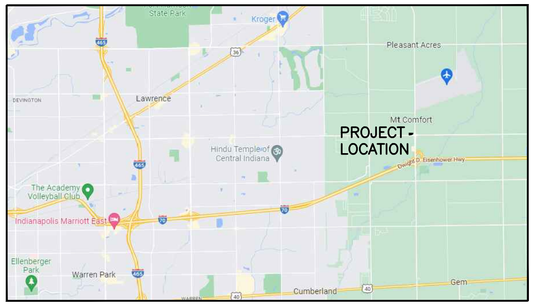
Beeson Trust / 300 Plaza

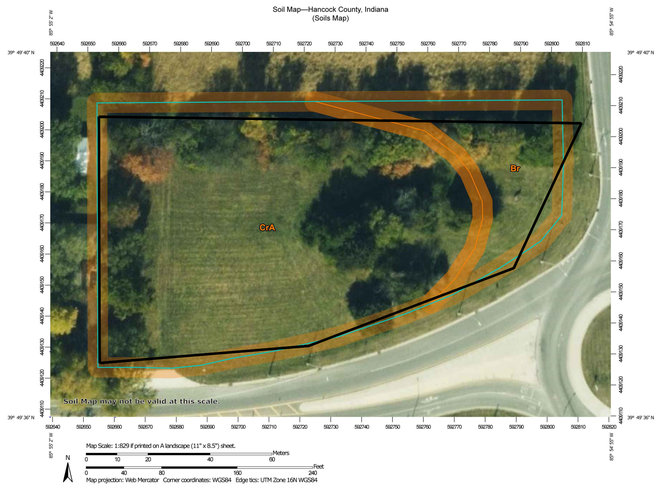
6088, 6084, 6080, and 6072 W. 300 North
Greenfield, Indiana 46140



VICINITY MAP



LOCATION MAP



N

UTILITY COMPANIES

GAS – CENTER POINTE ENERGY
1600 ALLISONVILLE RD
NOBLESVILLE, IN 46061
ANDREW REICHLE
PH: (800)–227–1376

WATER – CITIZENS ENERGY GROUP
2020 N MERIDIAN ST
INDIANAPOLIS, IN 46202
PH: 317–924–3311

STORM – HANCOCK COUNTY SURVEYORS OFFICE
111 AMERICAN LEGION PLACE
SUITE 171
GREENFIELD, IN 46140
PH: 317–447–1150

HANCOCK COUNTY HIGHWAY ENGINEER
921 W. OSAGE STREET
GREENFIELD, IN 46140
PH:317–477–1130
GARY POOL

SANITARY SEWER – AQUA INDIANA, INC.
AQUA INDIANA, INC.
5750 CASTLE CREEK PARKWAY
NORTH DRIVE, SUITE 314
INDIANAPOLIS, IN 46250
PH:317–716–6026
KIERAN TANSY

ELECTRIC – DUKE ENERGY
485 N RANGE LINE ROAD
MORRISTOWN, IN 46161
JOSEPH ALAN

TELEPHONE – NINE STAR CONNECT
2331 E 600 N
GREENFIELD, IN 46140
PH: 317–323–2078
GEORGE PLISINSKI

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Br	Brookston silty clay loam, 0 to 2 percent slopes	0.5	17.4%
CrA	Crosby silt loam, New Castle Till Plain, 0 to 2 percent slopes	2.2	82.6%
Totals for Area of Interest		**2.7**	**100.0%**

OWNER INFORMATION

AJE Properties, LLC
4292 W. 186th Street
Sheridan, Indiana
46069
Phone: (317) 340–6819

PROPOSED PROJECTS ADDRESS

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 North
Greenfield, Indiana 46140

BUILDING INFORMATION:

MISCELLANEOUS BUILDING INFORMATION:
OCCUPANCY GROUP: (mixed) A–2, B, M,
CONSTRUCTION TYPE II–B (sprinklered)
TOTAL SQUARE FOOTAGE: 10,297.0 SQ. FT.
BUILDING MAX HT. 29'–8"
BUILDING DESIGN TO MEET EARTHQUAKE ZONE ONE
BUILDING TO MEET ADA (AMERICAN DISABILITY ACT)

ENGINEERING AND CERTIFICATION:

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

PLANS CERTIFIED BY:
TRENT A. BAXTER P.E.
REGISTERED P.E. No. 19700309
DATE: MARCH 31, 2022

TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER

Trent A Baxter
CERTIFIED BY:

INDEX TO DRAWINGS

SHEET NO.	DESCRIPTION
T100	TITLE SHEET
CIVIL PLANS	
1 of 2	MINOR SUBDIVISION PLAT PLAN
2 of 2	MINOR SUBDIVISION PLAT PLAN
C050	SITE AREA AND ZONING PLAN
C100	SITE DEMOLITION PLAN
C200	SITE LAYOUT PLAN
C210	SITE LAYOUT DETAILS PLAN
C220	SITE LANDSCAPING PLAN
C230	SITE LANDSCAPING DETAILS
C300	SITE UTILITY PLAN
C305	SANITARY SEWER EXTENSION PROFILE
C310	SITE PHOTOMETRIC PLAN
C315	SITE PHOTOMETRIC DETAILS
C400	SITE GRADING PLAN
C410	SITE STORM SEWER PLAN
C420	STORM SEWER PROFILE PLAN
C430	STORM SEWER PROFILE PLAN
C440	STORM SEWER PROFILE PLAN
C450	STORM SEWER PROFILE PLAN
C460	STORM SEWER CONTROL STRUCTURES DETAILS
C470	100yr. OVERFLOW PATH PLAN
C500	SITE EROSION CONTROL PLAN
C510	EROSION CONTROL DETAILS
C520	EROSION CONTROL DETAILS
C530	EROSION CONTROL DETAILS, IMPLEMENTATION AND MAINTENANCE GUIDELINES
C540	STORMWATER POLLUTION PREVENTION ASSESSMENT SHEET
C600	GENERAL SITEWORK DETAILS
C610	GENERAL SITEWORK DETAILS
C620	GENERAL SITEWORK DETAILS
1-20	AQUA INDIANA STANDARD DETAILS
C700	GENERAL SITEWORK NOTES

REVISION

04/26/2022 added remote intercom system– caw	07/14/2022 revised fdc, added ss ease. revised water main size– caw
05/04/2022 revised storm and water lines– caw	11/17/2022 revised park lot, landscape, storm sewer, site lighting, and
05/05/2022 revised water line– caw	added bike rack– caw
05/24/2022 removed sleeve from water and sewer bore– caw	03/14/2023 revised storm sewer piping from rcp to hp pipe
06/01/2022 revised water and san. sewer lines– caw	

300 PLAZA - MINOR SUBDIVISION PLAT

A PART OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 16 NORTH, RANGE 5 EAST, IN BUCK CREEK TOWNSHIP, HANCOCK COUNTY, INDIANA.

LAND SURVEY CERTIFICATION

I, John J. Larrison, hereby certify that I am a Land Surveyor registered in compliance with the laws of the State of Indiana; and I do hereby certify that I have surveyed the property described in the above caption and that I have subdivided the same into block and lots as shown on the hereon drawn plat. This plat correctly represents said survey and subdivision in every detail. Monuments shown are in place as located. All lot corners are marked with iron pins with caps. Dimensions are in feet and decimal parts thereof.

Dated this 22nd day of June, 2022.

Signature _____
Indiana Professional
Surveyor No. 20000230

FLOOD ZONE INFORMATION STATEMENT

The accuracy of any flood hazard data shown within this report is subject to map scale uncertainty in location or elevation on the referenced flood insurance rate map. Per Flood Insurance Rate Map Community Panel Number 18059C0108E, dated March 17, 2014, the entire subject parcel is within Zone "X", defined thereon as "an area of minimal flood hazard", and not subject to innundation by the 1% annual chance flood.

LEGAL DESCRIPTION OF 300 PLAZA

Part of the Southeast Quarter of Section 13, Township 16 North, Range 5 East, Hancock County, Indiana, described as follows:

Commencing at a Harrison survey monument which marks the southeast corner of the above captioned Southeast Quarter; thence North 89 degrees 12 minutes 44 seconds West (bearing of the south line of the Southeast Quarter of Section 13, based upon Indiana State Plane, East Zone Coordinate System – N.A.D. 1983), with said south line, 577.50 feet; thence North no degrees 09 minutes 33 seconds West, parallel with the east line of the Southeast Quarter, 50.01 feet to a concrete right-of-way monument on the north right-of-way line for County Road 300 North, as cited and described in the Hancock Superior Court No. 1, Cause No. 30D01-1111-PL-02334 - Agreed Finding and Judgement recorded as Instrument Number 130012112, and the POINT OF BEGINNING of the subdivision herein described; thence continuing North no degrees 09 minutes 33 seconds West, 248.32 feet to an iron pin with cap engraved "Holloway Engr. – Firm 46"; thence South 89 degrees 12 minutes 44 seconds East, 486.53 feet to a concrete right-of-way monument on the northwesterly right-of-way line for County Road 600 West and County Road 300 North, as described in Instrument Number 130012112; thence with said northwesterly and northerly right-of-way lines for the following three (3) courses; 1) South 25 degrees 03 minutes 34 seconds West, 161.20 feet to a concrete right-of-way monument; 2) South 69 degrees 14 minutes 10 seconds West, 221.43 feet to a concrete right-of-way monument; 3) South 85 degrees 21 minutes 10 seconds West, 211.16 feet to the Point of Beginning.

Containing 2.160 acres, more or less, and subject to any easements, rights-of-way or restrictiuons of record or observable.

I affirm, under the penalties for perjury, that I have taken reasonable care to redact each social security number in this document, unless required by law.

John J. Larrison
Indiana Professional
Surveyor No. 20000230
Dated: June 22, 2022

This instrument was prepared by John J. Larrison

HANCOCK COUNTY PLAT COMMITTEE APPROVAL

Approved by the Hancock County Plat Committee in accordance with the Subdivision Control Ordinance.

By: _____ _____
Byron Holden — Date
Committee Chairperson

_____ _____
Mike Dale — Date
Plan Commission Director

Void unless recorded before _____

SCALE: 1 INCH = 50 FEET
BEARING SYSTEM BASED UPON INDIANA STATE PLANE, EAST ZONE COORDINATE SYSTEM (N.A.D. 1983)

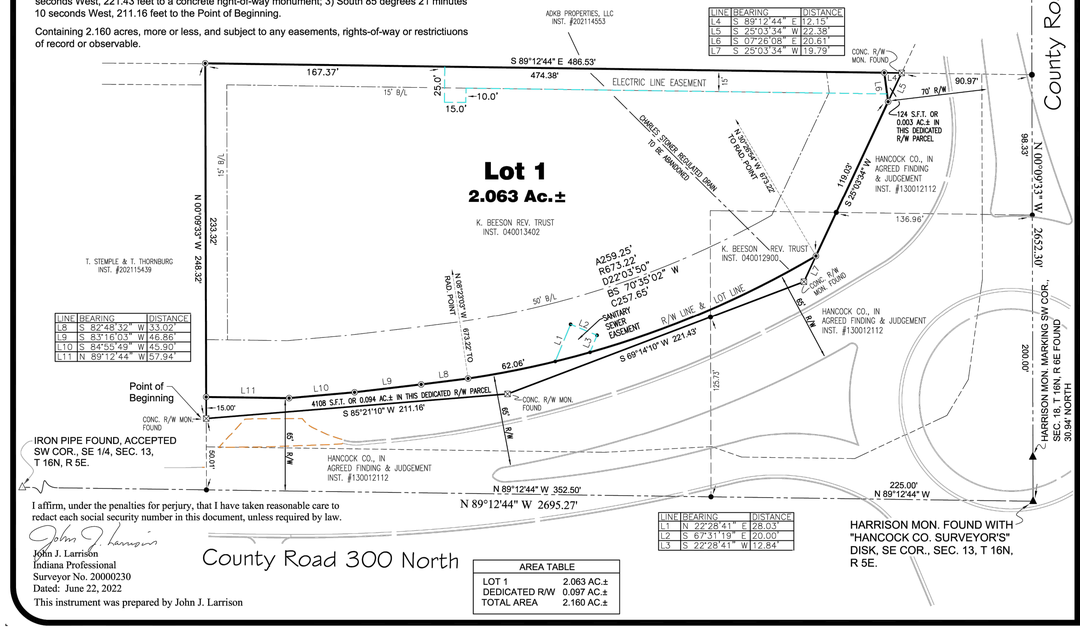
0' 50' 100' 150'

SURVEY LEGEND

- ▲ SEC MON FND & ACCEPTED: PER COUNTY SURVEYOR RECORDS
- △ SEC MON FND; ACCEPTED BUT NOT IN COUNTY SURV. RECORDS (SEE PLAT NOTE FOR ORIGIN)
- ⓟ IPN or IPE FND (SEE PLAT)
- ◯ PK NAIL or ISPK FND (SEE PLAT)
- ☒ RIGHT-OF-WAY MKR FND
- ◉ IRON PIN W/"HOLLOWAY" CAP SET THIS SURVEY
- ⊗ P.K. NAIL W/"HOLLOWAY" WASHER SET THIS SURVEY
- ● CAL CORNER; NO MONUMENT FOUND OR SET
- FE LINE, PRIVACY —x——x——x— FE LINE, WIRE

SET MONUMENTS: Iron pins are 5/8" x 30" in earth. In pavement Iron pins are 5/8"x8" or PK Nails. Monuments are flush to 2" BG in pavement or lawns and 4" to 6" AG grade in other locations. Monuments have a cap or washer stamped "HOLLOWAY - FIRM NO. 43".

ABBREVIATIONS: AG= Above Grade; BG= Below Grade; CAL= Calculated; COR= Corner; E= East; FE= Fence; Hf= Half; IPE= Iron Pipe; IPN= Iron Pin; ISPK= Iron Spike or Railroad Spike; MON= Monument; N= North; PK= PK Nail; QA= Quarter; QA-QA= Quarter-Quarter; R= Record Distance (adjoining parcel line distances are record/deed distances unless noted otherwise); S= South; SEC= Section; STN= Stone; W= West



LINE	BEARING	DISTANCE
L4	S 89°12'44" E	12.15'
L5	S 25°03'34" W	22.38'
L6	S 07°26'08" E	20.61'
L7	S 25°03'34" W	19.79'

LINE	BEARING	DISTANCE
L8	S 82°48'32" W	33.02'
L9	S 83°16'03" W	46.86'
L10	S 84°55'49" W	45.90'
L11	N 89°12'44" W	57.94'

LINE	BEARING	DISTANCE
L1	N 22°28'41" E	28.03'
L2	S 67°31'19" E	20.00'
L3	S 22°28'41" W	12.84'

AREA TABLE	
LOT 1	2.063 AC.±
DEDICATED R/W	0.097 AC.±
TOTAL AREA	2.160 AC.±

HOLLOWAY ENGINEERING & SURVEYING
P.O. Box 234 Mooresville, IN. 46158
Ph: 317-831-7918
Holloway@HollowayEngineering.com

JOHN J. LARRISON PROFESSIONAL NO. LS20000230 STATE OF INDIANA LAND SURVEYOR

CERTIFIER'S SIGNATURE: John J. Larrison
DATED: SEPTEMBER 21, 2022

FILE NO.	122127
DATED	SEPTEMBER 21, 2022
DRAWN BY	J.J.L.
CHECKED	
REVISED	
REVISED	
REVISED	

PROJECT NAME: 300 PLAZA - MINOR SUBDIVISION PLAT
SHEET OR CLIENT NAME: VERSATILE CONSTRUCTION LLC

SHEET NUMBER 1 of 2

300 PLAZA - MINOR SUBDIVISION PLAT

A PART OF THE SOUTHEAST QUARTER OF SECTION 13, TOWNSHIP 16 NORTH, RANGE 5 EAST, IN BUCK CREEK TOWNSHIP, HANCOCK COUNTY, INDIANA.

