored when not required for use. EXCESS PAINT WILL NOT BE DISCHARGED TO THE STORM SEWER SYSTEM but will be properly disposed of according to manufacturers' instructions or State or local regulations.

Spill prevention for portable toilets shall conform to the following practice: All portable toilets must be anchored to prevent spills. Spill prevention and cleanup shall conform to IDEM form 327 IAC 2-6 and the City of Indianapolis Fire Department shall be contacted in the

case of a material spill occurring. City of Indianapolis Fire Department: (317) 327-3811

City of Indianapolis Police Department: (317) 327-6041 Marion County Soil & Water District (317) 786-1776

(317) 233-7745 or (888) 233-7745 IDEM Emergency Spill Reporting:

(B14) MONITORING AND MAITENANCE GUIDELINES

EROSION CONTROL MEASURE	* MAINTENANCE	INSTALLATION SEQUENCE
STONE ENTRANCE	AS NEEDED	PRIOR TO CLEARING AND GRADING
SILT FENCE	WEEKLY, AFTER STORM EVENTS AND AS NEEDED	PRIOR TO CLEARING AND GRADING
FILTER SOCK	WEEKLY, AFTER STORM EVENTS AND AS NEEDED	PRIOR TO STREET UPGRADES
PERMANENT SEEDING	WATER AS NEEDED	AFTER FINISH GRADING
EROSION CONTROL BLANKET	WEEKLY, AFTER STORM EVENTS AND AS NEEDED	AFTER FINISH GRADING
SEED, SOD & LANDSCAPE AROUND	WATER AS NEEDED	AFTER FINISHED GRADING
DUST CONTROL	AS NEEDED	ALONG WITH ALL EARTHWORK ACTIVITIES
CONCRETE WASHOUT	WEEKLY, AFTER STORM EVENTS AND AS NEEDED	PRIOR TO START OF ANY CONCRETE WORK
REMOVAL OF INLET PROTECTION	l N/A	AFTER ALL AREAS DRAINING TO THESE AREAS ARE STABILIZED
REMOVAL OF SILT FENCE	N/A	AFTER ALL AREAS DRAINING TO THESE AREAS ARE STABILIZED
REMOVAL OF FILTER SOCK	l Ñ/A	AFTER ALL AREAS DRAINING TO THESE AREAS ARE STABILIZED

* - SEE CHART FOR MAINTENANCE REQUIREMENTS

EROSION CONTROL MEASURES MAINTENANCE REQUIREMENTS

SILT FENCE MAINTENANCE REQUIREMENTS:

- INSPECT THE SILT FENCE PERIODICALLY AND AFTER EACH STORM EVENT. 2. IF FENCE FABRIC TEARS, STARTS TO DECOMPOSE, OR IN ANY WAY
- BECSOMES INEFFECTIVE, REPLACE THE AFFECTED PORTION IMMEDIATELY. 3. REMOVE DEPOSITED SEDIMENT WHEN IT REACHES HALF THE HEIGHT OF THE

FENCE AT ITS LOWEST POINT OR IS CAUSING THE FABRIC TO BULGE.

REMOVE THE FENCE AND SEDIMENT DEPOSITS, BRING THE DISTURBED

- 4. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEAN OUT. 5. AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED
- AREA TO GRADE, AND STABILIZE. TEMPORARY GRAVEL CONSTRUCTION ENTRANCE MAINTENANCE REQUIREMENTS: 1. INSPECT ENTRANCE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
- 2. RESHAPE PAD AS NEEDED FOR DRAINAGE AND RUNOFF CONTROL.
- TOPDRESS WITH CLEAN STONE AS NEEDED.
- IMMEDIATELY REMOVE MUD AND SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROADS BY BRUSHING OR SWEEPING. FLUSHING SHOULD ONLY BE USED IF THE WATER IS CONVEYED INTO A SEDIMENT TRAP OR BASIN. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.

EROSION CONTROL BLANKET MAINTENANCE REQUIREMENTS:

- 1. INSPECT EACH EROSION CONTROL BLANKET AREAS WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
- 2. CHECK FOR DISPLACEMENT OF BLANKET.
- 3. AREAS DISPLACED, PULL BACK PORTION OF BLANKET COVERING THE ERODED AREA, ADD SOIL AND TAMP, RESEED THE AREA. REPLACE AND STAPLE BLANKET.

EROSION CONTROL MEASURES MAINTENANCE REQUIREMENTS (cont.)

CONCRETE WASHOUT MAINTENANCE REQUIREMENTS:

- 1. INSPECT EACH CONCRETE WASHOUT AREAS DAILY AND
- AFTER STORM EVENTS OR HEAVY USE.
- FOR LEAKS, SPILLS OR TRACKING OF SOIL BY EQUIPMENT. REMOVE EXCESS CONCRETE WHEN WASHOUT SYSTEMS REACHES 50% OF THE DESIGN CAPACITY. UPON REMOVAL, INSPECT

INSPECT THE INTEGRITY OF THE OVERALL STRUCTURE. CHECK

- STRUCTURE. REPAIR AS NEEDED. DISPOSE OF ALL CONCRETE IN A LEGAL MANNER.
- REPLACE PLASTIC LINER AFTER EVERY CLEANING. ENLARGE AS NECESSARY TO MAINTAIN CAPACITY.

INLET PROTECTION MAINTENANCE REQUIREMENTS:

- INSPECT EACH INLET PROTECTION MEASURE WEEKLY AND AFTER STORM EVENTS OR HEAVY USE.
- INSPECT STORM INLET BASKET OR GEOTEXTILE FABRIC AND MAKE REPAIRS.
- REMOVE ANY SEDIMENT. AVOID DAMAGING OR UNDERCUTTING FABRIC.

(B15) EROSION CONTROL SPECIFICATIONS FOR INDIVIDUAL LOTS

NO ADDITIONAL EROSION CONTROL SPECIFICATIONS ARE NEEDED FOR THIS PHASE.

ASSESSMENT OF STORMWATER POLLUTION PREVENTION PLAN COMPONENT (SECTION C)

(C1) POTENTIAL LANDUSE POLLUTANTS

POTENTIAL POLLUTANT SOURCES THAT MAY APPEAR AT THE SITE DUE TO PROPOSED LAND USE ACTIVITIES. BUT ARE NOT LIMITED TO VEHICLES. EXPOSED SOIL AND TRASH, POTENTIAL POLLUTANTS INCLUDE, BUT ARE NOT LIMITED TO OIL, GREASE, DIESEL FUEL, GASOLINE, ANTI-FREEZE, AUTO SOAP AND FERTILIZER.

(C2) STORMWATER QUALITY IMPLEMENTATION

CONSTRUCTION, INCLUDING LANDSCAPING, IS COMPLETE.

THE STORMWATER QUALITY MEASURE IMPLEMENTATION SHALL BE BEGIN AFTER SUBSTANTIAL COMPLETION OF THE CONSTRUCTION ACTIVITIES FOR THE PROPOSED PROJECT. FOLLOWING CONSTRUCTION, ALL EROSION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED UNTIL ALL PERMANENT MEASURES, AND VEGETATION HAS BEEN ESTABLISHED AND

INDIVIDUAL EROSION CONTROL MEASURES MAY BE REMOVED FROM INLET PROTECTION STATUS FOLLOWING SEEDING AND AFTER SUFFICIENT VEGETATION HAS BEEN ESTABLISHED IN AN AREA TO PREVENT SILT AND SOIL EROSION INTO THE STORM SEWER SYSTEM.

INSPECTION AND MAINTENANCE OF LANDSCAPE AREAS AND INFRASTRUCTURE IMPROVEMENTS ARE THE RESPONSIBILITY OF THE DEVELOPER/OWNER AND OR LOCAL AGENCIES TAKING JURISDICTION OVER THE INFRASTRUCTURE IMPROVEMENTS.

(C3) POST CONSTRUCTION STORMWATER QUALITY

DESCRIPTION MEASURES: POST CONSTRUCTION STORMWATER QUALITY MEASURES TO AID IN REDUCING THE AMOUNT OF

- POLLUTANTS: 1. POST CONSTRUCTION STORMWATER QUALITY MEASURES WILL CONSIST OF VEGETATIVE COVER ON THE PERMANENT GRASS AREAS AND EROSION CONTROL BLANKETS IN SPECIFIED AREAS. BOTH THE VEGETATIVE COVER AND EROSION CONTROL BLANKETS ARE INTENDED TO STABILIZE THE DISTURBED AREAS AND TO SERVE AS A SEDIMENT TRAP FOR FINER PARTICLES WITHIN THE STORM SEWER SYSTEM. THE DRY DETENTION POND WILL ALLOW SEDIMENT PARTICLES TO SETTLE, WHILE THE SCREENS ON THE OUTLET CONTROL STRUCTURE WILL CATCH ANY LEAVES OR LARGE FLOATABLE DEBRIS.
- 2. THE USE OF INLETS WITHIN THE STORM SEWER SYSTEM HAS BEEN UTILIZED. MAINTENANCE OF THE INLETS WILL BE THE RESPONSIBILITY OF THE OWNER AND/OR AGENCY TAKING
- 3. ALTHOUGH NOT CURRENTLY A PART OF THE PROPOSED SYSTEM, THE OWNER SHOULD BE AWARE THAT IF AN EXCESS OF POLLUTANTS IS DETERMINED TO BE FOUND LEAVING THE SITE, ADDITIONAL MEASURES MAY BE REQUIRED IN THE FUTURE TO FURTHER REDUCE THE
- AMOUNT OF FINES AND PETROLEUM PRODUCTS. 4. A MECHANICAL BMP STRUCTURE AQUA-SWIRL XC-9 IS PROPOSED FOR THIS PROJECT. THE OWNER SHALL FOLLOW THE OPERATION AND MAINTENANCE SCHEDULE AS DEFINED IN THE PROJECT O&M MANUAL. INSPECTIONS SHALL OCCUR AS DEFINED IN THE PROJECT O&M

(C4) LOCATION, DIMENSIONS, SPECIFICATIONS,

AND CONSTRUCTION DETAILS OF EACH STORMWATER QUALITY MEASURE

SHOULD BE REPAIRED AS SOON AS POSSIBLE.