DEED OF DEDICATION OF 300 PLAZA

I, the undersigned Karen A. Beeson, Trustee of the Karen A. Beeson Revocable Trust, owner of the real estate shown and described herein, do hereby lay off, plat and subdivide said real estate in accordance with the within plat.

This subdivision shall be known and designated as 300 Plaza. All streets and alleys and public open spaces shown and not therefore dedicated are hereby dedicated to the public.

Front building setback lines are hereby established as shown on this plat, between which lines and property lines of the streets there shall be erected or maintained no building or structure. The strips of ground shown on this plat and marked "Easement" are reserved for the use of public utilities for the installation of water and sewer mains, poles, ducts, lines and wires, drainage facilities subject at all times to the proper authorities and th the easement herein reserved. No permanent or other structures are to be erected or maintained upon said strips of land, but owners of lots in this subdivision shall take their titles subject to the rights of the public utilities, and to the rights of the owners of other lots in this subdivision.

Further, the owner hereby certifies that she does hereby establish the following covenants and restrictions, to run with the land and to be binding upon all future owners, their heirs and assigns:

1) No covenants or restrictions are hereby made for the parcel shown and described herein, EXCEPT: Those rules and regulations, as required by Hancock County and the State of Indiana shall apply for the use and enjoyment of the lot created herein.

This declaratory statement of certification and approval to run with the land is hereby so declared and executed this ____day of _____ , 2022.

_____
Karen A. Beeson - Trustee of the
Karen A. Beeson Revocable Trust

State of Indiana)
)SS:
County of Hancock)

Before me, the undersigned, a Notary Public, personally appeared Karen A. Beeson, and acknowledged the execution of this instrument to be her voluntary act and deed.

Witness my Hand and Seal this_____ day of_____ , 2022.

_____ _____
Signed Notary Public Printed or Typed

Resident of _____ County

My Commission Expires: _____

CERTIFICATE OF OWNERSHIP

State of Indiana)
) SS:
County of Hancock)

I, Karen A. Beeson, Trustee of the Karen A. Beeson Revocable Trust, do hereby certify that I am the owner of the property described in the above caption and that as such owners we have caused the said above described property to be surveyed and subdivided as shown on the herein drawn plat, as our own free and voluntary act and deed.

_____
Karen A. Beeson

State of Indiana)
) SS:
County of Hancock)

I, , a Notary Public in and for said County and State, do hereby certify that , personally known to me to be the same persons whose names are subscribed to the above certificate appeared before me this day in person and acknowledged that they signed the above certificate as their own free and voluntary act and deed for the uses and purposes therein set forth.

Given under my hand and notarial seal this____ day of _____ , 2022.

_____
Signed

_____
Printed

RIGHT TO FARM DEED RESTRICTION

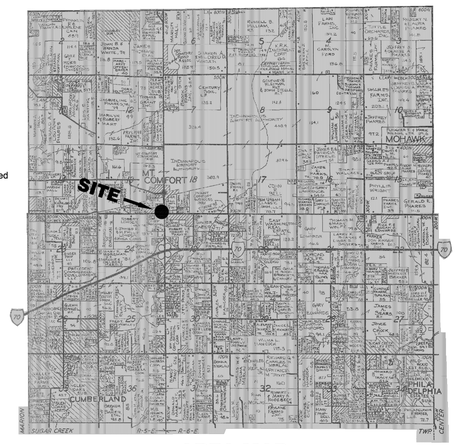
The owner of the herein described real estate, for herself, and for all future owners and occupants of said real estate, or any parcel or division thereof, for and in consideration of the right to develop the real estate for other than agricultural uses, hereby:

1) Acknowledges and agrees that the real estate is adjacent to an area zoned or used for agricultural purposes, which uses includes, but are not limited to: a) production of crops; b) animal husbandry; c) Land application of animal waste; d) raising, breeding and sale of livestock and poultry. including confinement feeding operations; e) use of farm machinery; and/or f) the sale of farm products.

2) Waives any and all objections to any agricultural uses within two miles of any boundary of the real estate.

3) Agrees that agricultural uses do not constitute a nuisance so long as they are not negligently maintained, do not cause bodily injury to third parties, or directly endanger human health.

4) Agrees that this covenant is for the benefit of Hancock County, Indiana, and for all persons engaged in agricultural uses within two miles of any boundary of the real estate and is enforceable by any of the foregoing.



AREA MAP

BUCK CREEK TOWNSHIP, HANCOCK COUNTY, INDIANA

(NOT TO SCALE)

HOLLOWAY ENGINEERING & SURVEYING
P.O. Box 234 Mooresville, IN. 46158
PH- 317-831-7916
Holloway@hollowayengineering.com

JOHN J. LARRISON
PROFESSIONAL
NO.
LS20000230
STATE OF
INDIANA
LAND SURVEYOR

CERTIFIERS SIGNATURE:

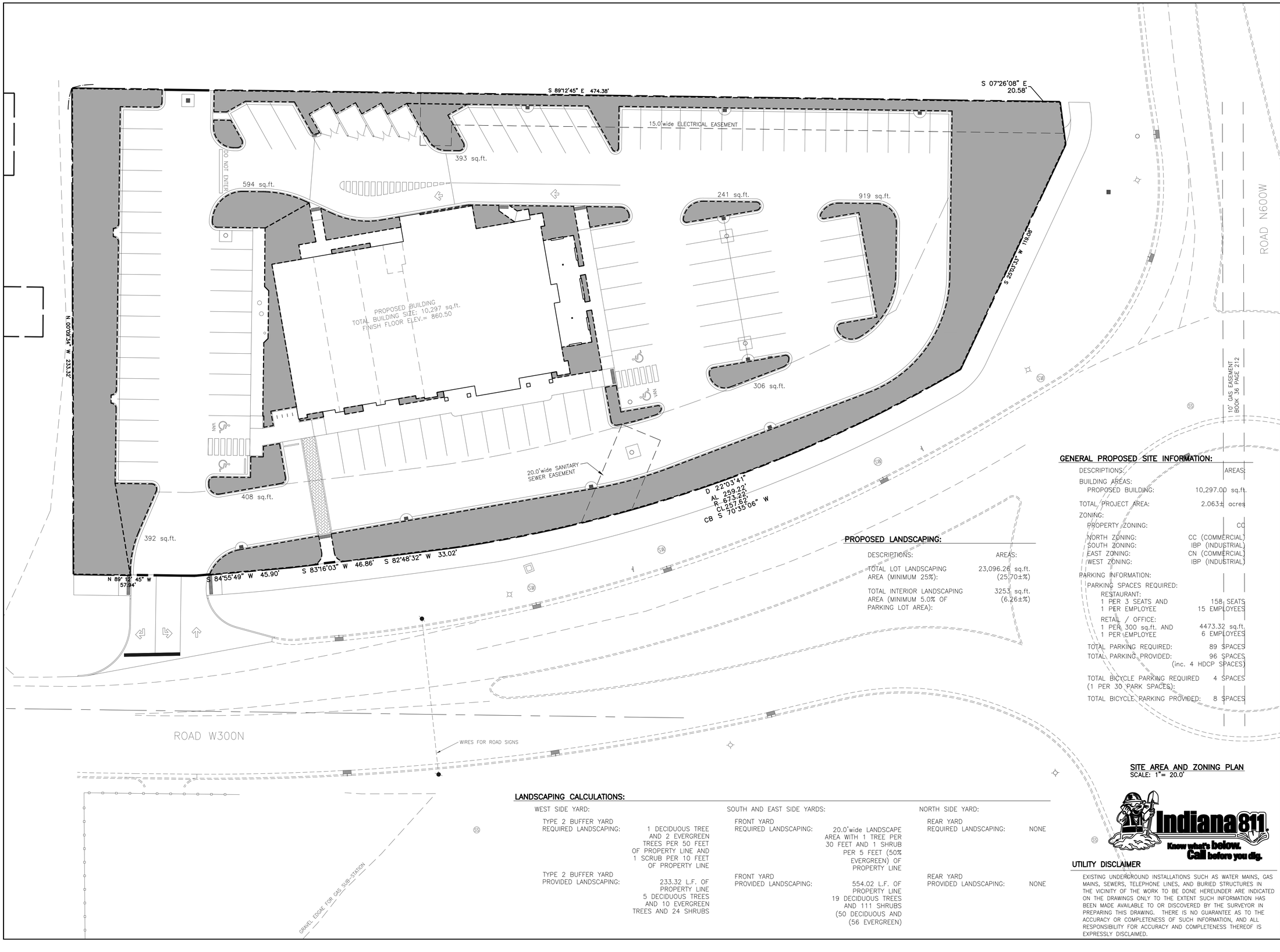
DATED: SEPTEMBER 21, 2022

FILE NO.	122127
DATED	SEPTEMBER 21, 2022
DRAWN BY	J.J.L.
CHECKED	
REVISED	
REVISED	

PROJECT NAME: **300 PLAZA - MINOR SUBDIVISION PLAT**

SHEET OR CLIENT NAME: **VERSATILE CONSTRUCTION LLC**

SHEET NUMBER
2 of 2



N

REVISION	
04/26/2022	added remote intercom system– caw
10/23/2022	revised property line, shortened retaining wall, added privacy fence, and shifted site– caw
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack– caw

VERSATILE CONSTRUCTION GROUP, LLC.

570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Area and Zoning Plan

GENERAL PROPOSED SITE INFORMATION:

DESCRIPTIONS:	AREAS:
BUILDING AREAS:	
PROPOSED BUILDING:	10,297.00 sq.ft.
TOTAL PROJECT AREA:	2.063± acres
ZONING:	
PROPERTY ZONING:	CC
NORTH ZONING:	CC (COMMERCIAL)
SOUTH ZONING:	IBP (INDUSTRIAL)
EAST ZONING:	CN (COMMERCIAL)
WEST ZONING:	IBP (INDUSTRIAL)
PARKING INFORMATION:	
PARKING SPACES REQUIRED:	
RESTAURANT:	
1 PER 3 SEATS AND	158 SEATS
1 PER EMPLOYEE	15 EMPLOYEES
RETAIL / OFFICE:	
1 PER 300 sq.ft. AND	4473.32 sq.ft.
1 PER EMPLOYEE	6 EMPLOYEES
TOTAL PARKING REQUIRED:	89 SPACES
TOTAL PARKING PROVIDED:	96 SPACES (inc. 4 HDCP SPACES)
TOTAL BICYCLE PARKING REQUIRED (1 PER 30 PARK SPACES):	4 SPACES
TOTAL BICYCLE PARKING PROVIDED:	8 SPACES

PROPOSED LANDSCAPING:

DESCRIPTIONS:	AREAS:
TOTAL LOT LANDSCAPING AREA (MINIMUM 25%):	23,096.26 sq.ft. (25.70±%)
TOTAL INTERIOR LANDSCAPING AREA (MINIMUM 5.0% OF PARKING LOT AREA):	3253 sq.ft. (6.26±%)

LANDSCAPING CALCULATIONS:

WEST SIDE YARD:

TYPE 2 BUFFER YARD REQUIRED LANDSCAPING:	1 DECIDUOUS TREE AND 2 EVERGREEN TREES PER 50 FEET OF PROPERTY LINE AND 1 SCRUB PER 10 FEET OF PROPERTY LINE
TYPE 2 BUFFER YARD PROVIDED LANDSCAPING:	233.32 L.F. OF PROPERTY LINE 5 DECIDUOUS TREES AND 10 EVERGREEN TREES AND 24 SHRUBS

SOUTH AND EAST SIDE YARDS:

FRONT YARD REQUIRED LANDSCAPING:	20.0'wide LANDSCAPE AREA WITH 1 TREE PER 30 FEET AND 1 SHRUB PER 5 FEET (50% EVERGREEN) OF PROPERTY LINE
FRONT YARD PROVIDED LANDSCAPING:	554.02 L.F. OF PROPERTY LINE 19 DECIDUOUS TREES AND 111 SHRUBS (50 DECIDUOUS AND (56 EVERGREEN)

NORTH SIDE YARD:

REAR YARD REQUIRED LANDSCAPING:	NONE
REAR YARD PROVIDED LANDSCAPING:	NONE

SITE AREA AND ZONING PLAN
SCALE: 1"= 20.0'

Indiana 811
Know what's below. Call before you dig.

UTILITY DISCLAIMER

EXISTING UNDERGROUND INSTALLATIONS SUCH AS WATER MAINS, GAS MAINS, SEWERS, TELEPHONE LINES, AND BURIED STRUCTURES IN THE VICINITY OF THE WORK TO BE DONE HEREUNDER ARE INDICATED ON THE DRAWINGS ONLY TO THE EXTENT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE SURVEYOR IN PREPARING THIS DRAWING. THERE IS NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION, AND ALL RESPONSIBILITY FOR ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED.

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
G:\21081\c050 site area and zoning plan.dwg

TRENT A. BAXTER
REGISTERED
No. 19700309
STATE OF INDIANA
PROFESSIONAL ENGINEER

Trent A Baxter
CERTIFIED BY:

THIS DRAWING IS THE PROPERTY OF VERSITILE CONSTRUCTION GROUP, LLC. ANY ALTERATION TO THIS DRAWING IS STRICTLY PROHIBITED WITHOUT THE PRIOR WRITTEN CONSENT AND UNDER THE DIRECTION OF THE PROFESSIONAL LICENSOR WHOSE SEAL IS AFFIXED TO THIS DRAWING.

SHEET TITLE:

C050

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONE "X" AS SAID PARCEL PLOTS ON MAP NUMBER 18059C0108E (DATED MARCH 17, 2014) OF THE FLOOD INSURANCE RATE MAPS FOR THE HANCOCK COUNTY UNINCORPORATED AREAS, HANCOCK COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

REMOVE EXISTING FENCE

S 89°12'45" E 474.38'

S 07°26'08" E 20.58'

EXIST. 4' CHAINLINK FENCE TO BE REMOVED

EXIST. 4' CHAINLINK FENCE TO BE REMOVED

TREE AREA WITH TRASH INSIDE
ALL TREES, STUMPS AND TRASH TO BE REMOVED IN THIS AREA

TREE AREA WITH TRASH INSIDE
ALL TREES, STUMPS AND TRASH TO BE REMOVED IN THIS AREA

REMOVE EXISTING FENCE

N 00°09'34" W 233.32'

CHARLES STONER REGULATED DRAIN TILE (LOCATED FROM GIS, NO EVIDENCE FOUND TO BE CRUSHED AND ABANDONED)

S 25°03'33" W 119.08'

80.0'wide CORRIDOR SET-BACK LINE

40.0'wide CORRIDOR SET-BACK LINE

D 22°03'41"
AL 259.22'
R 673.92'
CB 257.62'
CB S 70°35'06" W

REMOVE EXISTING ENTRANCE DRIVE PAVE,MENT

N 89° 12' 45" W 57.94'

S 84°55'49" W 45.90'

S 83°16'03" W 46.86'

S 82°48'32" W 33.02'

EX-CURB INLET
TOP CURB=858.52
GUTTER=858.00
INV. E 24" A2000=852.56
INV. SW 24" A2000=852.56
INV. N 12" A2000=853.56

EX-CURB INLET
TOP CURB=859.25
GUTTER=858.81
INV. N 24" A2000=852.89
INV. SW 24" A2000=852.89

EX-STORM MH
TC=860.10
INV. SW 24" A2000=853.23
INV. NE 24" A2000=853.23
INV. SE 12" A2000=854.30

EX-STORM MH
TC=859.26
INV. SW 24" A2000=853.44
INV. NE 24" A2000=853.44
INV. S 12" A2000=856.00

EX-STORM CURB INLET
TOP CURB=859.68
GUTTER=859.14
INV. NW 12" A2000=856.19
INV. NE 6" UNDERDRAIN=857.42

EX-STORM CURB INLET
TOP CURB=861.47
GUTTER=860.92
INV. NW 12" A2000=855.22

EX-STORM MH
TC=858.07
INV. SW 24" A2000=853.71
INV. NE 24" A2000=853.71
INV. S 12" A2000=854.71

EX-STORM CURB INLET
TOP CURB=858.87
GUTTER=858.34
INV. NW 12" A2000=855.44
INV. NE 6" UNDERDRAIN=856.30

EX-DOME SHAPED INLET 3X3 LID
TC (FLOW)=856.47
INV. S 12" A2000=854.12

EX-STORM MH
TC=857.68
INV. S 24" A2000=854.28
INV. NE 24" A2000=854.01
INV. N 12" A2000=854.01

EX-STORM CURB INLET
TOP CURB=858.70
GUTTER=858.18
INV. SW 12" A2000=855.00
INV. S 18" A2000=854.40
INV. N 24" A2000=854.38
INV. NE 6" UNDERDRAIN=856.2

EX-STORM CURB INLET
TOP CURB=859.27
GUTTER=858.75
INV. NE 12" A2000=855.25
INV. NE 6" UNDERDRAIN=856.2

ROAD W300N

ROAD N600W

10' GAS EASEMENT
BOOK 36 PAGE 212

WIRES FOR ROAD SIGNS

GRAVEL EDGE TOP GAS SUB-STATION

EX-SANT. MH
TC=858.29
INV. SW 10"PVC=846.13
INV. E 10"PVC=845.97

EX-SANT. MH
TC=860.22
INV. W 10"PVC=845.06
INV. S 12"PVC=844.97
INV. N 12"PVC=844.89

DEMOLITION LEGEND

HATCH INDICATES:

AREAS OF PAVEMENT, CONCRETE CURBING, AND VEGETATION TO BE REMOVED AND PREPARED FOR NEW CONSTRUCTION AS SHOWN ON THE SITE LAYOUT PLAN

LEGEND:

- 857 — EXISTING SPOT ELEVATION
- EXISTING CONTOURS LINES
- W W — EXISTING WATER SERVICE LINE
- SAN SAN — EXISTING SANITARY SEWER SERVICE LINE
- EXISTING SANITARY SEWER MANHOLE
- FO — EXISTING FIBER OPTICAL CABLE
- G — EXISTING GAS LINES
- OHU — EXISTING OVERHEAD ELECTRICAL/ UTILITY LINES
- EXISTING STORM SEWER LINES
- EXISTING STORM SEWER MANHOLE
- EXISTING STORM SEWER CURB INLET

DEMOLITION SCOPE

1. VERIFY ALL REQUIRED DEMOLITION WITH THE PROPOSED SITE LAYOUT PLANS AND ALL OTHER UTILITY CONTRACTORS.
2. ALL EXISTING ON-SITE SERVICE UTILITIES LINES SHALL BE REMOVED.
3. ALL TRENCHES FROM THE REMOVAL OF ANY EXISTING STRUCTURES OR UTILITIES SHALL BE BACKFILLED WITH ENGINEERED STONE FILL TO 95% PROCTOR.

EROSION CONTROL INFORMATION:

SEE SITE EROSION CONTROL PLAN FOR LOCATIONS AND INSTALLATION OF ALL EROSION CONTROL MEASURES REQUIRED ON THIS SITE.

NOTE:

1. NO EARTH-DISTURBING ACTIVITY MAY COMMENCE WITHOUT AN APPROVED STORM WATER MANAGEMENT PERMIT.
2. ALL EXISTING ASPHALT PAVEMENT TO BE REMOVED SHALL BE SAWCUT TO A CLEAN EDGE IN PREPERATION FOR NEW CONSTRUCTION.

SITE DEMOLITION PLAN
SCALE: 1"= 20.0'

UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION (INDIANA 811 TICKET No.2110291296, DATED 10/29/2021) 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 ENGINEER 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.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES. 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.

BENCHMARK INFORMATION:

ELEVATION WAS ESTABLISHED USING INCORS GPS CONTINUOUSLY OPERATING REFERENCE STATION INMT (INDIANAPOLIS CORS ARP) AS REFERENCED ON NGS DATA SHEETS. ERROR +/- 0.13 FOOT

This survey was performed using GPS equipment referenced to the INDOT network using the North American Datum of 1983, Indiana East Zone. All bearings shown on this plat of survey are relative to this datum.

UTILITY DISCLAIMER

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REVISION

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Demolition Plan

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

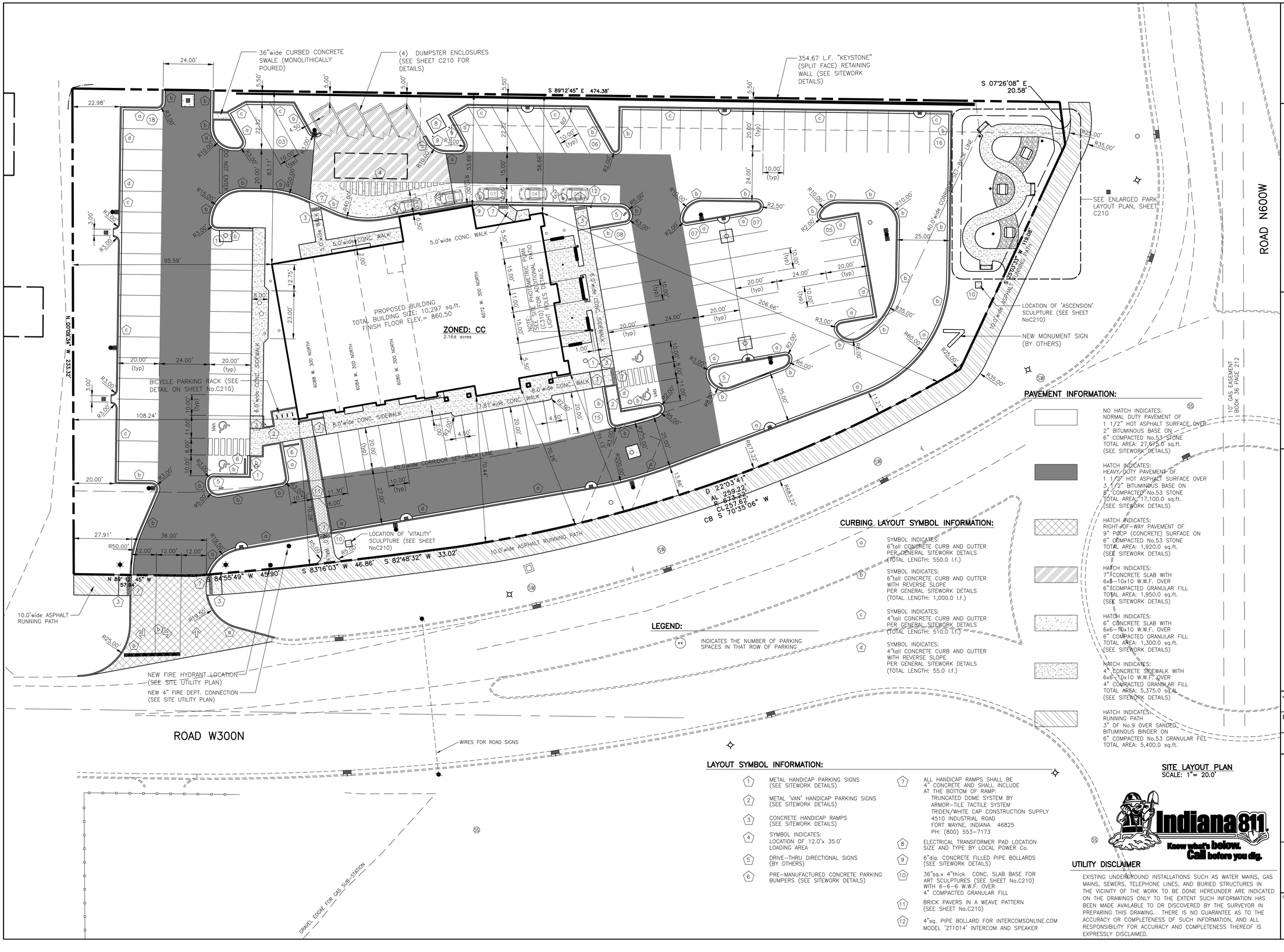
CAD FILE:
G:\21081\c100 site demolition plan.dwg

TRENT A. BAXTER
REGISTERED
No. 19700309
STATE OF INDIANA
PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

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SHEET TITLE:

C100



LEGEND:

INDICATES THE NUMBER OF PARKING SPACES IN THAT ROW OF PARKING

CURBING LAYOUT SYMBOL INFORMATION:

- a — SYMBOL INDICATES: 6"tall CONCRETE CURB AND GUTTER PER GENERAL SITEWORK DETAILS (TOTAL LENGTH: 550.0 l.f.)
- b — SYMBOL INDICATES: 6"tall CONCRETE CURB AND GUTTER WITH REVERSE SLOPE PER GENERAL SITEWORK DETAILS (TOTAL LENGTH: 1,000.0 l.f.)
- c — SYMBOL INDICATES: 4"tall CONCRETE CURB AND GUTTER PER GENERAL SITEWORK DETAILS (TOTAL LENGTH: 510.0 l.f.)
- d — SYMBOL INDICATES: 4"tall CONCRETE CURB AND GUTTER WITH REVERSE SLOPE PER GENERAL SITEWORK DETAILS (TOTAL LENGTH: 55.0 l.f.)

LAYOUT SYMBOL INFORMATION:

1. METAL HANDICAP PARKING SIGNS (SEE SITEWORK DETAILS)
2. METAL 'VAN' HANDICAP PARKING SIGNS (SEE SITEWORK DETAILS)
3. CONCRETE HANDICAP RAMPS (SEE SITEWORK DETAILS)
4. SYMBOL INDICATES: LOCATION OF 12.0'x 35.0' LOADING AREA
5. DRIVE-THRU DIRECTIONAL SIGNS (BY OTHERS)
6. PRE-MANUFACTURED CONCRETE PARKING BUMPERS (SEE SITEWORK DETAILS)
7. ALL HANDICAP RAMPS SHALL BE 4" CONCRETE AND SHALL INCLUDE AT THE BOTTOM OF RAMP: TRUNCATED DOME SYSTEM BY ARMOR-TILE TACTILE SYSTEM TRIDEN/WHITE CAP CONSTRUCTION SUPPLY 4510 INDUSTRIAL ROAD FORT WAYNE, INDIANA 46825 PH: (800) 553-7173
8. ELECTRICAL TRANSFORMER PAD LOCATION SIZE AND TYPE BY LOCAL POWER Co.
9. 6"dia. CONCRETE FILLED PIPE BOLLARDS (SEE SITEWORK DETAILS)
10. 36"sq.x 4"thick CONC. SLAB BASE FOR ART SCULPTURES (SEE SHEET No.C210) WITH 6-6-6 W.W.F. OVER 4" COMPACTED GRANULAR FILL
11. BRICK PAVERS IN A WEAVE PATTERN (SEE SHEET No.C210)
12. 4"sq. PIPE BOLLARD FOR INTERCOMSONLINE.COM MODEL 'ZT1014' INTERCOM AND SPEAKER

PAVEMENT INFORMATION:

NO HATCH INDICATES: NORMAL DUTY PAVEMENT OF 1 1/2" HOT ASPHALT SURFACE OVER 2" BITUMINOUS BASE ON 6" COMPACTED No.53 STONE TOTAL AREA: 27,675.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: HEAVY DUTY PAVEMENT OF 1 1/2" HOT ASPHALT SURFACE OVER 3 1/2" BITUMINOUS BASE ON 8" COMPACTED No.53 STONE TOTAL AREA: 17,100.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: RIGHT-OF-WAY PAVEMENT OF 9" PCCP (CONCRETE) SURFACE ON 6" COMPACTED No.53 STONE TOTAL AREA: 1,920.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: 7" CONCRETE SLAB WITH 6x6-10x10 W.W.F. OVER 6" COMPACTED GRANULAR FILL TOTAL AREA: 1,950.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: 6" CONCRETE SLAB WITH 6x6-10x10 W.W.F. OVER 6" COMPACTED GRANULAR FILL TOTAL AREA: 1,300.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: 4" CONCRETE SIDEWALK WITH 6x6-10x10 W.W.F. OVER 4" COMPACTED GRANULAR FILL TOTAL AREA: 5,375.0 sq.ft. (SEE SITEWORK DETAILS)

HATCH INDICATES: RUNNING PATH 3" OF No.9 OVER SANDED BITUMINOUS BINDER ON 6" COMPACTED No.53 GRANULAR FILL TOTAL AREA: 5,400.0 sq.ft.