THE STORMWATER QUALITY MEASURES FOR POST CONSTRUCTION ACTIVITIES ARE INDICATED WITHIN THESE CONSTRUCTION DOCUMENTS. WATER QUALITY FEATURES INCLUDE THE MECHANICAL STORMWATER QUALITY UNIT, DRY DETENTION POND, AND ANY GRASSED SWALES. REFER TO SHEETS C900-C904 FOR REQUIRED INFORMATION ABOUT EROSION CONTROL MEASURES TO BE IMPLEMENTED WITHIN THE PROJECT SITE, REFER TO SHEET C400 FOR STORM SEWER IMPROVEMENTS INTENDED TO SERVE THE POST CONSTRUCTED AREA. DIMENSIONS, SPECIFICATIONS AND CONSTRUCTION DETAILS FOR THESE STORMWATER QUALITY MEASURES ARE INCLUDED WITHIN THE AFOREMENTIONED SERIES OF CONSTRUCTION

DOCUMENTS. (C5) POST CONSTRUCTION MAINTENANCE GUIDELINES OWNER WILL PROVIDE MAINTENANCE ACTIVITIES FOR THE POST CONSTRUCTION WATER QUALITY

- MEASURES. MAINTENANCE ACTIVITIES WILL BE COMPLETED AS DESCRIBED BELOW. 1. ALL INLET CASTINGS WILL BE INSPECTED MONTHLY. DEBRIS AND TRASH AROUND OR OBSTRUCTING INLETS WILL BE REMOVED AND DISPOSED PROPERLY.
- 2. GRASS AREAS SURROUNDING INLETS WILL BE MAINTAINED ON A REGULAR MOWING CYCLE. TRASH AND DEBRIS WILL BE REMOVED FROM SEEDED AND PAVED AREAS. 3. EXCESS SEDIMENT WILL BE REMOVED FROM THE DRY DETENTION POND WHEN REGULAR
- MAINTENANCE ACTIVITIES OCCUR. THE OUTLET CONTROL STRUCTURE GRATES MUST BE CLEARED OF SEDIMENT AND DEBRIS, ESPECIALLY AFTER STATISTICALLY LARGE RAIN EVENTS. 4. DAMAGE TO INLET CASTINGS, INLET STRUCTURES, STORM STRUCTURES, OR CATCH BASINS
- 5. A MECHANICAL BMP STRUCTURE AQUA-SWIRL XC-9 IS PROPOSED FOR THIS PROJECT. THE OWNER SHALL INSPECT THE SYSTEM ON AT LEAST A MONTHLY BASIS. MORE FREQUENT INSPECTIONS MAY NEED TO TAKE PLACE DURING PERIODS OF HEAVY RAINFALL. THE BMP SHOULD BE INSPECTED FOR FLOATABLE DEBRIS AND FROM ACCUMULATED SEDIMENT. ANY EXCESS SEDIMENT SHOULD BE COLLECTED TO BE REMOVED OF IN A PROPER LOCATION SO THAT THE DEBRIS DOES NOT ENTER INTO THE DOWNSTREAM STORMWATER SYSTEM. ALL MAINTENANCE REQUIREMENTS ARE THE RESPONSIBILITY OF THE OWNER. THE OWNER SHALL FOLLOW THE OPERATION AND MAINTENANCE SCHEDULE AS DEFINED IN THE PROJECT O&M MANUAL. INSPECTIONS SHALL OCCUR AS DEFINED IN THE PROJECT O&M MANUAL.

EROSION CONTROL RESPONSIBLE PERSON

THE PERSON RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF THE EROSION CONTROL IS LISTED BELOW.

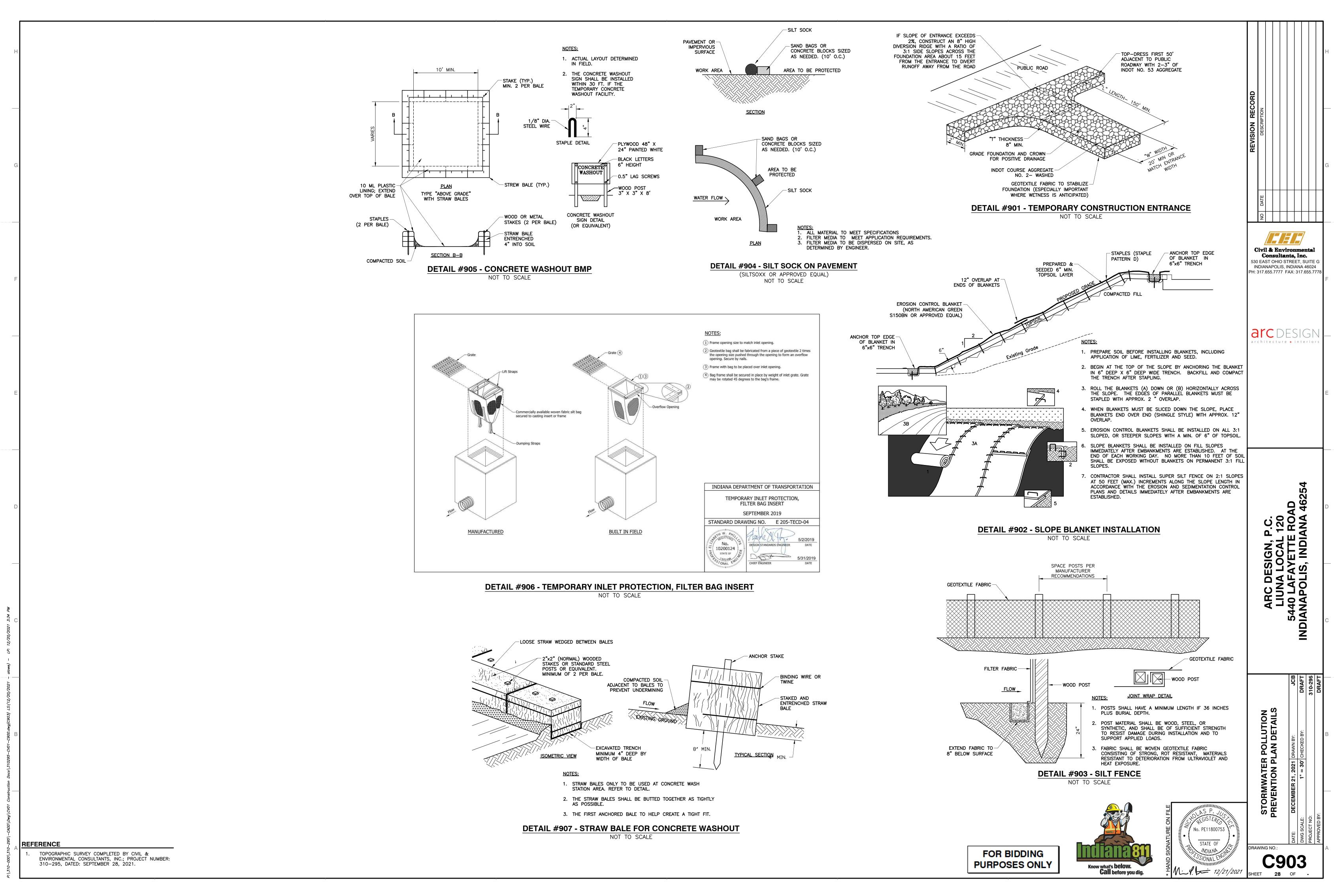
HANNIG CONSTRUCTION, INC. CONTACT: JASON JONES 815 SWAN STREET TERRE HAUTE, IN 47807 PHONE: 812-235-6218 FAX: 812-235-1218 EMAIL: JJONES@HANNIGCONSTRUCTION.COM

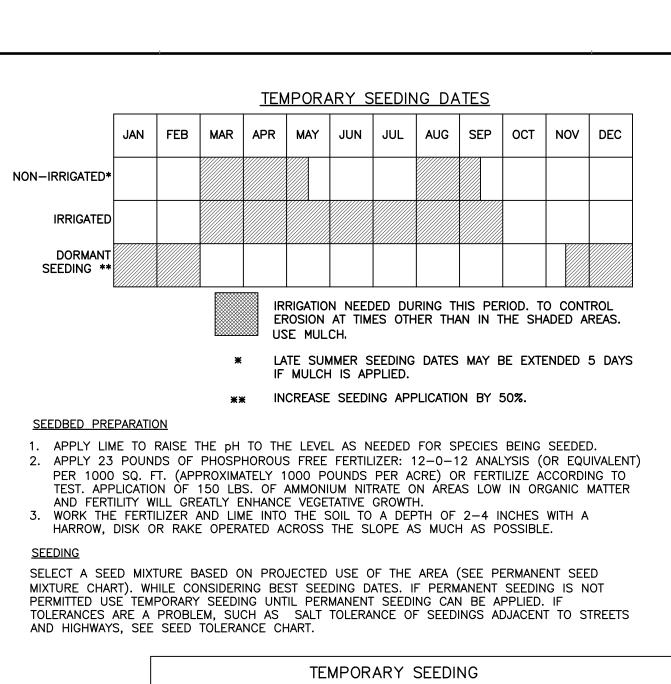




Civil & Environmenta Consultants, Inc. 530 EAST OHIO STREET, SUITE INDIANAPOLIS. INDIANA 46024 PH: 317.655.7777 FAX: 317.655.777

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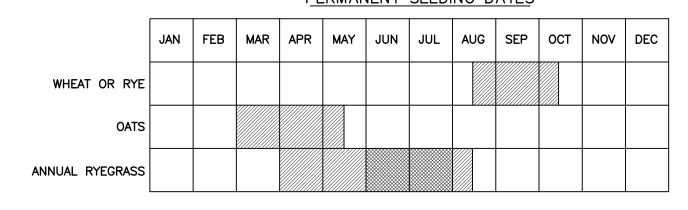




TYPE OF SEED 1000 SQ. FT. ACRE REMARKS WHEAT OR RYE 3.5 LBS. 2 BU. COVER SEED 1" TO 1 1/2" DEEP SPRING OATS 2.3 LBS. 3 BU. COVER SEED 1" DEEP ANNUAL RYEGRASS 1 LB. 40 LB. COVER SEED 1/4" DEEP * NOT NECESSARY WHERE MULCH IS APPLIED.

PERMANENT SEEDING													
SPECIES	SEEDIN	G RATE	SUITABLE pH	SITE	E SUITABILITY *								
	LBS/ACRE	LBS/1000 SQ. FT.		DROUGHTY	WELL DRAINED	WET							
LEVEL AND SLOPING, OPEN AREAS													
1. TALL FESCUE	35	.8	5.5-8.3	2	1	2							
2. TALL FESCUE	25	.6	5.5-8.3		1								
RED CLOVER	5	.12											
3. KENTUCKY BLUEGRASS	15	.4	5.8-7.5	2	1								
CREEPING RED FESCUE	15	.4											
STEEP BANKS AND CUTS													
4. TALL FESCUE	15	.4	5.8-7.5	2	1	2							
KENTUCKY BLUEGRASS	25	.6											
5. TALL FESCUE	35	.8	5.5-8.3	2	1								
LAWNS AND HIGH MAINTENAN	NCE AREAS												
6. KENTUCKY BLUEGRASS	40	.9	5.8-7.5	2	1								
CREEPING RED FESCUE	40	.9											
7. PERENNIAL RYEGRASS	170	4.0	5.0-7.5		1								
(TURF TYPE)													
8. TALL FESCUE	170	4.0	5.5-8.3	2	1	2							
* 1 DDEEEDDED 0 WILL													

PERMANENT SEEDING DATES



	WET	SOIL CONDIT NORM		SHADE TOLERANCE	CLOSE MOWING TO 2-3 1/2 INCHES	TRAMPING TOLERANCE	FERTILITY NEEDS	WINTER HARDINESS	FLOODING TOLERANCE (DAYS)	MATURE HEIGHT (INCHES)	EMERGENCE TIME (DAYS)	TO GEN.	SOIL DLERAN SOIL	CE SPRAY
CREEPING RED FESCUE FESTUCA RUBRA	2	1	2	1	1	1	MED.	1	20-25	12-18	7–21			S
KENTUCKY BLUEGRASS POA PROTINSIS	2	1	2	1	1	1	MED.	1	20-35	12-18	10-20			мт
TALL FESCUE FESTUCA L. ARUNDINACEA	2	1	1	1	1	1	LOW	1	24-35	24-36	5-14		Т	
PERENNIAL RYEGRASS LOLLUM PERENNE	2	1	2	_	1	2	MED. HIGH	2	15-20	12-18	5-10		МТ	
RED CLOVER TRIFOLIUM PROTENSE	-	1	ı	2	_	ı	MED.	1	7-10	18	5-10	S	S	