SITE LAYOUT PLAN
SCALE: 1"= 20.0'

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UTILITY DISCLAIMER

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N

REVISION	
04/26/2022	added remote intercom system- caw
10/23/2022	revised property line, shortened retaining wall, added privacy fence, and shifted site- caw
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack- caw

VERSATILE CONSTRUCTION GROUP, LLC.
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New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Layout Plan

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

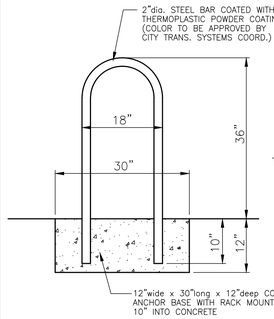
CAD FILE:
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TERRY A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

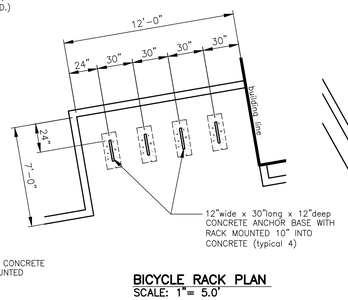
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SHEET TITLE:

C200

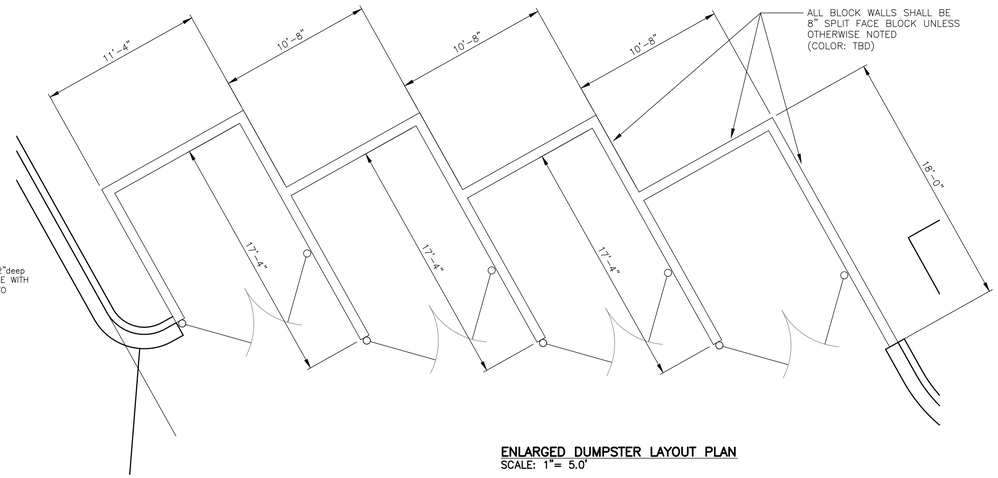


BICYCLE RACK ELEVATION (SIDE VIEW)
SCALE: NO SCALE

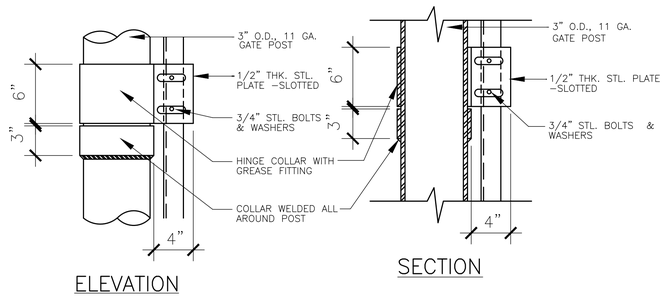


BICYCLE RACK PLAN
SCALE: 1"= 5.0'

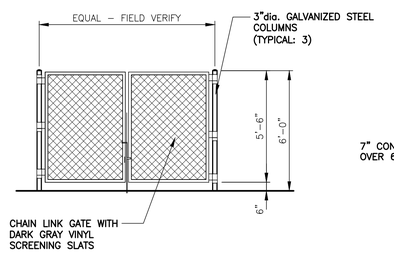
BICYCLE PARKING RACK DETAILS
SCALE: AS INDICATED



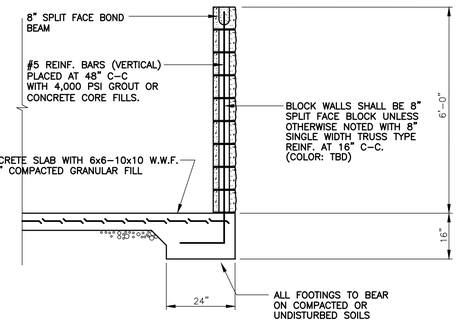
ENLARGED DUMPSTER LAYOUT PLAN
SCALE: 1"= 5.0'



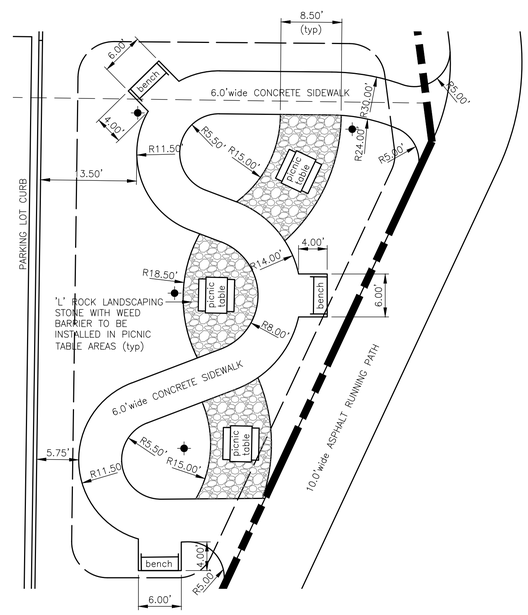
GATE HINGE CONNECTION DETAILS



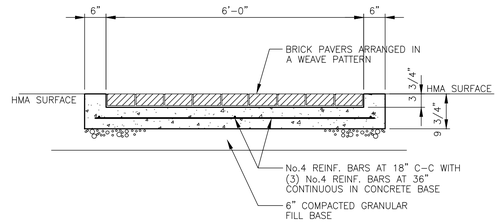
TYPICAL DUMPSTER ENCLOSURE GATE ELEVATION
SCALE: N.T.S.



TYPICAL DUMPSTER ENCLOSURE WALL SECTION
SCALE: 1/2"= 1'-0"



ENLARGED PARK LAYOUT PLAN
SCALE: 1"= 10.0'



ENLARGED BRICK PAVERS AREA DETAIL
SCALE: NO SCALE

Ascension

Dimensions: 6ft tall x 2ft wide x 2ft deep (including shown 12in tall base)

Weight: Approx. 120 lbs.

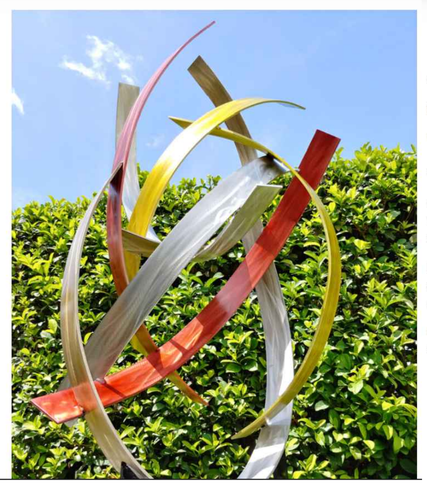
Material: High Marine Grade Aluminum Plate

Coating: Powder Coat (color and clear coat)

Installation & Placement Information: The sculpture is welded permanently directly to the shown fabricated aluminum plate base that has predrilled holes that has the option to be bolted down to any hard surface.

Purchase Information: This large metal sculpture design is available for direct commission with a 20% deposit. Every piece is custom created by the artist. To get started or get answers to other questions please contact us.

Shipping Information: Every sculpture is insured, wrapped, crated and handled with care by our hand selected and trusted transporters.



Vitality

Large Metal Sculpture by Dustin Miller

Dimensions: 6ft tall x 3ft wide x 3ft wide (including shown base)

Weight: Approx. 140 lbs.

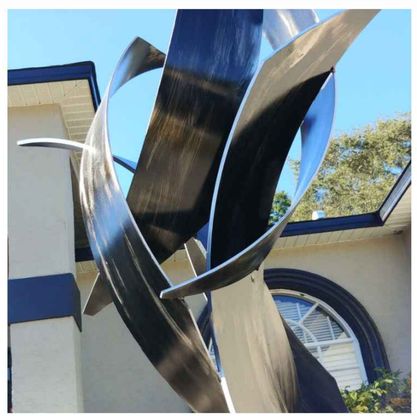
Material: High Marine Grade Aluminum Plate

Coating: Signature Weathered Enamel

Installation & Placement Information: The sculpture is welded permanently directly to the shown fabricated aluminum plate base that has predrilled holes that has the option to be bolted down to any hard surface.

Purchase Information: This large metal sculpture design is available for direct commission with a 20% deposit. Every piece is custom created by the artist. To get started or get answers to other questions please contact us.

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SCULPTURE PURCHASE INFORMATION:

Dustin Miller Gallery
22057 US Hwy 19 North
Clearwater, FL 33765
Email: info@dustinmillergallery.com
Phone: (727) 888-1122

GENERAL NOTES:

1. ALL LAYOUT DIMENSIONS SHALL BE TAKEN FROM THE NEW BUILDING AND SHALL BE PARALLEL WITH THE PROPERTY LINES.
2. ALL DISTURBED AREAS (CONCRETE, ASPHALT PAVEMENT, DIRT, AND GRAVEL) SHALL BE PATCHED BACK TO THEIR ORIGINAL CONDITION WITH "LIKE" CONSTRUCTION.
3. GENERAL CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION.
4. ALL CONCRETE SIDEWALKS SHALL HAVE TOOLED SMOOTH CONTROL JOINTS AT 5.0' C-C. (MAXIMUM) WITH 1/2" EXPANSION JOINTS AT 50.0' C-C. (MAXIMUM).
5. ALL PARKING LOT PARKING SPACES TO BE STRIPED WITH "WHITE" PAINT WITH THE EXCEPTION OF HANDICAP SPACES WHICH ARE TO BE PAINTED "BLUE".

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N

REVISION

10/25/2022	revised property line, shortened retaining wall, added privacy fence, and shifted site- caw
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack- caw

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Site Layout Details Plan

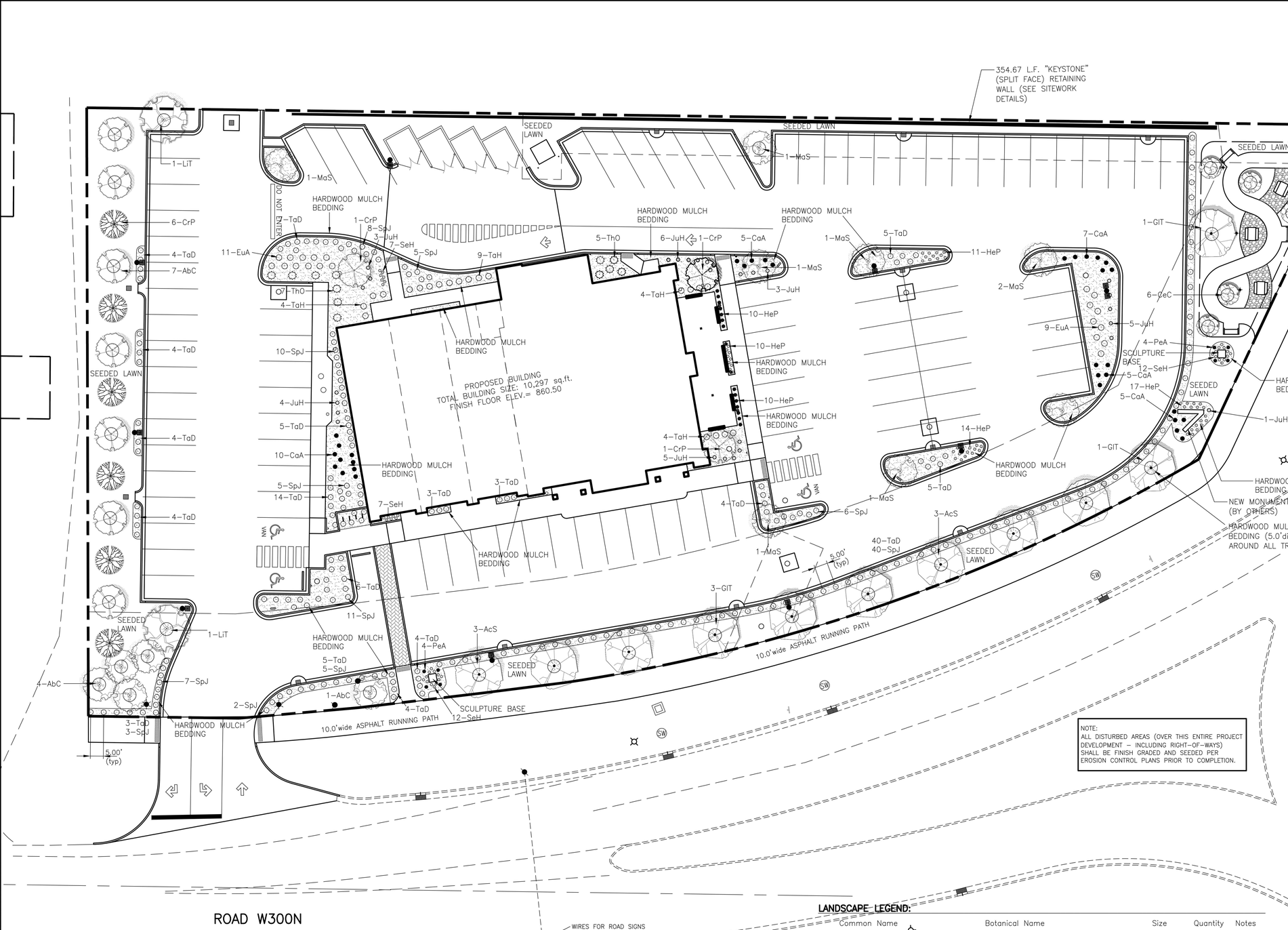
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Drawn By:	Checked By:	Scale:
caw	tab	as noted

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TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

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SHEET TITLE:
C210



LANDSCAPE LEGEND:

Common Name	Botanical Name	Size	Quantity	Notes
Shrubs:				
Magic Carpet Spirea	Spiraea japonica 'Magic Carpet'	24"	102	SpJ
Dense Yew	Taxus x media 'Densiformis'	24"	120	TaD
Dwarf Burning Bush	Euonymus alatus 'Compacta'	5gallon	20	EuA
Blue Rug Juniper	Juniperus horizontalis 'Blue Rug'	3gallon	22	JuH
Hicks Yew	Taxus x media 'Hicks'	10gallon	19	TaH
Emerald Green Arborvitae	Thuja occidentalis 'Smaragd'	25gallon	12	ThO
Trees:				
Washington Hawthorn	Crataegus phaenopyrum	2"	8	CrP
Snowdrift Crabapple	Malus 'Snowdrift'	2"	8	MaS
Sugar Maple	Acer sacchrum	2"	6	AcS
Sunburst Honeylocust	Gleditsia triacanthos inermis 'Sunburst'	2"	5	GlT
Tulip Poplar	Liriodendron tulipifera	2"	2	LiT
Eastern Redbud	Cercis canadensis	2"	6	CeC
White Fir	Abies Concolor	2"	12	AbC
Ornamental Grass:				
Karl Forester Feather Reed Grass	Calamagrotis x acut. 'Karl Forester'	5gallon	32	CaA
Hameln Dwarf Fountain Grass	Pennisetum alopecuroides 'Hameln'	3gallon	28	PeA
Perennials:				
Autumn Joy Sedum	Sedum herbstfreude 'Autumn Joy'	1gallon	38	Seh
Purple de Oro Daylily	Hemerocallis 'Purple de Oro'	1gallon	52	HeP

SITE LANDSCAPING PLAN
SCALE: 1"= 20.0'

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REVISION	
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10/23/2022	revised property line, shortened retaining wall, added privacy fence, and shifted site– caw
10/27/2022	revised per reviewers comments– caw
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack– caw

ELEVATE
Landscape Architecture & Design

Landscaping Layout Designed by:
Daniel Camacho,
Landscape Architect
5221 Ivy Tech Drive
Kokomo, IN 46902
Phone: (317) 550-9565
Email:
danielcamacho@calvinlandscape.com

6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Landscaping Plan

Job No.:	Date Stamped:	
21081	03/21/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
G:\21081\c220 site landscaping plan.dwg

DANIEL MANUEL CAMACHO
REGISTERED
No. LA22100017
STATE OF
INDIANA
LANDSCAPE ARCHITECT

CERTIFIED BY:

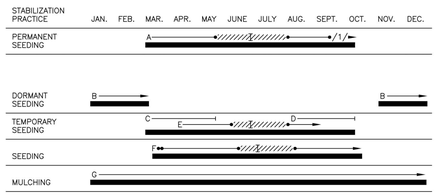
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SHEET TITLE:

C220

Seasonal Soil Protection Chart

TABLE "A"
SEASONAL SOIL PROTECTION CHART



A= KENTUCKY BLUEGRASS 40 LBS/ACRE; CREEPING RED FESCUE 40 LBS/ACRE; PLUS 2 TONS STRAW MULCH/ACRE, OR ADD ANNUAL RYEGRASS 20 LBS/ACRE.

B= KENTUCKY BLUEGRASS 60 LBS/ACRE; CREEPING RED FESCUE 60 LBS/ACRE; PLUS 2 TONS STRAW MULCH/ACRE, OR ADD ANNUAL RYEGRASS 30 LBS/ACRE.

C= SPRING OATS 3BUSHEL/ACRE.

D= WHEAT OR RYE 2 BUSHEL/ACRE.

E= ANNUAL RYEGRASS 40 LBS/ACRE. (1 LB/1,000 S.F.)

F= SOD.

G= STRAW MULCH 2 TONS/ACRE.

•/1/• = IRRIGATION NEEDED DURING JUNE, JULY AND / OR SEPT.

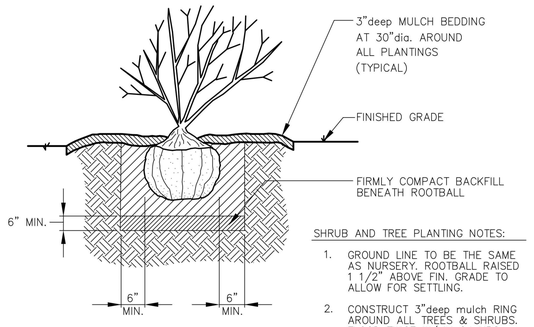
•• = IRRIGATION NEEDED FOR 2 TO 3 WEEKS AFTER APPLYING SOD.

Landscaping Notes

1. All plant materials to meet minimum standards set by American Association of Nurserymen, latest published addition of American Standard for Nursery Stock.
2. All areas disturbed by construction and not otherwise paved or landscaped and all lawn areas shall be seeded with straw as specified.
3. All lawn areas to be raked smooth, fertilized and watered prior to seeding.

% of mix.	Name of grass	Application
39.86%	Falcon IV tall fescue	1.5 #/1,000 sq.ft.
29.80%	Scorpion II tall fescue	1.5 #/1,000 sq.ft.
29.60%	Six point tall fescue	1.5 #/1,000 sq.ft.
00.72%	Inert	1.5 #/1,000 sq.ft.
00.02%	Other weeds	1.5 #/1,000 sq.ft.

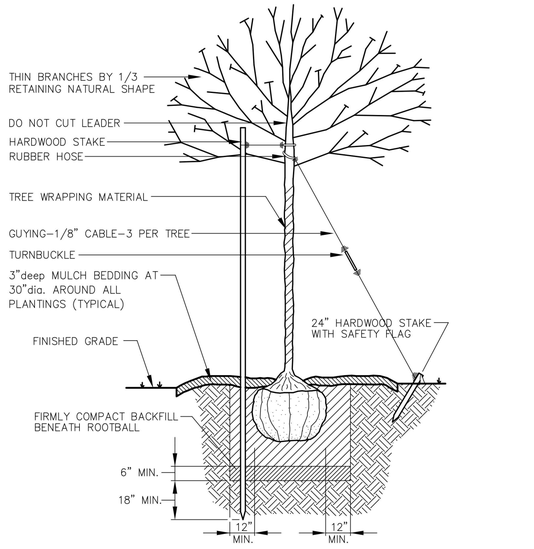
4. Planting soil for tree and shrub pits to be backfilled with the soil that was removed from the planting pit.



SHRUB PLANTING DETAIL
NO SCALE

SHRUB AND TREE PLANTING NOTES:

1. GROUND LINE TO BE THE SAME AS NURSERY. ROOTBALL RAISED 1 1/2" ABOVE FIN. GRADE TO ALLOW FOR SETTLING.
2. CONSTRUCT 3"deep mulch RING AROUND ALL TREES & SHRUBS. FLOOD TWICE W/ IN 24 HRS.
3. CUT AND REMOVE BURLAP FROM TOP OF ROOTBALL.



TREE PLANTING DETAIL
NO SCALE

PLANTING SPECIFICATIONS:

1. ALL PLANT MATERIALS SHALL CONFORM TO THE STANDARDS SET FORTH IN THE CURRENT EDITION OF THE AMERICAN STANDARDS NURSERY STOCK OF NURSERYMEN. PLANTS SHALL BE TYPICAL OF SPECIES AND VARIETY, AND HAVE NORMAL, WELL–DEVELOPED BRANCHING STRUCTURE AND VIGOROUS FIBROUS ROOT SYSTEM.
2. PLANTS SHALL BE HEALTHY, VIGOROUS PLANTS FREE FROM INSECTS AND DISEASE. TRUNK AND STEMS SHALL BE FIRM WITH NO INDICATION OF FUNGUS CANKERS OR GALLS, INSECT BORERS, DIEBACK, FRONT CRACKS, OR OTHER DEFECTS.
3. ALL PLANTS SHALL BE COMMERCIALLY GROWN AND NO PLANTS FROM THE WILD SHALL BE ACCEPTABLE WITHOUT SPECIFIC APPROVAL FROM THE DIVISION OF BUILDING INSPECTION.
4. TREES SHALL NOT BE ACCEPTABLE IF THEIR CENTRAL LEADER HAS BEEN CUT OR IS DAMAGED SO THAT CUTTING IS NECESSARY.
5. PLANTS SHALL NOT BE PRUNED PRIOR TO INSTALLATION. ANY NECESSARY PRUNING SHALL BE DONE IMMEDIATELY AFTER THE TIME OF INSTALLATION.
6. PLANT HEIGHT SHALL BE MEASURED BEFORE PRUNING WITH BRANCHES IN A NORMAL POSITION. NO PLANT SHALL BE PRUNED BACK TO SUCH AN EXTENT THAT IT NO LONGER MEETS THE REQUIRED SIZE SPECIFICATIONS.
7. ALL DECIDUOUS AND EVERGREEN TREES SHALL BE BALLED AND BURLAPPED. NO BARE ROOT TREES SHALL BE ACCEPTABLE.
8. THE MINIMUM SIZE OF BALLS, BALL DEPTHS, AND BALL DIAMETERS SHALL BE IN ACCORDANCE WITH RECOMMENDED BALLING AND BURLAPPING SPECIFICATIONS AS SET FORTH IN THE CURRENT EDITION OF THE AMERICAN STANDARDS OF NURSERY STOCK.
9. ALL BALLED AND BURLAPPED PLANTS WHICH CANNOT BE PLANTED IMMEDIATELY SHALL BE SEALED IN AND PROTECTED WITH BURLAP OR OTHER ACCEPTED MATERIAL.
10. IDEAL TREES SELECTED FOR THIS PROJECT HAVE A STRAIGHT TRUNK, ROUNDED OR OVAL FORM, AND SYMMETRICAL BRANCHING PATTERN.
11. ALL TREES AND SHRUBS SHOWN ON THIS DRAWING SHALL BE PLACED IN A MANNER TO ALLOW FOR AMPLE ROOM TO DEVELOP.
12. IF WORK IS REQUIRED WITHIN THE EASEMENTS CAUSING REMOVAL OR DAMAGE OF LANDSCAPE MATERIALS, THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR REPLACEMENT OF MATERIALS ACCORDING TO THE APPROVED LANDSCAPE PLAN.
13. INSTALLATION OF A WEED BARRIER IS REQUIRED IN ALL MULCHED/ LANDSCAPED AREAS.

REVISION
11/17/2022 revised park lot, landscape, storm sewer, and added bike rack– caw

ELEVATE
Landscape Architecture & Design

Landscaping Layout Designed by:
Daniel Camacho,
Landscape Architect
5221 Ivy Tech Drive
Indianapolis, IN 46268
Phone: (317) 550–9565
Email:
danielcamacho@calvinlandscape.com

6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Landscaping Details

Job No.:	Date Stamped:	
21081	03/21/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
G:\21081\c220 site landscaping plan.dwg

DANIEL MANUEL CAMACHO REGISTERED No. LA22100017 STATE OF INDIANA LANDSCAPE ARCHITECT

CERTIFIED BY:

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SHEET TITLE:

C230

(4) NEW 4"pvc CONDUITS FROM NEW ELECT. TRANS. (sch.80 PVC ABOVE GRADE, SWEEP 90 IN GROUND) CONDUIT AND PULL STRING BY ELECTRICAL CONTRACTOR, WIRE BY LOCAL POWER Co.

NEW TRANSFORMER LOCATION BY LOCAL POWER Co.

354.67 L.F. "KEYSTONE" (SPLIT FACE) RETAINING WALL (SEE SITEWORK DETAILS)

(1) NEW 4"pvc CONDUIT TO NEW ELECT. TRANS. (sch.80 PVC ABOVE GRADE, SWEEP 90 IN GROUND) CONDUIT AND PULL STRING BY ELECTRICAL CONTRACTOR, WIRE BY LOCAL POWER Co.

ELECTRICAL NOTE:

TOP OF ALL NEW ELECTRICAL SERVICE CONDUITS SHALL BE INSTALLED AT A MINIMUM OF 36" BELOW FINISH GRADE.

DO NOT ENTER

(1) 3/4"pvc CONDUIT TO UTILITY ROOM FOR ALARM WIRING

(1) NEW 800amp CT CABINET (208/120/3ø) MOUNTED PER CITY SPECIFICATIONS

15.0'wide ELECTRICAL EASEMENT

(1) NEW 4"pvc CONDUIT FOR NEW TELEPHONE

(1) NEW 4"pvc CONDUIT FOR NEW TELEPHONE

LOCATION OF (4) NEW UNIT GAS METERS

GAS

CONNECT NEW GAS SERVICE MAIN TO EXISTING MAIN

NEW 4" 'STORTZ' LINE

NEW 6"sdr18 WATER SERVICE LINE

NEW 4"sdr18 WATER SERVICE LINE

NEW 6" WATER LINE REDUCES TO 4" AT 'TEE' WITH 4" SHUT-OFF VALVE

NEW POST INDICATOR VALVE HEIGHT: 36" A.F.G. PAINT: RED

(1) 3/4"pvc CONDUIT FOR CAT6 WIRING FROM REMOTE INTERCOM

type 1 co. inv.= 855.09

type 1 co. inv.= 854.98

45° 45°

(1) NEW 600amp CT CABINET (208/120/3ø) MOUNTED PER CITY SPECIFICATIONS

SEE ARCHITECTURAL PLANS FOR LOCATION AND SIZE OF ALL INTERIOR WATER METERS

type 1 co. inv.= 856.45

type 2 co. inv.= 857.50 type 1 co.

PROPOSED BUILDING
TOTAL BUILDING SIZE: 10,297 sq.ft.
FINISH FLOOR ELEV.= 860.50

NEW MONUMENT SIGN (BY OTHERS)

ROAD N600W
11/17/2022 revised entrance, dumpster pad, storm sewer and added bike rack- caw

10' GAS EASEMENT BOOK 39 PAGE 212

inv.= 856.45 type co.

4" 'STORTZ' CONNECTION WITH HEIGHT: 36" - 40" A.F.G. PAINT: FDC RED INCLUDE FIRE DEPT. IDENTIFICATION SIGN

40.0'wide CORRIDOR SET-BACK LINE

REDUCED PRESSURE PRINCIPLE (WILKINS MODEL 975XLMS) WITH PRESSURE VACUUM VALVE -BY IRRIGATION CONTRACTOR-

inv.= 850.77

20.0'wide SANITARY SEWER EASEMENT

(1) 1" WATER METER FOR IRRIGATION

80° bend

NEW 6"sdr18 WATER SERVICE LINE

NEW 6" SHUT-OFF VALVE

CHANGE FROM hdpe TO sdr18 AT THIS 6"x 6"x 8" TEE FITTING

NEW 8" WATER SERVICE LINE BORED UNDER STREET

NEW 8" SANITARY SEWER LINE BORED UNDER STREET

NEW FIRE HYDRANT WITH 6" SHUT-OFF VALVE (SEE SITEWORK DETAILS)

ROAD W300N

WIRES FOR ROAD SIGNS

23° bend

NEW 6" WATER SERVICE SHUT-OFF VALVE

GRAVEL EDGE FOR GAS SUB-STATION

EX-SANT. MH
TC=858.29
INV. SW 10"PVC=846.13
INV. E 10"PVC=845.97
NEW NW 8"(sdr35) pvc INV.= 849.56
(INSTALLED WITH INSIDE DROP PER SANITARY SEWER DETAILS)

EX-SANT. MH
TC=860.22
INV. W 10"PVC=845.06
INV. S 12"PVC=844.97
INV. N 12"PVC=844.89

LEGEND:

- EXISTING WATER SERVICE LINE
- EXISTING SANITARY SEWER SERVICE LINE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING FIBER OPTICAL CABLE
- EXISTING GAS LINES
- EXISTING OVERHEAD ELECTRICAL/ UTILITY LINES
- EXISTING STORM SEWER LINES
- EXISTING STORM SEWER MANHOLE
- EXISTING STORM SEWER CURB INLET
- PROPOSED WATER SERVICE LINE
- PROPOSED TELEPHONE LINES
- PROPOSED SANITARY SEWER SERVICE LINE
- SCREW TOP SANITARY SEWER CLEANOUTS
- type 1 co. PLASTIC SCREW CAP LIDS (PER SITEWORK DETAILS)
- type 2 co. BRASS SCREW CAP LIDS (PER SITEWORK DETAILS)
- PROPOSED UNDERGROUND ELECTRICAL LINE
- PROPOSED ELECTRICAL METERS
- PROPOSED GAS LINES
- PROPOSED GAS METERS
- PROPOSED STORM SEWER PIPES
- PROPOSED STORM SEWER INLETS
- PROPOSED FIRE HYDRANT
- PROPOSED STORTZ CONNECTION

SITE UTILITY PLAN
SCALE: 1"= 20.0'

SANITARY SEWER PIPING INSTALLATION:

- (a) 16.4 L.F. OF 6"(sdr35) pvc SANITARY SEWER LATERAL AT 1.10% SLOPE
- (b) 2,000 gal. GREASE SEPARATOR (SEE DETAIL, SHEET No.C305) inv. in= 857.35 inv. out= 857.07
- (c) 14.4 L.F. OF 6"(sdr35) pvc SANITARY SEWER LATERAL AT 4.31% SLOPE
- (d) 73.7 L.F. OF 6"(sdr35) pvc SANITARY SEWER LATERAL AT 1.06 SLOPE
- (e) NEW 4.0'dia. PRECAST CONCRETE SANITARY (PRIVATE) DROP MANHOLE (CASTING: NEENAH R-1772) T.C.= 860.50 INV. IN N 6"(sdr35) pvc= 854.31 INV. IN S 6"(sdr35) pvc= 851.40
- (f) 59.4 L.F. OF 6"(sdr35) pvc SANITARY SEWER LATERAL AT 1.06% SLOPE
- (g) NEW 4.0'dia. PRECAST CONCRETE SANITARY SEWER MANHOLE (CASTING: NEENAH R-1772) T.C.= 859.25 INV. OUT SW 8"(sdr11/hdpe)= 850.83
- (h) 26.0 L.F. OF 8"(sdr11/hdpe) SANITARY SEWER PIPE AT 0.60% SLOPE
- (i) NEW 4.0'dia. PRECAST CONCRETE (SAMPLING) SANITARY SEWER MANHOLE (CASTING: NEENAH R-1772) T.C.= 858.85 INV. IN NE 8"(sdr11/hdpe)= 850.68 INV. OUT SW 8"(sdr11/hdpe)= 850.58
- (j) 170.7 L.F. OF 8"(sdr11/hdpe) SANITARY SEWER PIPE AT 0.60% SLOPE

UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION (INDIANA 811 TICKET No.2110291296, DATED 10/29/2021) 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 ENGINEER 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.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES. 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.