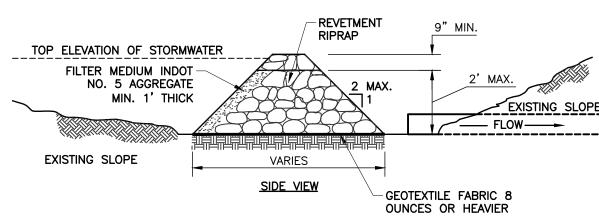
RANKING: 1 GOOD

2 MEDIUM

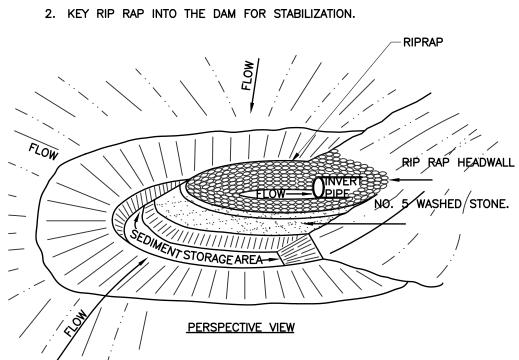
SALT TOLERANCE (TO BOTH SOIL SALTS & SPRAY) T TOLERANCE

MT MEDIUM TOLERANCE

- NOT TOLERANT S SLIGHT TOLERANCE



1. HEIGHT & WIDTH DETERMINED BY EXISTING TOPOGRAPHY AND SEDIMENT STORAGE REQUIRED.

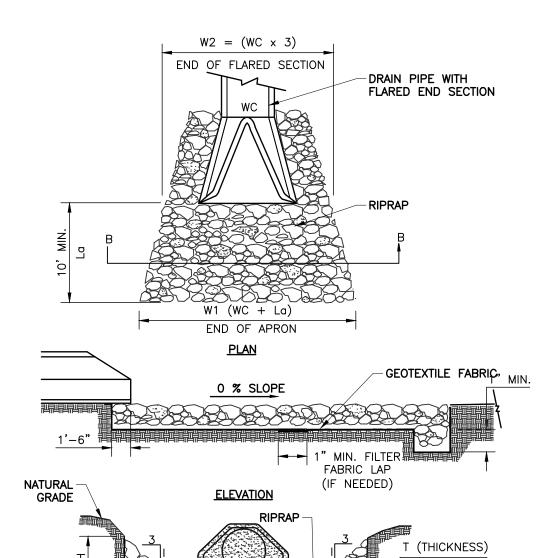


DETAIL 908 - ROCK HORSESHOE DAM DETAIL NOT TO SCALE

NOTES:

- 1. CLASS OR MEDIAN SIZE OF RIPRAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE DESIGNED BY THE ENGINEER AND ARE SUMMARIZED BELOW.
- 2. RIPRAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUND THE END OF THE PIPE OR CULVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
- 3. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIPRAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM
- 4. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAX. TAPER TO RECEIVING CHANNEL 5:1.
- 5. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR
- 6. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.
- 7. NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON WILL BE PERMITTED.
- 8. FILTER FABRIC SHALL BE INSTALLED ON COMPACTED SUBGRADE PRIOR TO PLACEMENT OF RIPRAP.

9. ANY DISTURBED AREA FROM END OF APRON TO RECEIVING CHANNEL MUST BE STABILIZED.



SECTION B-B

OUTLET	La	W1	W2	wc	Т	Н	d ₅₀	d _{MA}
Str. 400	10 If	11.25 ft.	6 ft.	24"	12 in.	24 in.	10 in.	12 in.
Str. 416	10 If	11 ft.	3 ft.	12"	12 in.	18 in.	6 in.	9 in.

-LAYER OF

GEOTEXTILE FABRIC

DETAIL 909 - RIP RAP APRON DETAIL NOT TO SCALE

ORMWATER POLLUTIO PREVENTION DETAILS

No. PE11800753 STATE OF MDIANA ... Mil. 12/21/2021

RAWING NO.: C904 SHEET **29** OF -

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ARC DESIGN, P.C. LIUNA LOCAL 120 5440 LAFAYETTE ROAD INDIANAPOLIS, INDIANA 462

FOR BIDDING **PURPOSES ONLY**





FOUNDATIONS

- 1. Proofroll slab on grade areas with a medium-weight roller or other suitable equipment to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed should be removed and replaced with compacted, engineered fill as outlined in the
- specifications. Proofrolling operations shall be monitored by the Geotechnical Testing Agency. 2. All engineered fill beneath slabs and over footings should be compacted to a dry density of at least 93% of the Modified Proctor maximum dry density (ASTM D-1557). All fill which shall be stressed by foundation loads shall be approved granular materials compacted to a dry density of at least 95% (ASTM D-1557). Coordinate all fill and compaction operations with the Specifications and the Subsurface Investigation. 3. Compaction shall be accomplished by placing fill in approximate 8" lifts and mechanically compacting
- each lift to at least the specified minimum dry density. For large areas of fill, field density tests shall be performed for each 3,000 square feet of building area for each lift as necessary to insure adequate compaction is being achieved.
- 4. Column footings and wall footings to bear on firm natural soils or well-compacted engineered fill with allowable bearing pressures of 2,000 PSF for column and wall footings, as outlined in the Subsurface Investigation Report. It is essential that the foundations be inspected to insure that all loose, soft, or otherwise undesirable
- material (such as organics, existing uncontrolled fill, etc.) is removed and that the foundations will bear on satisfactory material. The Geotechnical Testing Agency shall inspect the subgrade and perform any necessary tests to insure that the actual bearing capacities meet or exceed the design capacities. The Geotechnical Testing Agency shall verify the bearing capacity at each spread column footing and every 10 feet on center for strip footings prior to placement of concrete.
- 5. Place footings the same day the excavation is performed. If this is not possible, the footings shall be adequately protected against any detrimental change in condition, such as from disturbance, rain, or
- 6. It is the responsibility of the Contractor and each Sub-Contractor to verify the location of all utilities and
- services shown, or not shown; and establish safe working conditions before commencing work. The Contractor shall layout the entire building and field verify all dimensions prior to excavation.
- 8. For information regarding subsurface conditions, refer to the *Subsurface Investigation & Foundation* Recommendations report prepared by Alt & Witzig Engineering, Inc., A & W Project No. 21IN0829, dated December 21, 2021.

PRE-ENGINEERED METAL BUILDING (PEMB) NOTES

- 1. The entire PEMB system shall be designed by the PEMB Manufacturer in conformance with the provisions of the 2014 Indiana Building Code and the "Low Rise Building Systems Manual" as published by the Metal Building Manufacturer's Association. Where these criteria conflict, the more stringent criteria shall apply. It is the responsibility of the PEMB Manufacturer to design the complete building system, including main frame members, anchor rods, purlins, girts, lateral force resisting system(s), connections, roofing, wall panel, flashing, components, attachments, etc. The Manufacturer shall submit certification in the form of a letter bearing the seal of a Professional Engineer registered in the state of Indiana stating that the building system design meets the indicated code, performance and loading requirements.
- The PEMB Manufacturer shall be certified by the American Institute of Steel Construction (AISC), Category MB. 4. The foundation design is based upon information as provided by Ceco Buildings. The Contractor shall be responsible for coordination of any revisions required as a result of a change in the PEMB Manufacturer, including the redesign of foundations. 5. The size, number and pattern of all anchors bolts shall be determined by the PEMB Manufacturer.
- 6. The PEMB Manufacturer shall submit the anchor bolt requirement and foundation reactions prior to submittal

Anchor rod embedments are indicated on the foundation drawings.

- of the balance of the building shop drawings so as not to delay the work. Should the PEMB Manufacturer make any changes in the anchor rod configuration, base plate sizing, foundation reactions, etc. after submittal and review of anchor rod submittal, they must be communicated to all parties and explicitly noted on future submittals. The PEMB Manufacturer shall bear the cost for any changes necessary to the foundations based on changes made to the anchor rods sizes or patterns, base plate sizing, foundation reactions, etc. during preparation of the balance of the building design.
- The Contractor shall submit shop drawings of the entire PEMB system for review. The Contractor shall also submit a complete structural design analysis of the building (for recording purposes only). All shop drawing and calculation submittals shall bear the seal of a Professional Engineer registered in state of Indiana.
- 8. The PEMB Manufacturer must use the same grid identification as those used on the Contract Documents. Design criteria and loading to be used in the design of the PEMB shall match those listed in the "Design Load Criteria" section of the structural notes. Coordinate the location and magnitude of loads for
- mechanical equipment and electrical fixtures with the Mechanical Contractor. Coordinate the loads of suspended equipment, fixtures, bulkheads, operable partitions, etc. with the Architectural Drawings. 10. Calculations for frame deflections (drift) shall be performed using only the Bare Frame Method.
- Reductions based on engineering judgement using the assumed composite stiffness of the building envelope are not permitted. A. Maximum lateral deflection/drift due to 10-year wind load shall not exceed H/120 for buildings with
- flexible cladding, such as metal wall panel, EIFS, wood siding, etc. B. Maximum lateral deflection/drift due to 10-year wind load shall not exceed H/240 for buildings with brittle cladding (pinned base) such as brick veneer with steel stud backup, full height masonry walls, etc., where 'H' denotes the eave height of the building.
- 11. The PEMB Manufacturer shall provide all girts, purlins, eave struts, and other components required for a complete system. All wall systems, such as steel studs, curtain walls, storefronts, etc. shall be properly supported by the PEMB system. Allowable deflections of components shall not exceed the
- A) Primary Framing no ceilings* L/150 for Roof Snow Load + Collateral Load
- B) Primary Framing with suspended L/240 for Roof Snow Load + Collateral Load Acoustical Ceilings
- C) Secondary Framing no ceilings* L/150 for Dead Load + Roof Snow Load + Collateral Load L/240 for Roof Snow Load + Collateral Load D) Secondary Framing with
- suspended Acoustical Ceilings
- E) Wall Girts w/ Flexible Cladding F) Wall Girts w/ Brittle Cladding
- G) Wind Beams Flexible Cladding L/240
- H) Wind Beams Brittle Cladding I) Wind Columns - Flexible Cladding L/240 J) Wind Columns - Brittle Cladding L/400
- L denotes the span of the element between supports For 10-year wind values, use 75% of the 50-year wind pressure
- * The PEMB Manufacturer must check ponding for low-slope applications. 12. The PEMB shall be designed to resist lateral loads as follows:
- A. Interior Frame Lines Rigid Frames with Pinned Bases B. Endwall Frame Lines Bearing Endwalls with Diagonal Rod or
- Cable Bracing C. Expandable Endwall Frame Lines Full-Load Rigid Frame w/ Pinned Bases & Removable Wind Columns
- D. Sidewalls Parallel to Eaves Diagonal Rod or Cable Bracing Where endwall bracing is not feasible, provide horizontal bracing in plane of roof to distribute lateral load to first interior rigid frame line. Fixed base columns and portal frames are not permitted, unless shown otherwise on the Contract Documents.
- 13. The PEMB Erector shall provide all temporary guying and bracing as required. 14. Unless otherwise specified or noted, all steel members shall be cleaned and painted in accordance with
- Manufacturer's standard procedures. Paint color for both primary and secondary steel shall match. 15. When modifications are proposed to PEMB members or elements under the design and certification of the
- PEMB Manufacturer, written authorization by the PEMB's Speciality Structural Engineer must be obtained and submitted to the Structural Engineer of Record for review prior to performing the proposed modification.