WATER SERVICE NOTE:

1. ALL WATER LINES INCLUDED IN THIS PROJECT SHALL BE PRIVATELY OWNED AND MAINTAINED.
2. ALL NEWLY INSTALLED WATER LINES SHALL MEET OR EXCEED THE COUNTY STANDARDS FOR PUBLIC UTILITIES AND SHALL BE TESTED PER HANCOCK COUNTY TESTING SPECIFICATIONS.
3. ALL NEWLY INSTALLED WATER METERS SHALL BE OBTAINED FROM THE LOCAL WATER COMPANY.
4. ALL WATER SERVICE PIPING SHALL HAVE WARNING TAPE AND (3) STRANDS OF 10ga. (INSULATED) COPPER LOCATOR WIRE (typical)

SANITARY SEWER NOTES:

1. ALL SANITARY SEWERS INCLUDED IN THIS PROJECT SHALL BE PRIVATELY OWNED AND MAINTAINED.
2. ALL NEWLY INSTALLED SANITARY SEWERS SHALL MEET OR EXCEED THE AQUA INDIANA STANDARDS AND SHALL BE TESTED PER THEIR TESTING SPECIFICATIONS.
3. ALL SANITARY SEWER LATERAL PIPING SHALL HAVE WARNING TAPE AND (3) STRANDS OF 10ga. (INSULATED) COPPER LOCATOR WIRE (typical)

Indiana 811 Know what's below. Call before you dig.

UTILITY DISCLAIMER

EXISTING UNDERGROUND INSTALLATIONS SUCH AS WATER MAINS, GAS MAINS, SEWERS, TELEPHONE LINES, AND BURIED STRUCTURES IN THE VICINITY OF THE WORK TO BE DONE HEREUNDER ARE INDICATED ON THE DRAWINGS ONLY TO THE EXTENT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE SURVEYOR IN PREPARING THIS DRAWING. THERE IS NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION, AND ALL RESPONSIBILITY FOR ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED.

N

REVISION	
04/26/2022	added remote intercom system- caw
05/04/2022	revised storm and water lines- caw
05/05/2022	revised water line- caw
05/24/2022	removed sleeve from water and sewer bore- caw
06/01/2022	revised water and san. sewer lines- caw
07/14/2022	added ss easement and revised fire connection- caw

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Treoy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Utility Plan

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By: caw	Checked By: tab	Scale: 1"= 20.0'

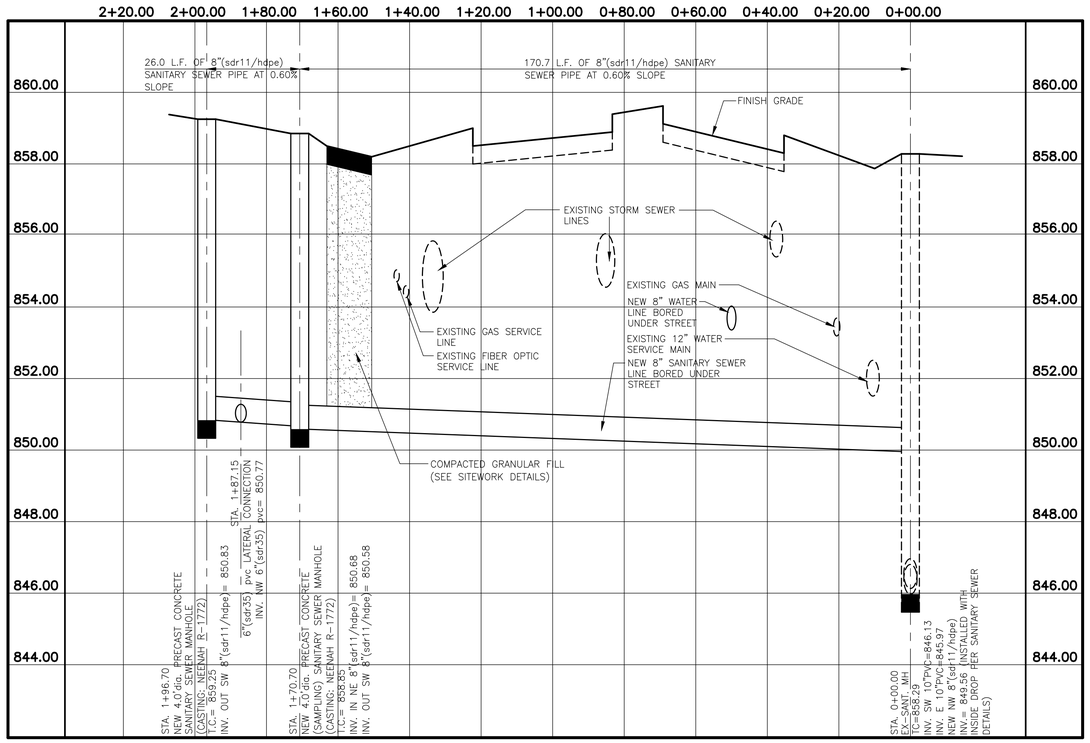
CAD FILE:
G:\21081\c300 and c305 site utility plan.dwg

TREVA A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Treva A Baxter
CERTIFIED BY:

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SHEET TITLE:

C300



8" SANITARY SEWER EXTENSION PROFILE
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)

UTILITY CONSTRUCTION NOTES:

1. Site Contractor shall have approval of all governing agencies having jurisdiction over these systems prior to any installations.
2. The Sanitary Sewer pipe material shall be pvc unless otherwise noted. All pipes shall meet the ASTM 3034 with the wall thickness equal to SDR 35. The pipe shall be joined with rubber ring gaskets as specified in ASTM 3034 and shall be installed in accordance with ASTM 2321. Furthermore the pipe material cell classification shall be 12454B as per ASTM 1784.
3. All trenching, pipe laying, and backfilling shall be in accordance with all federal OSHA regulations.
4. Site contractor shall be responsible for repairs to any existing utilities damaged during construction.
5. The contractor shall refer to the Architect's plans and specifications for the actual location of all utility entrances to include sanitary sewer laterals, domestic and fire protection water services, electrical, telephone, and gas services. The contractor shall coordinate installation of utilities in such a manner as to avoid conflicts and assure proper depths are achieved, as well as coordinating with the regulatory agency as to the location and scheduling of all tie-ins/connections to said services.
6. All vertical bends on the proposed water mains shall be restrained with a mechanical joint fittings supplied with retainer glands. Any joints 25 feet or less from either side of the vertical bends shall be restrained with a retainer gland.
7. All dimensions shown here are to centerline of pipe, fitting, or structure.
8. All valves shall be installed in a cast iron valve box with cover.
9. Thrust blocking shall be provided at all horizontal bends, tees, and fire hydrants.
10. The minimum cover depths of all water line/mains shall be 54" deep.
11. All gate valves 3/4" through 3" shall be bronze 'wedge' type gate valves. All valves shall have non-rising stems with solid tee head operating nut.
12. All pipes 3" in diameter and smaller shall be type K copper. All fittings shall be copper or cast bronze. All joints shall be solder or flare type joints.
13. The minimum horizontal separation between the closest two points of the water service and sanitary sewer service lines is to be ten feet (10'). The minimum vertical separation between the closest two points of the water service and sanitary sewer service lines is twenty-four inches (24").
14. All water mains shall be hydrostatically tested and disinfected before acceptance, as per AWWA standard specifications.

REVISION

05/04/2022	revised storm and water lines- caw
05/24/2022	removed sleeve from water and sewer bore- caw
06/01/2022	revised sanitary sewer profile- caw
07/14/2022	revised sanitary sewer profile- caw
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack- caw

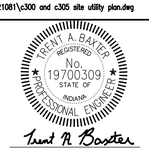
VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Sanitary Sewer Extension Profile

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

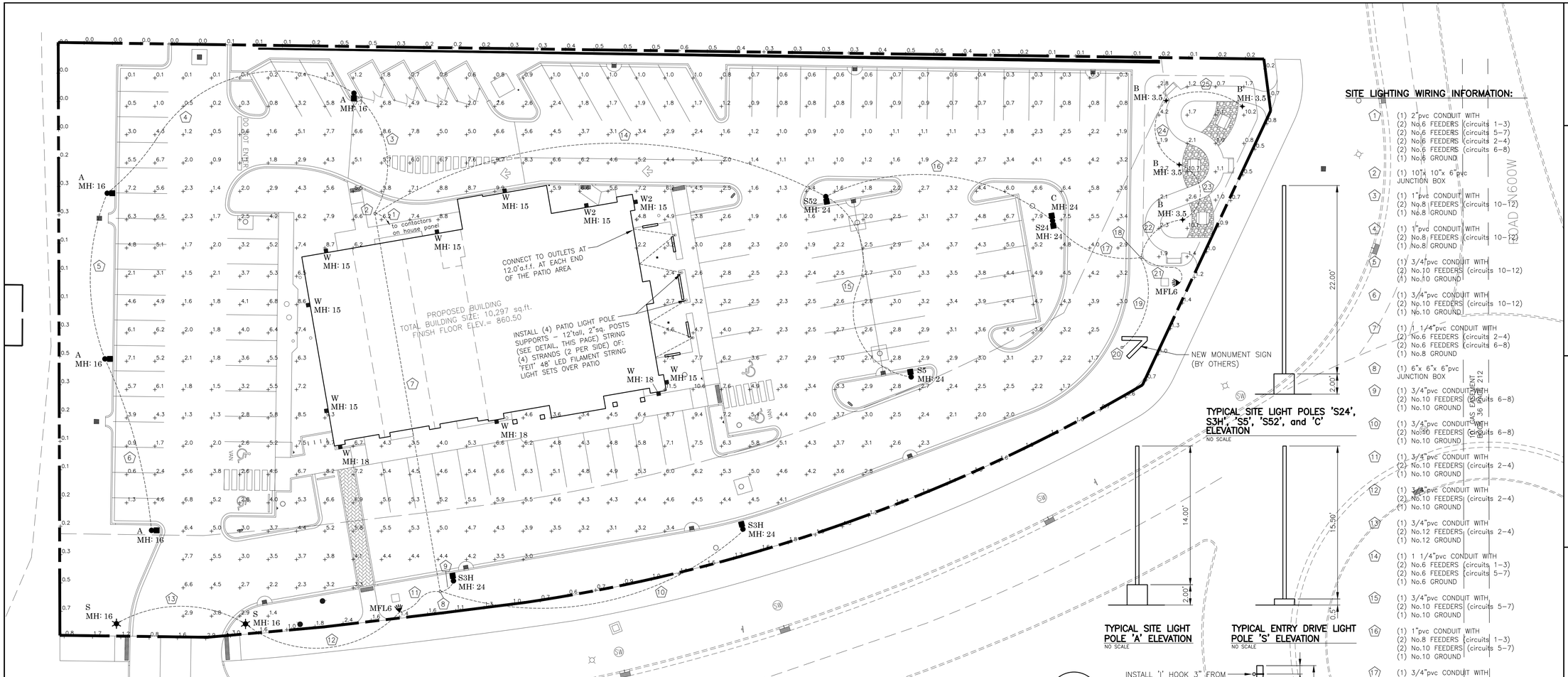
CAD FILE:
Q:\21081\c300 and c305 site utility plan.dwg



Trent R Baxter
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SHEET TITLE:
C305



Lighting Schedule:

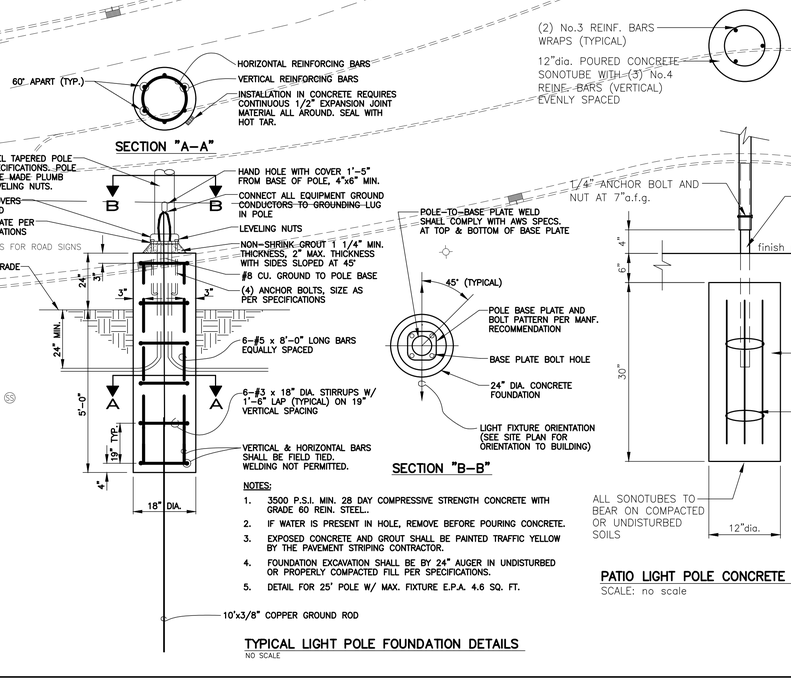
Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
B	4	Industrial Lighting Products	BLDT-15WLED-UNIV-4000K	Black aluminum housing, specular reflector, clear plastic enclosure	1	1209	0.9	16.46
S	2	Sternberg Lighting	A840SR-VCOB-4L40TS-MDL05	A840 Series with Vertical COB tower, Old Town Series Acorn, new LEDit optic, TS	1	7695	0.9	74.2
S24	1	Industrial Lighting Products Inc	SAS-18L-U-40-T4	Skyline Small, 18,000 Lumens, 4000K, Type 4 Optic	1	19422	0.9	132.6
S3H	2	Industrial Lighting Products Inc	SAS-15L-U-40-T3	Skyline Small, 15,000 Lumens, 4000K, Type 3 Optic	1	16982	0.9	110.5
S5	1	Industrial Lighting Products Inc	SAS-18L-U-40-T5S	Skyline Small, 18,000 Lumens, 4000K, Type 5 Square Optic	1	20236	0.9	132.6
S52	1	Industrial Lighting Products Inc	SAS-9L-U-40-T5S	Skyline Small, 9,000 Lumens, 4000K, Type 5 Square Optic	1	10118	0.9	66.3
W	9	Industrial Lighting Products Inc	WPCM-12L-U-40-T4	Full Cutoff Wallpack 2.0, Medium Housing, 12,000 Lumens, 4000K, Type IV Distribution	1	11291	0.9	87
MFL6	2	Industrial Lighting Products, LLC	VFS-5L-U-CCTS-M-x-y at 0% CCT Setting		1	5269	0.9	42.25
A	4	Industrial Lighting Products Inc	SAS-12L-U-40-T3-GS	Gray cast aluminum housing, frosted lens enclosure with cl ear T3 optics, glare shield	1	8636	0.9	135.607
W2	2	Industrial Lighting Products Inc	WPCM-8L-U-40-T4	Full Cutoff Wallpack 2.0, Medium Housing, 8,000 Lumens, 4000K, Type IV Distribution	1	7969	0.9	57
C	1	Industrial Lighting Products Inc	SAS-12L-U-40-T2	Skyline Small, 12,000 Lumens, 4000K, Type 2 Optic	1	13607	0.9	88.4

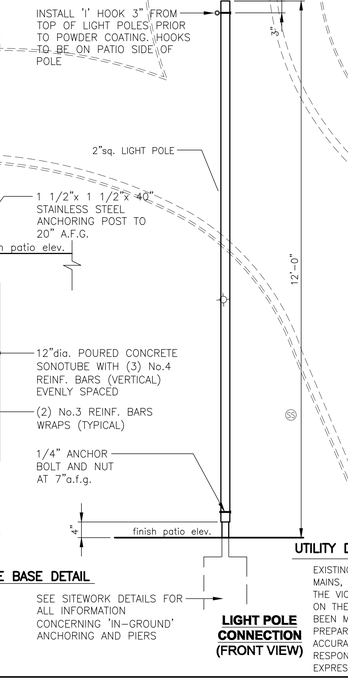
SITE LIGHTING NOTE:
SEE ARCHITECTURAL PLANS FOR EXACT PLACEMENT OF ALL WALL MOUNTED LIGHTING FIXTURES