SPECIALTY STRUCTURAL ENGINEERING (SSE)

- 1. A Specialty Structural Engineer is defined as a Professional Engineer licensed in the State of Indiana, not the Structural Engineer of Record, who performs Structural Engineering functions necessary for the structure to be completed and who has shown experience and/or training in the specific speciality.
- 2. It is the Specialty Structural Engineer's responsibility to review the Construction Drawings and Specifications to determine the appropriate scope of engineering. 3. It is the intent of the Drawings and Specifications to provide sufficient information for the Specialty
- Structural Engineer (SSE) to perform his design and analysis. If the SSE determines there are details, features, or unanticipated project limits which conflict with the engineering requirements as described in the project documents, the SSE shall in a timely manner, contact the Structural Engineer of Record for resolution of conflicts. 4. The Specialty Structural Engineer (SSE) shall forward documents to the Structural Engineer of Record
- for review. Such documents shall bear the stamp of the SSE and include: A) Drawings introducing engineering input, such as defining the configuration or structural capacity of structural components and/or their assembly into structural systems.
- B) Calculations. C) Computer printouts which are an acceptable substitute for manual calculations provided they are accompanied by sufficient design assumptions and identified input and output information to permit their proper evaluation. Such information shall bear the stamp of the Specialty Engineer as
- an indication that said engineer has accepted responsibility for the results. Contractors are referred to the specific technical specification sections and the structural drawings for those elements requiring Specialty Structural Engineering. Examples of components requiring Specialty Structural Engineering include, but are not limited to the following: A) Pre-Engineering Metal Building Systems.
- B) Cold-Formed Steel Framing.
- 6. When modifications are proposed to elements under the design and certification of the Specialty Structural Engineer (SSE), written authorization by the SSE must be obtained and submitted to the Engineer of Record for review, prior to performing the proposed modification.

POST-INSTALLED DOWELS & ANCHOR BOLTS/RODS

- 1. All reinforcing steel and threaded rod anchors to be installed in a 2-part chemical anchoring system shall be treated as follows:
- A. Drill holes larger than bar or rod to be embedded. Coordinate hole diameter with Manufacturer's recommendations.
- B. Holes must be cleaned and prepared in accordance with Manufacturer's recommendations. C. When reinforcing steel is encountered during drilling for installation of anchors; stop drilling, use a
- sensor to locate the reinforcing in the surrounding area and install anchor(s) as close as possible to the original location. Contact the Structural Engineer of Record (SER) for direction when the revised location is more than 2" from the original location, or when the original function of the anchorage is significantly altered. When in doubt, contact the SER for direction.
- D. Drill the hole a minimum of 15 bar diameters or as shown on the plans. E. Use a 2-part adhesive anchoring system, Hilti HY-200, or approved equal.
- F. For anchorage into hollow substrate, use Hilti HY-270, or approved equal.
- G. Reinforcing steel dowels shall be ASTM A615, Grade 60, unless noted. H. Anchor rods shall be Hilti HAS-V-36, unless noted. Provide finish as noted on the Drawings. If not noted, provide hot-dip galvanized finish for interior applications. Provide stainless steel finish for all exterior applications, unless noted.
- 2. When column anchor bolts have been omitted, or damaged by construction operations, the Contractor must obtain the written approval of the Structural Engineer of Record prior to repair or replacement. A. As a precaution, the affected column must be guyed and braced after repair for the balance of the
- erection period. B. As an alternate to guying and bracing, the Contractor may at his option, employ a testing agency to perform a tensile pull test to confirm the strength for the repaired or replaced anchor bolt. The tensile proof load must exceed 1.33 x the design load of the original anchor without causing distress of the anchor bolt or the surrounding concrete. Reference the following table for the minimum proof loads:
- 3/4" diameter: 12.8 kips 7/8" diameter: 17.4 kips
- 1" diameter: 22.7 kips 1 1/8" diameter: 28.8 kips
- 1 1/4" diameter: 35.6 kips Note: Values listed above are for ASTM F-1554, Grade 36 material. When higher grade or strength materials are specified, refer to the AISC Steel Design Guide 1, Table 3.1 for minimum
- allowable loads to be multiplied by 1.33. C. When affected anchor bolts are part of a fixed moment resisting column base, such as those in
- moment-resisting space frames, canopies, or fixed-base installations, the repaired anchor bolts must be proof-loaded, or the affected column footing and/or pier replaced in its entirety.
- D. When affected anchor bolts are part of a braced frame the affected column footing and/or pier
- must be replaced in its entirety. E. Prior to erection, the controlling Contractor must provide written notification to the Steel Erector if there has been a repair, replacement or modification of the anchor bolts for that column.

CAST IN PLACE CONCRETE

- 1. Details of fabrication of reinforcement, handling and placing of the concrete, construction of forms and placement of reinforcement not otherwise covered by the Plans and Specifications, shall comply with the ACI Code requirements of the latest revised date.
- 2. Cold weather concreting shall be in accordance with ACI 306. Cold weather is defined as a period when for more than 3 successive days the average daily air temperature drops below 40F and stays below 50F. The Contractor shall maintain a copy of this publication on site. 3. Hot weather concreting shall be in accordance with ACI 305. Hot weather is defined as any
- combination of the following conditions that tends to impair the quality of the freshly mixed or hardened concrete: high ambient temperature, high concrete temperature, low relative humidity, wind speed, or solar radiation The Contractor shall maintain a copy of this publication on site. 4. A certified Testing Agency shall be retained to perform industry standard testing including
- measurement of slump, air temperature, concrete cylinder testing, etc. to ensure conformance with the Contract Documents. Submit reports to Architect/Engineer. 5. Finishing of Slabs: After screeding, bull floating and floating operations have been completed, apply final finish as indicated below, and as described in the Division 3 Cast In Place Concrete Specification
- of the Project Manual. A. Floor Slabs Hard Trowel Finish B. Ramps, Stairs, & Sidewalks Broom Finish
- C. Driving Surfaces Sample Finishes: See Specifications for sample and mockup requirements, if any. Floor Tolerances: See the Specifications for specified Ff and Fl tolerances. Ff and Fl testing shall be performed by the Testing Agency in accordance with ASTM E-1155. Results, including acceptance or rejection of the work will be provided to the Contractor and the Architect/Engineer within 48 hours after

data collection. Remedies for out-of-tolerance work shall be in accordance with the Specifications.

Rough Swirl Finish

- 6. Finishing of Formed Surfaces: Finish formed surfaces as indicated below, and as described in the Division 3 Cast In Place Concrete Specification of the Project Manual. A. Sides of Footings where required Rough Form Finish
- Rough Form Finish B. Sides of Grade Beams where required
- C. Surfaces not exposed to public view Rough Form Finish
- Smooth Form Finish D. Surfaces exposed to public view 7. The Contractor shall consult with the Structural Engineer of Record before starting concrete work to establish a satisfactory placing schedule and to determine the location of construction joints so as to
- minimize the effects of shrinkage in the floor system. 8. Sawn or tooled control/contraction joints shall be provided in all slabs on grade. For a framed structure, joints shall be located on all column lines. If the column spacing exceeds 20'-0", provide intermediate ioints. Exterior slabs, and interior slabs without column shall have joints spaced a maximum of 15-0" apart. Layout joints so that maximum aspect ratio (ratio of long side to short side) does not exceed 1.5
- 9. Where vinyl composition tile, vinyl sheets goods, thin-set epoxy terrazzo, or other similar material is the specified finish floor material, the Contractor shall coordinate the locations of control/contraction and construction joints with the Finish Flooring Contractor. Submit a dimensioned plan showing joint locations and proposed sequence of floor pours.
- 11. Joints in slabs to receive a finished floor may remain unfilled, unless required by the finish flooring contractor. All exposed slabs shall be filled with sealant specified in Division 7. Defer filling of joints as long as possible, preferably a minimum of 4 to 6 weeks after the slab has been cured. Prior to filling, remove all debris from the slab joints, the fill in accordance with the manufacturer's recommendations.
- 13. Refer to the Architectural Drawings for chamfer requirements for corners of concrete. Where not indicated, provide 3/4" chamfers on exposed corners of concrete, except those abutting masonry. 14. Refer to the Architectural Drawings for exact locations and dimensions of recessed slabs, ramps, stairs,
- thickened slabs, etc. Slope slabs to drains where shown on the Architectural and Plumbing Drawings. 15. Sidewalks, drives, exterior retaining walls, and other site concrete are not indicated on the Structural Drawings. Refer to the Site/Civil and Architectural Drawings for locations, dimensions, elevations, jointing, and finish details.

CONCRETE REINFORCING

- 1. Reinforcement, other than cold drawn wire for spirals and welded wire fabric, shall have deformed surfaces in accordance with ASTM A305.
- 2. Reinforcing steel shall conform to ASTM A615, Grade 60, unless noted. 3. Welded wire fabric shall conform to ASTM A1064, unless noted.
- 4. Where hooks are indicated, provide standard hooks per ACI and CRSI for all bars unless other hook dimensions are shown on the plans or details.

section or note:

- 5. Reinforcement in footings, walls and beams shall be continuous. Lap bars a minimum of 40 diameters, unless noted otherwise. 6. Reinforcement shall be supported and secured against displacement in accordance with the CRSI
- 'Manual of Standard Practice'.
- 7. Details of reinforcing steel fabrication and placement shall conform to ACI 315 'Details and Detailing of Concrete Reinforcement' and ACI 315R 'Manual of Engineering and Placing Drawings
- for Reinforced Concrete Structures', unless otherwise indicated 8. Spread reinforcing steel around small openings and sleeves in slabs and walls, where possible,
- and where bar spacing will not exceed 1.5 times the normal spacing. Discontinue bars at all large openings where necessary, and provide an area of reinforcement, equal to the interrupted reinforcement, in full length bars, distributing one-half each side of the opening. Where shrinkage and temperature reinforcement is interrupted, add (2) #5 x opening dimension + 4'-0" on each side of the opening. Provide #5 x 4'-0" long diagonal bars in both faces, at each corner of openings larger than 12" in any direction. 9. Provide standees for the support of top reinforcement for footings, pile caps, and mats.
- 10. Provide individual high chairs with support bars, as required for the support of top reinforcement for supported slabs. Do NOT provide standees. 11. Provide snap-on plastic space wheels to maintain required concrete cover for vertical wall
- 12. Where walls sit on column footings, provide dowels for the wall. Dowels shall be the same size and spacing as the vertical wall reinforcement, unless noted otherwise, with lab splices as shown
- on the application sections. Install dowels in the footing forms before concrete is placed. Do NOT stick dowels into footings after concrete is placed. 13. Field bending of reinforcing steel is prohibited, unless noted on drawings.

14. Minimum concrete cover over reinforcing steel shall be as follows, unless noted otherwise on plan,

MINIMUM COVER FOR REINFORCEMENT

	MINIMUM COVER
FOOTINGS & BASE SLABS	
AT FORMED SURFACES & BOTTOMS BEARING ON CONCRETE WORK MAT	2"
AT UNFORMED SURFACES & BOTTOMS IN CONTACT WITH EARTH	3"
TOP OF FOOTINGS	SAME AS SLABS

CONCRETE MIX CLASS	SES
FOOTINGS &FOUNDATION WALLS	
COMPRESSIVE STRENGTH	4000 PSI
MAXIMUM WATER/CEMENT RATIO	0.45
AIR CONTENT	0 - 3 PERCENT
WATER-REDUCING ADMIXTURE	REQUIRED
SLUMP	5" TO 6 1/2"
INTERIOR CONCRETE SLABS	
COMPRESSIVE STRENGTH	4000 PSI
MINIMUM CEMENTITIOUS MATERIAL CONTENT	517 LB/CU YD
AIR CONTENT	0 - 3 PERCENT
WATER-REDUCING ADMIXTURE	REQUIRED
SLUMP	5" TO 6 1/2"
INCLUDE FIBER REINFORCING AND 'E5 INTERAL CURE' ADMIXTURE AS INDICATED ON PLAN	
EXTERIOR CONCRETE SUBJECT TO FREEZE-THAW	
COMPRESSIVE STRENGTH	4500 PSI
MINIMUM CEMENTITIOUS MATERIAL CONTENT	564 LB/CU YD
AIR CONTENT	6 ± 1 PERCENT
WATER-REDUCING ADMIXTURE	REQUIRED
SLUMP	5" TO 6 1/2"
COARSE AGGREGATE	CRUSHED STONE
LEAN CONCRETE FILL	
COMPRESSIVE STRENGTH	2000 PSI
MAXIMUM WATER/CEMENT RATIO	0.65
AIR CONTENT	OPTIONAL
WATER-REDUCING ADMIXTURE	NOT REQUIRED
SLUMP	4" TO 7"

 SLUMP: MIXES CONTAINING TYPE A WRDA MIXES CONTAINING MID-RANGE WRDA

5 - 6 1/2" MIXES CONTAINING HIGH-RANGE WRDA 2. SPECIFIED MINIMUM CEMENTITIOUS MATERIAL CONTENTS ARE BASED ON THE USE OF WATER REDUCING ADMIXTURES.

3. INCLUDE AN AIR-ENTRAINING ADMIXTURE FOR ALL CONCRETE EXPOSED TO FREEZING

CONSTRUCTION, BEFORE ATTAINING ITS SPECIFIED DESIGN COMPRESSIVE STRENGTH. REF. ACI 306 FOR DEFINITION OF COLD WEATHER. 4. CLASS C FLY ASH MAY BE USED AS A CEMENT SUBSTITUTE WITH A MAXIMUM 20% SUBSTITUTION RATE ON A POUND-PER-POUND BASIS.

CIRCUMSTANCES WARRANT. THESE REVISED MIX DESIGNS SHALL BE SUBMITTED TO THE

AND THAWING IN SERVICE AND FOR ALL CONCRETE EXPOSED TO COLD WEATHER DURING

5" MAXIMUM

5. PROPORTION CONCRETE MIXES TO PROVIDE WORKABILITY AND CONSISTENCY TO PERMIT CONCRETE TO BE WORKED READILY INTO THE CORNERS AND ANGLES OF THE FORMS AND AROUND REINFORCEMENT BY THE METHODS OF PLACEMENT AND CONSOLIDATION TO BE EMPLOYED, WITHOUT SEGREGATION AND EXCESSIVE BLEEDING. 6. ADJUSTMENTS TO THE APPROVED MIX DESIGNS MAY BE REQUESTED BY THE

CONTRACTOR WHEN JOB CONDITIONS, WEATHER, TEST RESULTS, OR OTHER

ARCHITECT/ENGINEER FOR APPROVAL PRIOR TO USE.

DESIGN CRITERIA

1. DESIGN STANDARDS: The intended design standards and/or criteria are as follows: The 2014 Indiana Building Code (2012 International Building Code (IBC) with Indiana Amendments) Concrete

AISI-ASD

Steel Deck

Cold-Formed Metal All referenced standards and codes, as well as ASTM numbers, are for the editions of these publications referenced in the Building Code listed above, unless otherwise noted. 2. DEAD LOADS: Gravity Dead Loads used in the design of the structure are as computed for the materials of construction incorporated into the building, including but not limited to walls, floors, ceilings, stairways, fixed partitions, finishes, cladding and other similar architectural and structural items, as well as mechanical, electrical and plumbing equipment and fixtures, and material handling and fixed service

Steel Deck Institute

AISC Manual, Allowable Stress Design (ASD)

equipment, including the weight of cranes. 3. LIVE LOADS: Gravity live loads used in the design of the structure meet, or exceed the following table

UNIFORM (PSF) OCCUPANCY OR USE CONCENTRATED (LB) [Note #1] A. Assembly Area Movable Seats 2. Platforms (Assembly) B. Office Buildings . Lobbies & First Floor Corridors 2000 Offices Note #1: Unless otherwise noted, the indicated concentrated load has been assumed to be

uniformly distributed over an area of 30" x 30". 4. LIVE LOAD REDUCTION: Live load reductions in accordance with IBC 1607.9 have been used with the following exceptions:

A. Heavy live loads in excess of 100 PSF have not been reduced except for members supporting 2 or more floors have been reduced by a maximum of 20%. B. Live loads of 100 PSF or less for public assembly occupancies have not been reduced. C. Live loads for roof members have not been reduced. 5. PARTITION ALLOWANCE: a uniform partition allowance of 15 PSF has been used to account for the load

of all floors where partition locations are subject to change, unless the specified live load exceeds 80 PSF.

6. COLLATERAL LOAD: Unless otherwise noted, a minimum uniform collateral load of 3 PSF has been

used to account for ductwork, ceilings, sprinklers, lighting, etc. The collateral load is in addition to the weight of mechanical units, larger piping (greater than 4" diameter) and suspended fixtures or equipment that have been specifically accounted for in the design. 7. CONCENTRATED LOADS: All single panel points of the lower chord of exposed roof trusses or any point along the primary structural

members supporting roofs over all other occupancies shall be capable of carrying safely a suspended concentrated load of not less than 200 LBS in addition to dead load, unless noted. 8. HANDRAILS AND GUARDS

A. Handrail Assemblies and Guards 50 PLF applied in any direction 200 LB concentrated load applied in any direction (non-concurrent with 50 PLF load) B. Components, Intermediate Rails, 50 LBS horizontally applied normal load Balusters, Fillers, Etc. on an area not to exceed 1 square foot not superimposed with those of handrail assemblies.

9. ROOF LIVE/SNOW LOADS: Gravity Live Loads used in the design of the roof structure meet or exceed the following table: A. Snow Load Ground Snow Load, Pg 14 PSF Flat Roof Snow Load, Pf Low Slope Minimum Snow Load, Pm 20 PSF Exposure Factor, Ce Risk Category (IBC Table 1604.5) Snow Importance Factor, Is Thermal Factor, Ct

C. Overhang Eaves & Projections 1. Sloped roof snow loads calculated in accordance with Section 7.4, ASCE 7. 2. Unbalanced roof snow loads calculated in accordance with Section 7.6, ASCE 7. Specialty Structural Engineers must consider unbalanced snow loads in the design of pre-engineered trusses, frames, skylights, curtain walls, cold-formed metal framing, canopies, etc. 3. Drift loads calculated in accordance with Section 7.7, ASCE 7.

10. LATERAL LOADS: Lateral loads were computed using the following criteria: 115 MPH Ultimate Design Wind Speed, Vult Nominal Design Wind Speed, Vasd 89 MPH Risk Category (IBC Table 1604.5) Internal Pressure Coefficient, GCpi B. Seismic Load Site Classification Risk Category (IBC Table 1604.5) Seismic Importance Factor, le

Base Seismic Force-Resisting System

B. Minimum Roof Live Load

Mapped Spectral Response Acceleration, Ss Mapped Spectral Response Acceleration, S1 Design Spectral Response Acceleration, Sds Design Spectral Response Acceleration, Sd1 Seismic Design Category, SDC Response Modification Coefficient, R Seismic Response Coefficient, Cs Analysis Procedure Equivalent Lateral Force

(ASCE 7-10, Table 12.2-1) Detailed For Seismic Resistance 11. SAFETY FACTORS: This structure has been designed with 'Safety Factors' in accordance with accepted principles of structural engineering. The fundamental nature of the 'Safety Factor' is to compensate for uncertainties in the design, fabrication, and erection of structural building components. It is intended that ' Safety Factors' be used such that the load-carrying capacity of the structure does not fall below the design load and that the building will perform under design load without distress. While the use of 'Safety Factors' implies some excess capacity beyond design load, such excess capacity cannot be adequately predicted and SHALL NOT BE RELIED UPON.

Structural Steel Systems Not

GENERAL NOTES

- 1. The Contractor shall be responsible for complying with all safety precautions and regulations during the work. The Structural Engineer of Record will not advise on, nor issue direction as to safety precautions and programs. 2. The Structural Drawings herein represent the finished structure. The Contractor shall provide all temporary guying and bracing required to erect and hold the structure in proper alignment until all Structural Work and
- connections have been completed. The investigation, design, safety, adequacy and inspection of erection bracing, shoring, temporary supports, etc. is the sole responsibility of the Contractor. 3. The Structural Engineer of Record (SER) shall not be responsible for the methods, techniques and sequences are not specifically shown, similar details of construction shall be used, subject to approval of the SER. 4. Drawings indicate general and typical details of construction. Where conditions are not specifically shown,
- similar details of construction shall be used, subject to approval of the Structural Engineer of Record. 5. All structural systems which are to be composed of components to be field erected shall be supervised by the Supplier during manufacturing, delivery, handling, storage, and erection in accordance with the Supplier's instructions and requirements 6. Loading applied to the structure during the process of construction shall not exceed the safe loadcarrying capacity of the structural members. The live loading used in the design of this structure are
- indicated in the "Design Criteria Notes." Do not apply any construction loads until structural framing is properly connected together and until all temporary bracing is in place. '. All ASTM and other referenced standards and codes are for the latest editions of these publications, unless otherwise noted. 8. Shop drawings and other items shall be submitted to the Structural Engineer of Record (SER) for review prior to fabrication. All Shop Drawings shall be reviewed by the Contractor before submittal. The SER's review is to be fore conformance with the design concept and general compliance with the
- responsibility to review, check, and coordinate the Shop Drawings prior to submission. The Contractor remains solely responsible for errors and omissions associated with the preparation of Shop Drawings as they pertain to member sizes, details, dimensions, etc. 9. Submit Shop Drawings in the form of blueline/blackline prints (min. 2 sets/ max. 5 sets) and one reproducible blackline or sepia copy. In no case shall reproductions of the Contract Documents be

relevant Contract Documents. The SER's review does not relieve the Contractor of the sole

- used as shop drawings. As a minimum, submit the following items for review. A. Concrete Mix Design(s). B. Reinforcing Steel Shop Drawings.
- C. Pre-Engineered Metal Building Systems.
- D. Cold-Formed Steel Framing Systems. 10. Resubmitted Shop Drawings: Resubmitted shop drawings are reviewed only for responses to
- comments made in the previous submittal. 11. When calculations are included in the submittals for components of work designed and certified by a Specialty Structural Engineer (SSE), the review by the Structural Engineer of Record (SER) shall be for conformance with the relevant Contract Documents. The SER's review does not relieve the SSE from responsibility for the design of the system(s) and the coordination with the elements of the structure under the certification of the SER, or other SSE's. The SER's review does not constitute a warranty of
- the accuracy or completeness of the SSE's design. 12. Contractors shall visit the site prior to bid to ascertain conditions which may adversely affect the work
- 13. No structural member may be cut, notched, or otherwise reduced in strength without written direction from the Structural Engineer of Record. 14. When modifications are proposed to structural elements under the design and certification of a Specialty Structural Engineer (SSE), written authorization by the SSE must be obtained and submitted to the Structural Engineer of Record for review, prior to performing the proposed modification.

COORDINATION WITH OTHER TRADES

1. The Contractor shall coordinate and check all dimensions relating to Architectural finishes, mechanical equipment and openings, elevator shafts and overrides, etc. and notify the Architect/Engineer of any discrepancies before proceeding with any work in the area under question.