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Boundry Line	+	0.7 fc	3.0 fc	0.0 fc	N/A	N/A
Park Area	+	3.0 fc	10.7 fc	0.7 fc	15.3:1	4.3:1
Parking and Drive	+	3.5 fc	11.5 fc	0.1 fc	115.0:1	35.0:1

SITE LIGHTING WIRING INFORMATION:

1. (1) 2"pvc CONDUIT WITH (2) No.6 FEEDERS (circuits 1-3) (2) No.6 FEEDERS (circuits 5-7) (2) No.6 FEEDERS (circuits 2-4) (2) No.6 FEEDERS (circuits 6-8) (1) No.6 GROUND
2. (1) 10"x 10"x 6"pvc JUNCTION BOX
3. (1) 1"pvc CONDUIT WITH (2) No.8 FEEDERS (circuits 10-12) (1) No.8 GROUND
4. (1) 1"pvc CONDUIT WITH (2) No.8 FEEDERS (circuits 10-12) (1) No.8 GROUND
5. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 10-12) (1) No.10 GROUND
6. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 10-12) (1) No.10 GROUND
7. (1) 1 1/4"pvc CONDUIT WITH (2) No.6 FEEDERS (circuits 2-4) (2) No.6 FEEDERS (circuits 6-8) (1) No.8 GROUND
8. (1) 6"x 6"x 6"pvc JUNCTION BOX
9. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 6-8) (1) No.10 GROUND
10. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 6-8) (1) No.10 GROUND
11. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 2-4) (1) No.10 GROUND
12. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 2-4) (1) No.10 GROUND
13. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 2-4) (1) No.12 GROUND
14. (1) 1 1/4"pvc CONDUIT WITH (2) No.6 FEEDERS (circuits 1-3) (2) No.6 FEEDERS (circuits 5-7) (1) No.6 GROUND
15. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 5-7) (1) No.10 GROUND
16. (1) 1"pvc CONDUIT WITH (2) No.8 FEEDERS (circuits 1-3) (2) No.10 FEEDERS (circuits 5-7) (1) No.10 GROUND
17. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 1-3) (1) No.10 GROUND
18. (1) 6"x 6"x 6"pvc JUNCTION BOX
19. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 1-3) (1) No.12 GROUND
20. (1) 6"x 6"x 6"pvc JUNCTION BOX
21. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 1-3) (1) No.12 GROUND
22. (1) 3/4"pvc CONDUIT WITH (2) No.10 FEEDERS (circuits 1-3) (1) No.10 GROUND
23. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 1-3) (1) No.12 GROUND
24. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 1-3) (1) No.12 GROUND
25. (1) 3/4"pvc CONDUIT WITH (2) No.12 FEEDERS (circuits 1-3) (1) No.12 GROUND





SITE PHOTOMETRIC PLAN
SCALE: 1"= 20.0'

Indiana 811 Know what's below. Call before you dig.

UTILITY DISCLAIMER

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N

REVISION
11/17/2022 revised park lot, landscape, storm sewer, site lighting, and added bike rack- caw

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Treyy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Photometric Plan

Job No.:	Date Stamped:	
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Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

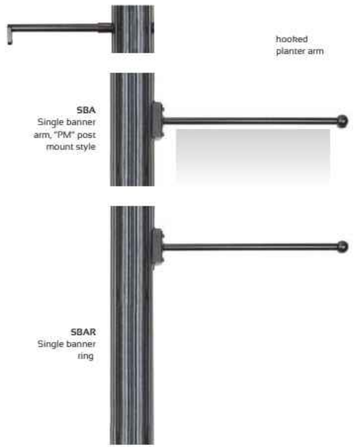
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SHEET TITLE:
C310



'S' POLE LIGHT BANNER RODS
SCALE: no scale



8300 BALTIMORE SERIES

ORNAMENTAL POLE

DIMENSIONS 19" SQUARE 57' TALL | 5 YEAR WARRANTY | UL LISTED | ETL LISTED | CLICK FOR FAQ's

BUILD A PART NUMBER

ORDERING EXAMPLE: 8314FP5-188-BCC-GFILPIUC-SH/BKT

Base Model	Height	Shaft	Wall Thickness	Post Center Cap	Option Burial	Option Receptacle	Option Ground Fault Breaker	Option Flag Pole Holder	Option Banner Arms	Option Planter Arms	Option Sign Arms	Option Speaker Hub	Option Sign Bracket	Option Steel Wreath Hook	Finish
83	16	P5	250						NONE						BKT

Base Model
- 83

Height (in feet)
- 10
- 12
- 14
- 16
- 18
- 20

Shaft
- T5: 5"- 3" Tapered Smooth
- T54: 5"- 4" Tapered Smooth
- P5: 5" Straight Smooth
- FP5*: 5" Straight Fluted
- TFP5*: 5"- 3" Cast Tapered Fluted

*Not available in 125 mph
†Heights limited to 12'-2", 13'-3", 15'-4", 17'-4"

Wall Thickness
- J25: 1/8" Wall Thickness
- J188: 3/16" Wall Thickness
- J250: 1/4" Wall Thickness
- C†: Cast Shaft, Varied Wall Thickness

†For cast "T5" shafts only

Post Center Cap (if required)
(Click here to view post cap sheet)
- BCC
- FCC
- SCC
- TFCC
- SSCC
- RCC
- PCC

Options (Click here to view accessories sheet)
- DB4 Direct Burial mounting style pole, with 4' direct burial section (or advise other length)
- HXB Helix Base mounting style pole
- PCD Electronic Button Photocontrol, mounted on an access door (120v-277v)
- PCD4 Electronic Button Photocontrol, mounted on an access door (480v)
- GFI LPIUC 15 Amp duplex GFCI receptacles with a low-profile in-use cover
- GFI IUC 15 Amp duplex GFCI receptacles with a standard in-use cover
- USB LPIUC 15 Amp duplex USB/Receptacle combo with a low-profile in-use cover (NON-GFI)
- USB IUC 15 Amp duplex USB/Receptacle combo with a standard in-use cover (NON-GFI)
- GFI IB 15 Amp duplex GFCI receptacle in pole base, includes mouse hole on door for wire access
- USB IB 15 Amp duplex USB/Receptacle combo in pole base, includes mouse hole on door for wire access (NON-GFI)
- GFB Remote Ground Fault Breaker installed in pole base (for use with NON-GFCI receptacles)
- FH Cast Aluminum flag holder mount, for use with 1" diameter flag pole
- SBA Single Banner Arm, "PM" style mount
- DBA Double Banner Arms, "PM" style mount
- SBAR Single Banner Arm and Ring, for triangle banners, "PM" style mount
- HSBA Single Banner Arm, HUB mount style mount
- HDBA Double Banner Arms, HUB mount style mount
- BDBA6 Double Banner Arms, Breah-Away style, to break with 60MPH wind gust
- BDBA9 Double Banner Arms, Breah-Away style, to break with 90MPH wind gust
- CSSBA Single Banner Arm, Clamp-Style mount, for 5" diameter poles
- CSDBA Double Banner Arms at 180°, Clamp-Style mount, for 5" diameter poles
- DHPA Double Hooked Planter Arm
- SHPA Single Hooked Planter Arm
- DSPA Double Stepped Planter Arm
- SSPA Single Stepped Planter Arm
- PA47B Cast aluminum decorative planter arm
- SA7B Small cast aluminum decorative sign arm, with 24" long channel for blade sign by others
- SA47B Large cast aluminum decorative sign arm, with 24" long channel for blade sign by others
- SABA Banner arm style sign arm, with 24" long channel for blade sign by others
- SH Female threaded speaker hub, advise thread size
- SB Sign Bracket, vertically mounted on pole shaft
- WHK Steel wreath hook

Finish (Click here to view paint finish sheet)
Standard Finishes*
- BKT Black Textured
- WHT White Textured
- PCT Park Green Textured
- ABZT Architectural Medium Bronze Textured
- DBT Dark Bronze Textured

*Smooth finishes are available upon request.

Custom Finishes†
- CM Custom Match
- OI Old Iron
- RT Rust
- WBR Weathered Brown
- CD Cedar
- WBK Weathered Black
- TT Two Tone

†Custom colors require upcharge.

Sternberg Select Finishes
- VG Verde Green
- SI Swedish Iron
- OWGT Old World Gray Textured

Specifications

Construction
The one piece base is made of heavy wall 356-alloy cast aluminum with a 1" thick floor cast as an integral part of the base. The high tensile aluminum shaft shall be double circumferentially welded internally and externally to the base for added strength.

Shaft
The **straight smooth shaft** shall be made of ASTM 6063 extruded aluminum and tempered to a T6 condition

The **tapered smooth shaft** shall be made of ASTM 6063 extruded aluminum and tempered to a T6 condition

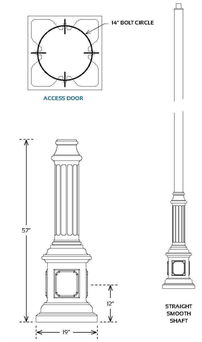
The **straight fluted shaft** shall be made of ASTM 6061 extruded aluminum and tempered to a T6 condition

The **tapered fluted shaft** shall be made of heavy wall 356 alloy cast aluminum.

Installation
Four 3/4" diameter, hot dipped galvanized "L" type anchor bolts shall be provided with the post for anchorage, they shall be mounted in a 14" bolt circle. A door shall be provided for wiring and anchor bolt access. It shall be secured with a stainless steel hardware. Post will be provided with a grounding stud mounted on the base floor opposite the access door.

Warranty
Five-year limited warranty. See product and finish warranty guide for details.

Finish
Refer to website for details.



SternbergLighting
ESTABLISHED 1923 / EMPLOYEE OWNED

800-621-3376
555 Lawrence Ave., Roselle, IL 60172
info@sternberglighting.com
www.sternberglighting.com

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'S' POLE LIGHT SPECIFICATIONS
SCALE: no scale

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REVISION

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Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Photometric Details

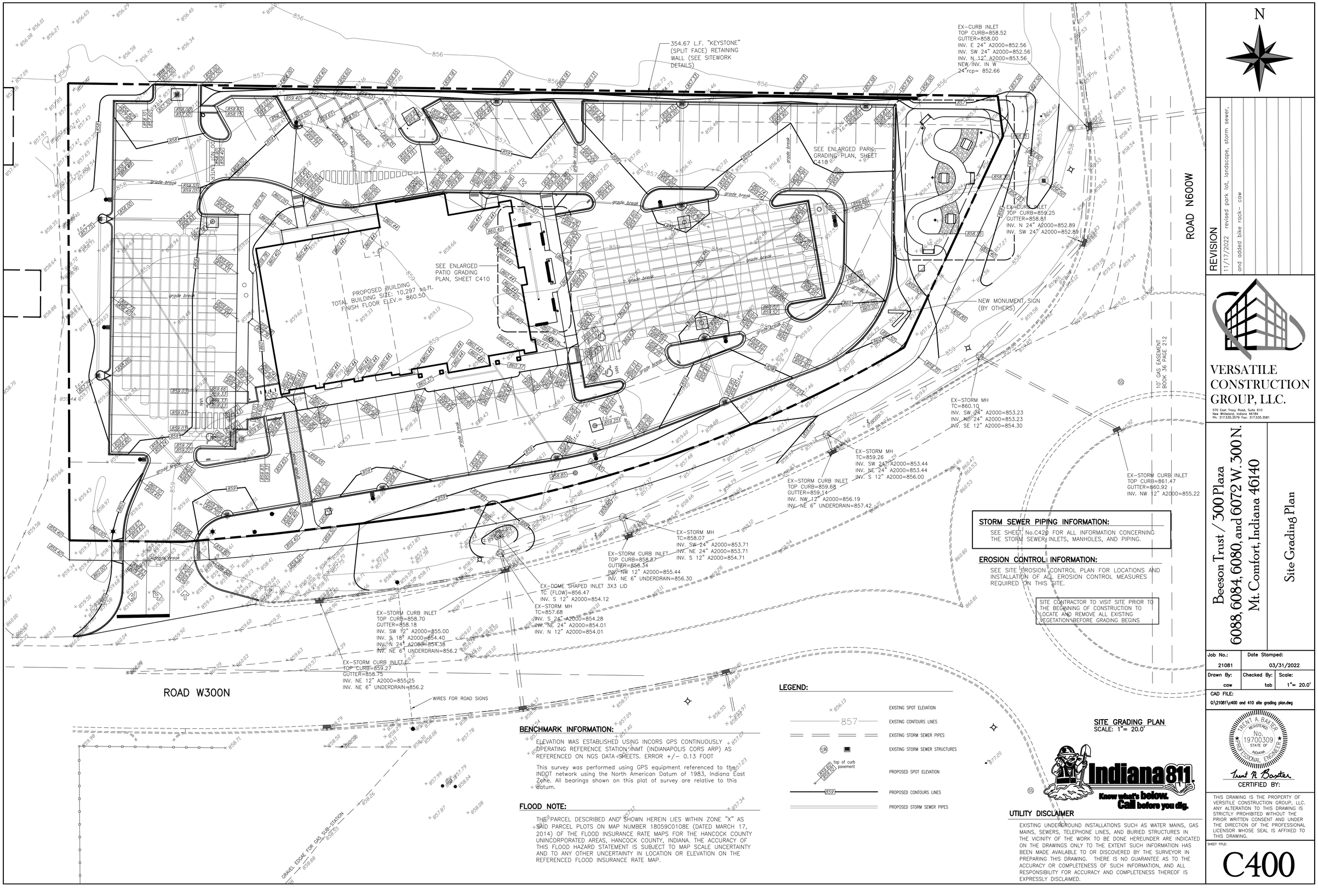
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caw	tab	1"= 20.0'

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TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
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SHEET TITLE:
C315



STORM SEWER PIPING INFORMATION:

SEE SHEET No.C420 FOR ALL INFORMATION CONCERNING THE STORM SEWER, INLETS, MANHOLES, AND PIPING.

EROSION CONTROL INFORMATION:

SEE SITE EROSION CONTROL PLAN FOR LOCATIONS AND INSTALLATION OF ALL EROSION CONTROL MEASURES REQUIRED ON THIS SITE.

SITE CONTRACTOR TO VISIT SITE PRIOR TO THE BEGINNING OF CONSTRUCTION TO LOCATE AND REMOVE ALL EXISTING VEGETATION BEFORE GRADING BEGINS

BENCHMARK INFORMATION:

ELEVATION WAS ESTABLISHED USING INCORS GPS CONTINUOUSLY OPERATING REFERENCE STATION NMT (INDIANAPOLIS CORS ARP) AS REFERENCED ON NGS DATA SHEETS. ERROR +/- 0.13 FOOT

This survey was performed using GPS equipment referenced to the INDOT network using the North American Datum of 1983, Indiana East Zone. All bearings shown on this plat of survey are relative to this datum.