Specifications. The Contractor shall verify the requirements of other trades as to sleeves, chases, hangers, inserts, anchors, holes, and other items to be placed or set in the Structural Work. 3. There shall be no vertical or horizontal sleeves set, or holes cut or drilled in any beam or column unless

2. The Structural Drawings shall be used in conjunction with the Drawings of all other disciplines and the

it is shown on the Structural Drawings or approved in writing by the Structural Engineer of Record. 4. Mechanical and electrical openings through supported slabs and walls, 8" diameter or larger, not shown on the Structural Drawings must be approved by the Structural Engineer of Record (SER). Openings less than 8" in diameter shall have at least 1'-0" clear between openings, unless approved in writing by the SER.

5. Verify locations and dimensions of mechanical and electrical openings through supported slabs and walls shown on the Structural Drawings with the Mechanical and Electrical Contractors. 6. Do not install conduit in supported slabs, slabs on grade, or concrete walls unless explicitly shown or

noted on the Structural Drawings. 7. Do not suspend any items, such as ductwork, mechanical or electrical fixtures, ceilings, etc. from steel roof deck or wood roof sheathing. 8. The Mechanical Contractor shall verify that mechanical units supported by the steel framing are capable of spanning the distance between the supporting members indicated on the Structural

Drawings. The Mechanical Contractor shall supply additional support framing as required.

9. If drawings and specifications are in conflict, the most stringent restrictions and requirements shall govern.

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BID SET

riangle REVISIONS:

12.21.2021

arcDESIGN PROJECT NUMBER:

21102 DRAWN BY:

SAC DRAWING TITLE: STRUCTURAL

DRAWING NUMBER:

TIES-SIZE & SPA.3 DETAIL | CRITICAL HEIGHT VERTICALS (8) #6 B ≤ 2' - 8" P24 2' - 0" 2' - 0" (4) #8 #4 @ 12" O.C. A > 2' - 8"

1. PROVIDE MIN. 1 ½" CLEAR TO PIER TIES. 2. 'CRITICAL HEIGHT' DENOTES THE HEIGHT ABOVE WHICH LARGER DIAMETER VERTICALS WITH FEWER TIES MAY BE USED AT CONTRACTOR'S OPTION. REF. FOUNDATION PLAN(S)

FOR TOP OF PIER & FOOTING ELEV'S. B. REF. 'TYPICAL CONCRETE PIER REINFORCING' ON FOUNDATION DETAIL SHEET FOR FURTHER INFORMATION ON TIE SPACING. 4. VERTICAL DOWELS ARE TO FUNCTION AS PIER VERTICALS FOR PIERS LESS THAN OR EQUAL

TO 5' - 0" HIGH. PROVIDE SEPARATE DOWELS & VERTICALS FOR PIERS GREATER THAN OR EQUAL TO 5' - 0" HIGH, UNLESS APPROVED. 5. CONTACT THE STRUCTURAL ENGINEER FOR DIRECTION IF COLUMN ANCHOR RODS FOUL WITH PIER TIES OR VERTICALS.

IIN. HEIGHT OF	PIERS: #6 VERT	ICALS = 2' - 0", #7 VERTICALS = 2' - 8".	
ETAIL "A"	DETAIL "B"	ALT. DETAIL "B"	
(1) SET	(2) SETS	(3) SETS	

COLUMN FOOTING SCHEDULE						
FORMING INCE FOR POTENTIA 3. INCREASE FOO 4. FOOTINGS FOR	Y BE EARTH FORM REASE PLAN DIMEI AL INACCURACY AS DTING DEPTH WHE R INTERIOR COLUM IS. FOOTINGS FOM	IED WHERE SOIL (NSIONS BY A MININ SSOCIATED WITH I ERE REQ'D TO ENC WNS SHALL BE CEI	MUM OF 2" ON AL EARTH CUTS. CASE COLUMN AN NTERED ON THE	L SIDES TO ACCOUNT NCHOR RODS.		
LENGTH PER SCHED ₁						
SEE NOTE #3	F.F	<u>. </u>	I	SEE NOTE #2		
FOOTING MARK	LENGTH	WIDTH	DEPTH	REINFORCING EACH WAY		
F4.0	4' - 0"	4' - 0"	2' - 4"	(5) #5 x 3'-6"		
F5.0	5' - 0"	5' - 0"	2' - 4"	(6) #5 x 4'-6"		
F5.0-INT	5' - 0"	5' - 0"	1' - 2"	(6) #5 x 4'-6"		
EGO	6' 0"	6' O"	21 4"	(7) #E v E' G"		

6' - 0" 6' - 0" 2' - 4"

TRENCH	FOOTING SCHEDULE
EGOTINIO GIZE	EGGTING DEINEGDOING

FTG.	FOOTIN	IG SIZE	FOOTING RE	INFORCING
MARK	WIDTH	DEPTH	LONGITUDINAL	TRANSVERSE
TF16	1'-4"	2'-4"	(2) #5 x CONTINUOUS	#4 x 0'-10" @ 48" o
TF26	2'-2"	2'-4"	(3) #5 x CONTINUOUS	#4 x 1'-10" @ 48" o

NOTES:

1. CENTER FOOTINGS BENEATH WALLS, U.N.O. 2. TRENCH FOOTINGS MAY BE CAST DIRECTLY AGAINST SOIL WITHOUT FORMING WHERE EXISTING SOIL CONDITIONS PERMIT. FORM TOP OF TRENCH FOOTINGS WHERE SOIL HAS SLOUGHED SIGNIFICANTLY, WHERE GRADE IS LOWER THAN THE INDICATED TOP OF FOOTING ELEVATION, OR WHEREVER TRENCH FOOTING WOULD INTERFERE WITH THE INSTALLATION OF DOWNSPOUTS, CONDUIT, BOLLARDS, ETC. COORDINATE WITH MECHANICAL, ELECTRICAL, PLUMBING & SITE/CIVIL

B. IF REQUIRED, INTERIOR OF TRENCH FOOTING SHALL BE FORMED WITH RIGID INSULATION. TAKE CARE IN TRIMMING INTERIOR FACE OF EXCAVATION TO MINIMIZE GAPS BEHIND THE INSULATION. FILL WITH #8 CRUSHED STONE, TAMPING AND COMPACTING WHERE SPACE PERMITS.

FOUNDATION PLAN NOTES

GENERAL NOTES:

1. ALL DIMENSIONS, COLUMN LOCATIONS, AND COLUMN FOOTING SIZES SHOWN ARE PRELIMINARY AND ARE SUBJECT TO CHANGE BASED ON FINAL

COORDINATION WITH PRE-ENGINEERED BUILDING SUPPLIER. 2. ALL CONTRACTORS ARE REQUIRED TO COORDINATE THEIR WORK WITH ALL DISCIPLINES TO AVOID CONFLICTS. THE MECHANICAL, ELECTRICAL, AND PLUMBING ASPECTS ARE NOT IN THE SCOPE OF THESE DRAWINGS.

THEREFORE, ALL REQUIRED MATERIALS AND WORK MAY NOT BE INDICATED. 3. ALL ELEVATIONS ARE REFERENCED FROM THE NEW CONSTRUCTION GROUND LEVEL FLOOR ELEVATION 0'-0". SEE THE CIVIL DRAWINGS FOR EXACT U.S.G.S.

ELEVATION. 4. REF. ARCH. DRAWINGS FOR ALL DIMENSIONS NOT SHOWN. CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION AND IMMEDIATELY

NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES. 5. NOTE: PERIMETER WALL AND COLUMN FOOTINGS SHALL BE LOWERED AND/OR SLEEVED TO PASS BELOW PLUMBING LINES (I.E. SANITARY & STORM SEWERS, WATER LINES, ETC.) SHOWN ON THE PLUMBING DRAWINGS. PROVIDE FOOTING

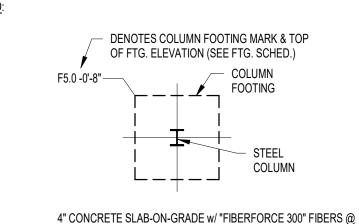
STEPS AS REQUIRED PER THE TYPICAL DETAILS. 6. ALL SLAB RECESSES SHALL BE LOCATED PER THE ARCHITECTURAL DRAWINGS. COORDINATE DEPTHS OF ALL SLAB RECESSES WITH THE ARCHITECTURAL DRAWINGS AND/OR THE FLOORING SUPPLIER. 7. COLUMN FOOTINGS SHOWN ARE PRELIMINARY AND SUBJECT TO CHANGE

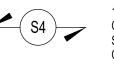
BASED ON FINAL REACTIONS PROVIDED BY THE PRE-ENGINEERED METAL BUILDING SUPPLIER. 8. COLUMN FOOTINGS AND WALL FOOTINGS SHALL BEAR ON SOILS WITH AN ALLOWABLE BEARING PRESSURE NOT LESS THAN 2,000 PSF.

KEYED NOTES:

A. PROVIDE (2) #8 CONTINUOUS TIE RODS ENCASED IN 16" W. x 8" H. CONCRETE TRENCH. TOP OF TRENCH = -0'-8". RODS MAY BE SPLICED WITH MECHANICAL COUPLERS CAPABLE OF ACHIEVEING FULL TENSION, STAGGERED AT LEAST 10 FEET APART.

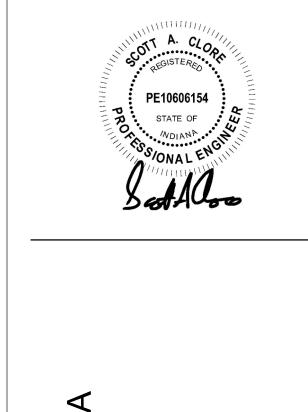
PLAN LEGEND:





1.5 LB/C.Y. (OR EQUAL) & "E5 INTERNAL CURE" ADMIXTURE AT 4
OZ/CWT & "E5 CATALYST" SPRAYED-ON BETWEEN 800-1,000
SF/GAL OVER 15-MIL CLASS A VAPOR BARRIER OVER 6" COMPACTED GRANULAR FILL (INDOT No. 53 CRUSHED STONE).

DENOTES APPROX. LOCATION OF PIPE PENTRATION THROUGH TRENCH FOOTING. PROVIDE SLEEVE PER DETAIL 4/S400. COORD. EXACT LOCATION, SIZE, AND INVERT w/ M.E.P. DRAWINGS AND/OR CONTRACTOR.



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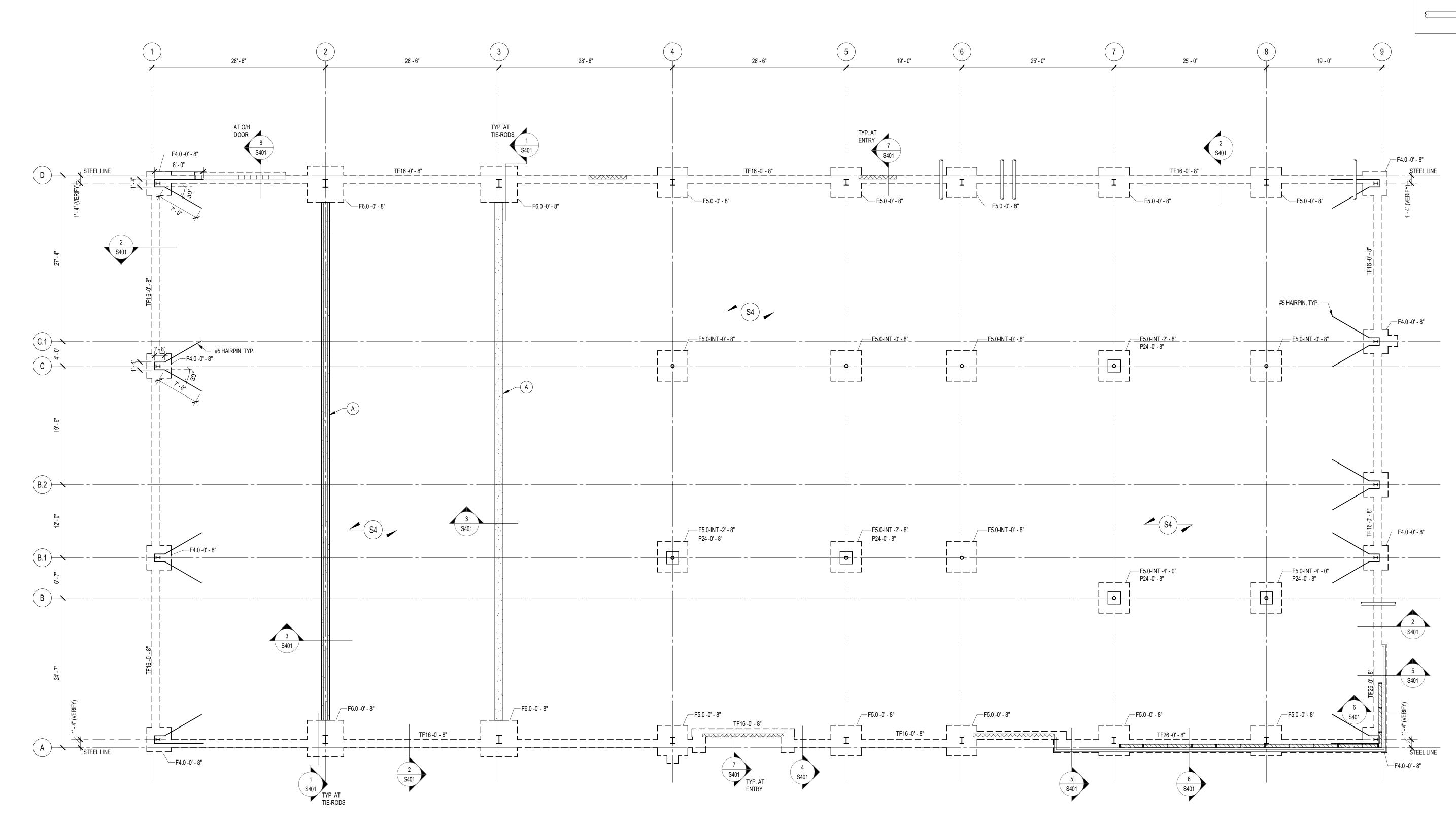
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1 FOUNDATION PLAN
1/8" = 1'-0"

BID SET

 \triangle REVISIONS:

12.21.2021

21102

arcDESIGN PROJECT NUMBER

FOUNDATION

DRAWING TITLE:

PLAN

7. AT BRACED-BAY COLUMNS, ENLARGE ISOLATION SECTION AS REQUIRED SUCH THAT PORTION OF BRACING THAT PENETRATES

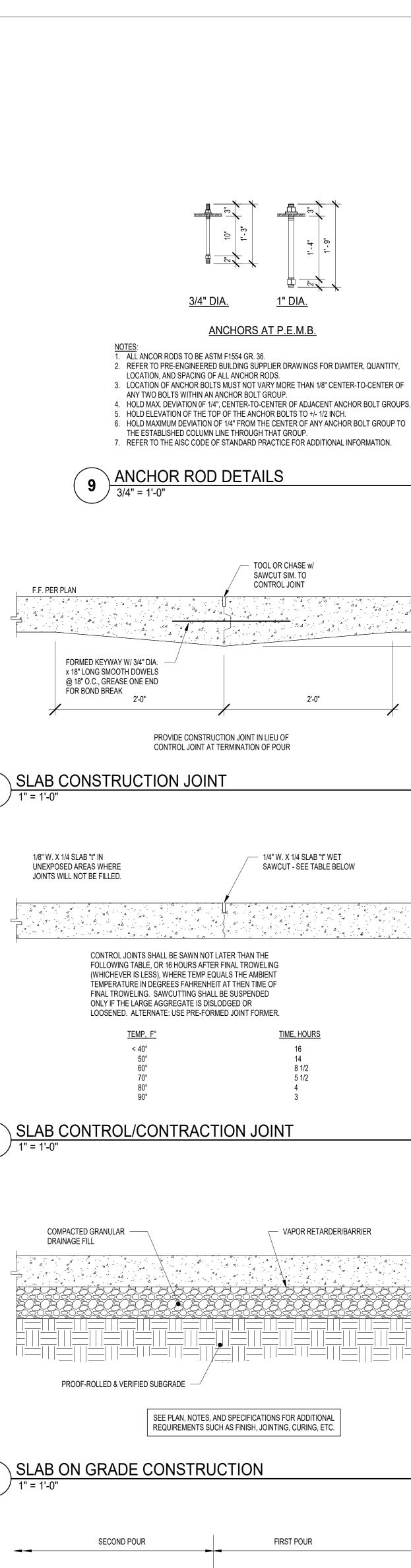
8. PROVIDE (1) #4 REINFORCED IN ISOLATION SLAB AS INDICATED. LOCATE REINFORCING WITH 2" CLEAR TO TOP OF SLAB. DETAIL

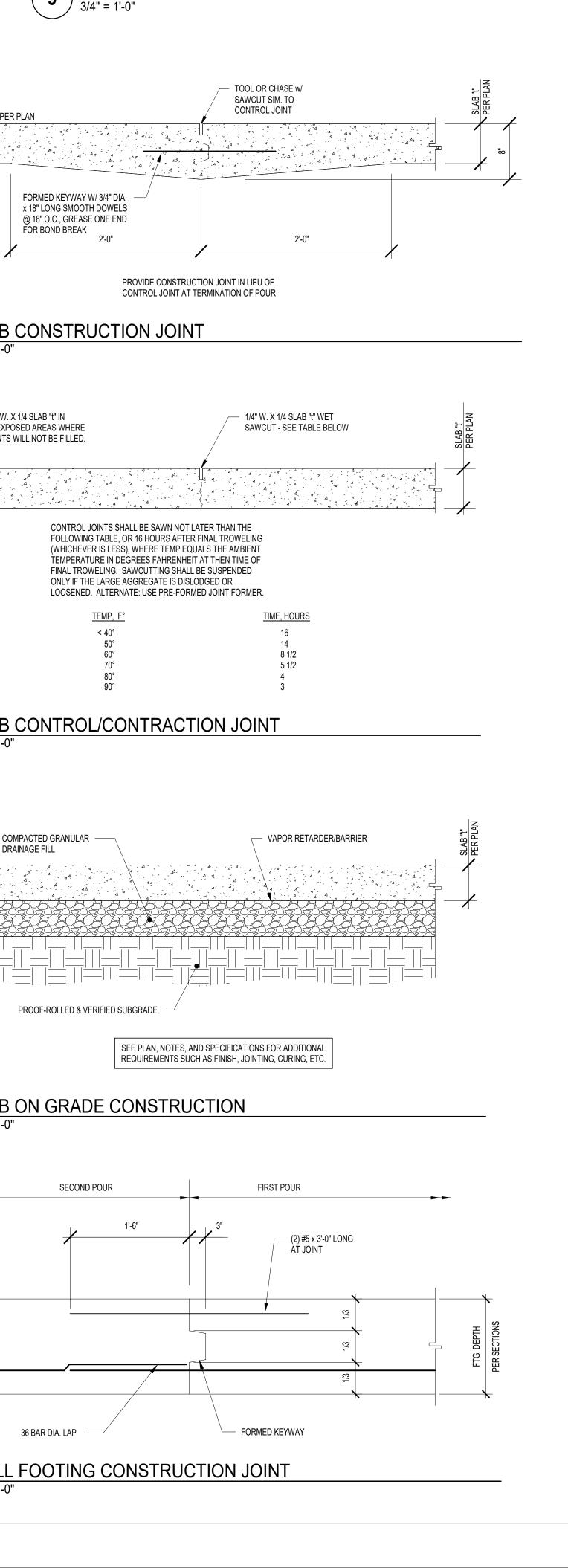
REINFORCING TO MATCH ISOLATION SLAB GEOMETRY, WITH STANDARD LAP LENGTHS REQUIRED AT BAR SPLICES (REDUCE

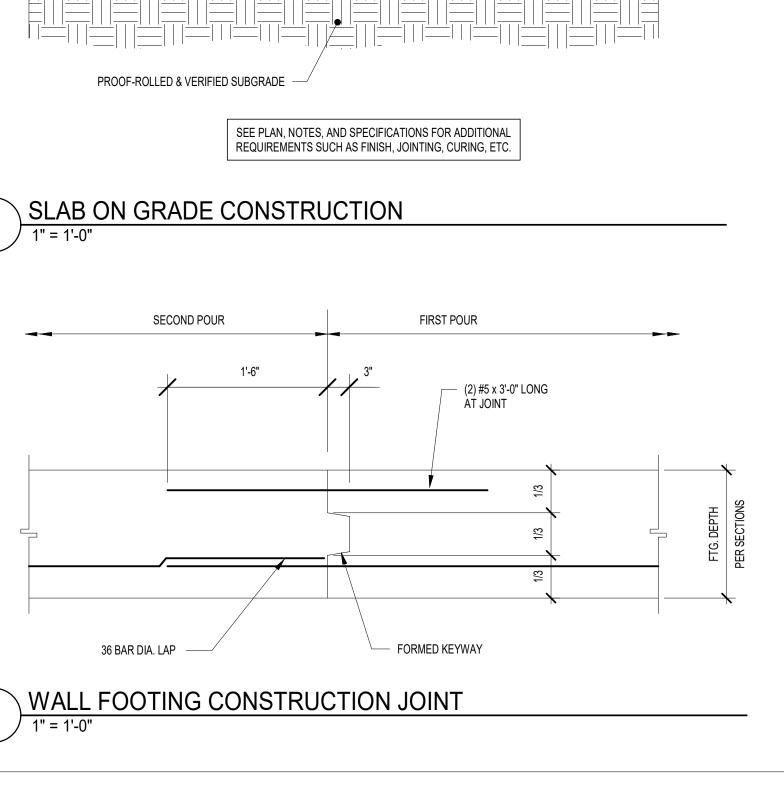
SLAB IS COMPLETELY WITHIN ISOLATION SECTION.

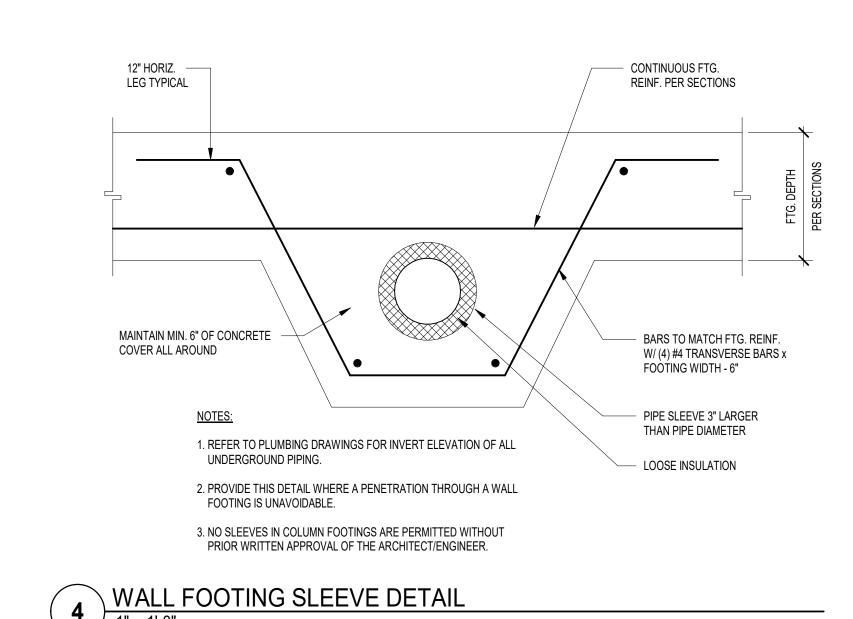
10 COLUMN ISOLATION JOINT DETAILS

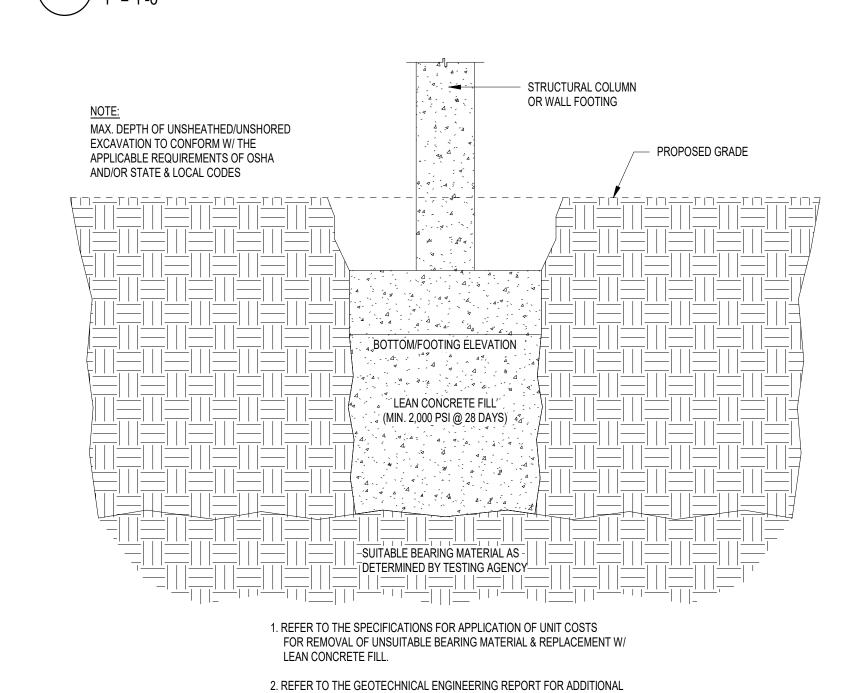
LENGTHS AS REQUIRED BY ISOLATION JOINT GEOMETRY).







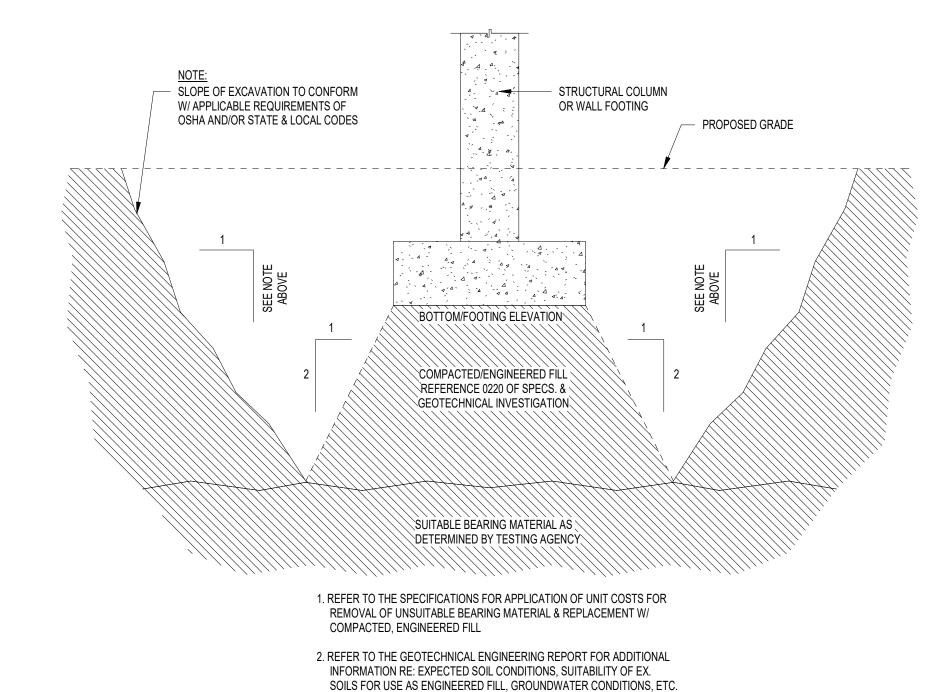




INFORMATION RE: EXPECTED SOIL CONDITIONS, SUITABILITY OF EX. SOILS

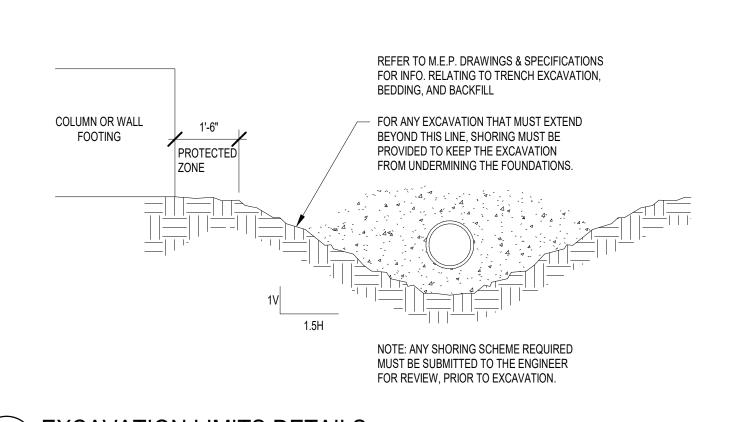
FOR USE AS ENGINEERED FILL, GROUNDWATER CONDITIONS, ETC.





OVEREXCAVATION DETAIL - COMPACTED FILL

3/4" = 1'-0"



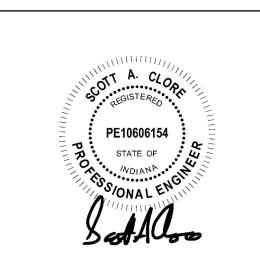
EXCAVATION LIMITS DETAILS

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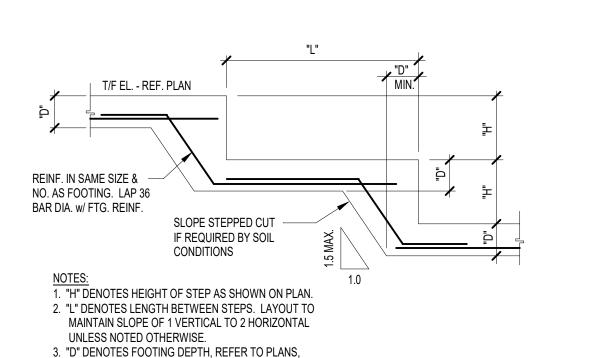
arcDESIGN PROJECT NUMBER: 21102

DRAWN BY: SAC DRAWING TITLE:

TYPICAL FOUNDATION **SECTIONS AND DETAILS**

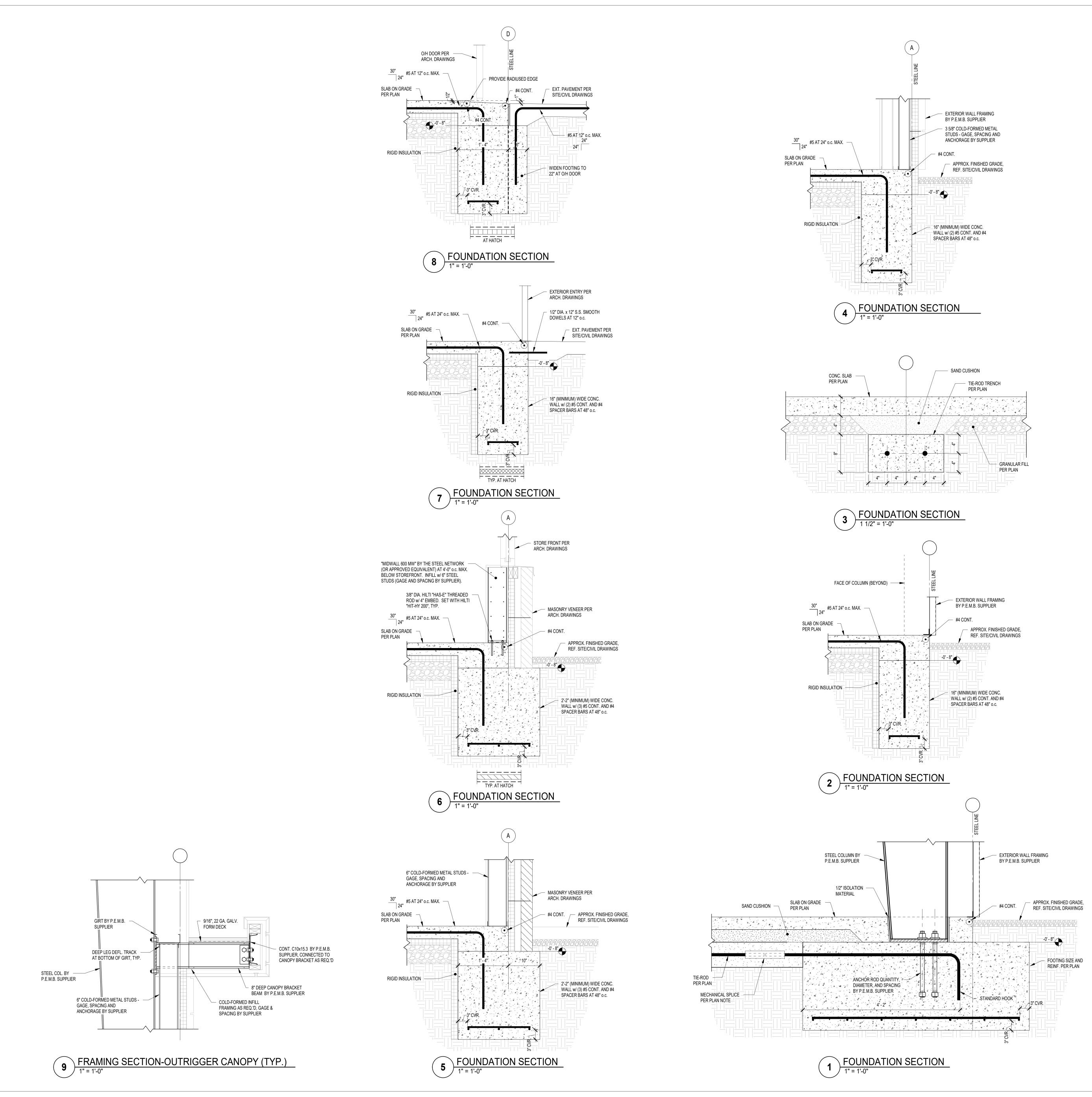
DRAWING NUMBER:

S400



SECTIONS & SCHEDULES.

\ STEPPED FOOTING DETAIL

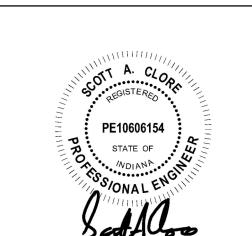


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