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONE "X" AS SAID PARCEL PLOTS ON MAP NUMBER 18059C0108E (DATED MARCH 17, 2014) OF THE FLOOD INSURANCE RATE MAPS FOR THE HANCOCK COUNTY UNINCORPORATED AREAS, HANCOCK COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

LEGEND:

- EXISTING SPOT ELEVATION
- EXISTING CONTOURS LINES
- EXISTING STORM SEWER PIPES
- EXISTING STORM SEWER STRUCTURES
- PROPOSED SPOT ELEVATION (top of curb / pavement)
- PROPOSED CONTOURS LINES
- PROPOSED STORM SEWER PIPES

SITE GRADING PLAN

SCALE: 1"= 20.0'

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11/17/2022 revised park lot, landscape, storm sewer, and added bike rack- caw

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Site Grading Plan

Job No.:	Date Stamped:	
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Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
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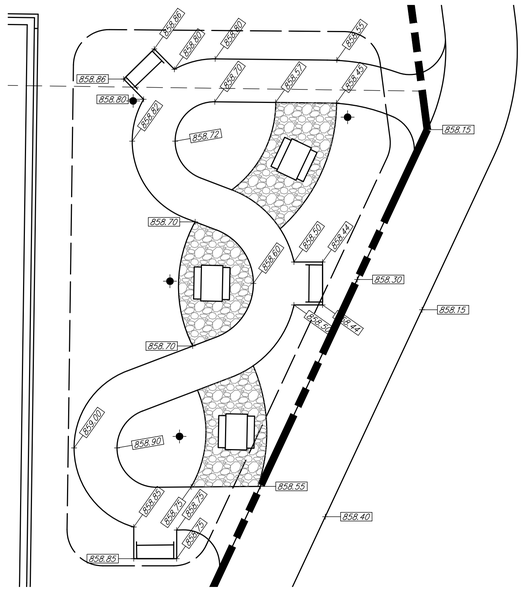
Trent A Baxter

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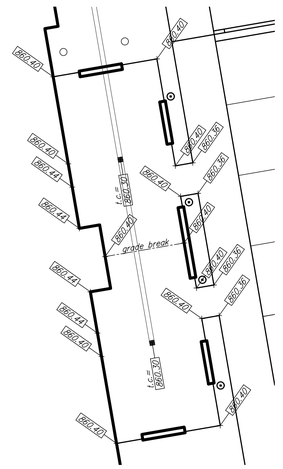
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SHEET TITLE:

C400



ENLARGED PARK GRADING PLAN
SCALE: 1"= 10.0'



ENLARGED PATIO GRADING PLAN
SCALE: 1"= 10.0'

STORM DRAINAGE AND GRADING NOTES

1. ALL NECESSARY PERMITS AND APPROVALS FROM AGENCIES GOVERNING THIS WORK SHALL BE SECURED PRIOR TO BEGINNING CONSTRUCTION.
2. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ALL PROPERTY CORNERS AND REPLACE ALL PINS ELIMINATED OR DAMAGED DURING CONSTRUCTION.
3. ALL PIPES ENTERING STORM SEWER STRUCTURES SHALL BE GROUTED TO ASSURE CONNECTION AT STRUCTURE IS WATER TIGHT.
4. DIMENSIONS SHOWN ARE TO CENTERLINE OF PIPE OF CENTERLINE OF STURCTURE.
5. GRADES SHOWN ARE FINISHED GRADES. FOR BUILDING SUBGRADE ELEVATIONS REFER TO ARCHITECTURAL PLANS.
6. ALL DIMENSIONS OR COORDINATES SHOWN TO BUILDING ARE TO OUTSIDE
7. EXISTING UTILITY LINES SHOWN ARE APPROXIMATE LOCATIONS ONLY. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LINE LOCATIONS PRIOR TO ANY CONSTRUCTION. ANY DEVIATIONS FROM THE DESIGN LOCATIONS SHALL BE REPORTED TO THE OWNER OR ENGINEER
8. THE SITE WORK CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL UNDERGROUND UTILITIES WITH HIS WORK. ALL UNDERGROUND UTILITIES (WATER, SANITARY SEWER, STORM SEWER, ELECTRICAL CONDUIT, IRRIGATION SLEEVES, AND ANY OTHER MISCELLANEOUS), SHALL BE IN-PLACE PRIOR TO THE PLACEMENT OF BASE COURSE
9. ALL FILL AREAS TO BE COMPACTED CLAY ROLLED IN WITH A SHEEPS FOOT ROLLER IN 8" LIFTS AND COMPACTED TO 95% STANDARD PROCTOR. VERIFICATION OF THE COMPACTION SHALL BE DONE BY AN INDEPENDENT SOILS TESTING COMPANY AND ALL TEST RESULTS SUBMITTED TO THE ENGINEER.

STORM SEWER PIPING INFORMATION:

SEE SHEET No.C420 FOR ALL INFORMATION CONCERNING THE STORM SEWER INLETS, MANHOLES, AND PIPING.

EROSION CONTROL INFORMATION:

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Site Grading Plan

Job No.:	Date Stamped:	
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Trent A Baxter
CERTIFIED BY:

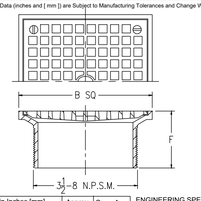
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SHEET TITLE:
C410

Z400S
"TYPE S" SQUARE STRAINER

SPECIFICATION SHEET
TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Strainer Designation	Dimension in Inches [mm] Size BF	Height	Approx. Wt. Lbs. [kg]	Open Area Sq. In. [cm2]
-5S	5 X 5 [127 X 127]	2-1/8 [55]	3 [1]	9 [58]
-6S	6 X 6 [152 X 152]	2-11/32 [60]	4 [2]	13 [84]
-7S	7 X 7 [178 X 178]		5 [2]	21 [135]
-8S	8 X 8 [203 X 203]	2-3/8 [55]	6 [3]	28 [181]
-10S	10 X 10 [254 X 254]		12 [5]	

ENGINEERING SPECIFICATION: ZURN ZN400S
"TYPE S" square adjustable, light-duty strainer top with secured heel-proof grate.
(Specify ZB or ZN finish)

OPTIONS (Check/specify appropriate options)
PREFIXES
____ ZB Polished Bronze Top
____ ZN Polished Nickel Bronze Top*

SUFFIXES
____ -CP Chrome-Plated Bronze Top
____ -HD Heavy Duty Slotted Grate (ZN 6 x 6 [152 x 152] Only with 4 [100] Shank)
____ -OF Oval Funnel (Z329-7) (6,7,8,10 [152, 178, 203, 254] Strainers Only)
____ -PC Protective Cover
____ -V Backwater Valve
____ -VP Vandal-Proof Secured Top
____ -Y Sediment Bucket
____ -4 4 [102] Diameter Funnel (Z328)

* Regularly furnished unless otherwise specified.

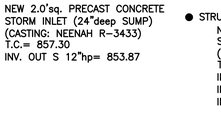
Zurn Industries, LLC | Specification Drainage Operation
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-8876, Fax 814-454-7929
In Canada | Zurn Industries Limited
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

Rev. L
Date: 09/26/2017
C.N. No. 137853
Prod. | Dwg. No. Z400S

Z415S
BODY ASSEMBLY W/ "TYPE S" STRAINER

SPECIFICATION SHEET
TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



A Pipe Size	B x B" KK" Strainer Top Size	Dimensions In Inches [mm] Min.	Max.	Min.	Max.	Approx. Wt. Lbs. [kg]	Strainer Open Area Sq. In. [cm2]
2, 3, [51, 76]	5 x 5 [127 x 127]	1 [25]	1-19/32 [40]	1-1/4 [32]	2-3/8 [60]	12 [5]	9 [58]
2, 3, 4 [51, 76, 102]	6 x 6 [152 x 152]	1 [25]	1-27/32 [47]	1-13/32 [36]	2-19/32 [66]	13 [6]	13 [84]
2, 3, 4 [51, 76, 102]	7 x 7 [178 x 178]	1 [25]		1-7/8 [48]	11 3/8 [35]	2-5/8 [67]	14 [6] 21 [135]
3, 4 [76, 102]	8 x 8 [203 x 203]	1-3/32 [28]	1-7/8 [48]	1-3/4 [44]	2-5/8 [67]	15 [7]	28 [181]
6 [152]	10 x 10 [254 x 254]	1-3/32 [28]	1-7/8 [48]	1-3/4 [44]	2-5/8 [67]	21 [10]	28 [181]

ENGINEERING SPECIFICATION: ZURN ZN415S
Floor and shower drain, Dura-Coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and "TYPE S" polished nickel bronze, square heel-proof, light-duty strainer.

OPTIONS (Check/specify appropriate options)

PIPE SIZE
2, 3, 4 [51, 76, 102]
2, 3, 4 [51, 76, 102]
2 [51]
3 [76]
4 [102]
6 [152]
2, 3, 4 [51, 76, 102]
2, 3, 4 [51, 76, 102]

(Specify size/type) OUTLET
____ TC Inside Caulk
____ IC Inside Gasket
____ IP Threaded [70]
____ IP Threaded
____ IP Threaded [73]
____ IP Threaded
____ NH No-Hub
____ NL Neo-Loc [98]

'E' BODY HT. DIM.
4-3/16 [106]
4-3/16 [106]
2-7/16 [62]
2-3/4
2-13/16 [71]
2-7/8
3-13/16 [97]
3-7/8

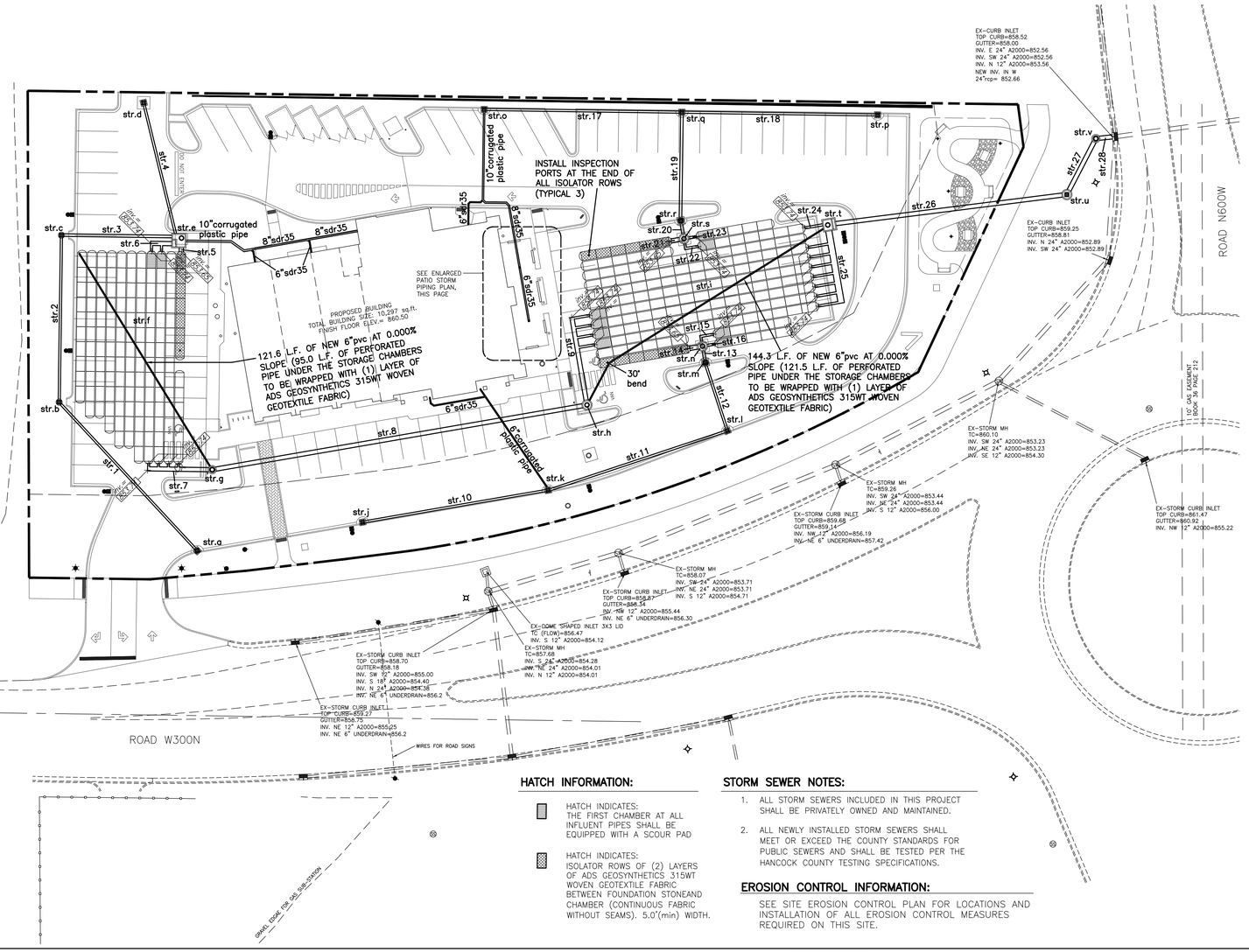
PREFIXES
____ ZB D.C.C.I. Body Assembly w/ Polished Bronze Top
____ ZN D.C.C.I. Body Assembly w/ Polished Nickel Bronze Top*

SUFFIXES
____ -AR Acid Resisting Epoxy Coated Cast Iron
____ -CP Chrome-Plated Top
____ -G Galvanized Cast Iron
____ -HD Heavy-Duty Grate (ZN 6 x 6 [152 x 152] Only)
____ -OF Oval Funnel (See Z329-7)
(6,7,8,10 [152,178,203,254]) Strainers only)
____ -P Trap Primer Connection (Specify 1/2 [13] or 3/4 [19])
____ -PC Protective Cover
____ -SA Stabilizer Assembly (See Z1035)
____ -SQ Stabilizer Q-Deck (See Z1035-Q)
____ -TC Neo-Loc Test Cap Gasket (2,3,4 [51,76,102] NL Outlet Only)
____ -U 1-3 [25-76] High Extension Adapter
____ -V Backwater Valve
____ -VP Vandal-Proof Secured Top
____ -Y Sediment Bucket
____ -4 4 [102] Diameter Funnel (Z328)
____ -90 90° Threaded Side Outlet Body Assembly (2,3 [51,76] Only)

* Regularly furnished unless otherwise specified.

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www.zurn.com

Rev. T
Date: 09/26/2017
C.N. No. 137871
Prod. | Dwg. No. Z415S



ENLARGED PATIO STORM PIPING PLAN
SCALE: 1"= 10.0'

HATCH INFORMATION:

HATCH INDICATES:
THE FIRST CHAMBER AT ALL INFLUENT PIPES SHALL BE EQUIPPED WITH A SCOUR PAD

HATCH INDICATES:
ISOLATOR ROWS OF (2) LAYERS OF ADS GEOSYNTHETICS 315WT WOVEN GEOTEXTILE FABRIC BETWEEN FOUNDATION STONEAND CHAMBER (CONTINUOUS FABRIC WITHOUT SEAMS). 5.0'(min) WIDTH.

STORM SEWER NOTES:

1. ALL STORM SEWERS INCLUDED IN THIS PROJECT SHALL BE PRIVATELY OWNED AND MAINTAINED.
2. ALL NEWLY INSTALLED STORM SEWERS SHALL MEET OR EXCEED THE COUNTY STANDARDS FOR PUBLIC SEWERS AND SHALL BE TESTED PER THE HANCOCK COUNTY TESTING SPECIFICATIONS.

EROSION CONTROL INFORMATION:

SEE SITE EROSION CONTROL PLAN FOR LOCATIONS AND INSTALLATION OF ALL EROSION CONTROL MEASURES REQUIRED ON THIS SITE.

SITE INFRASTRUCTURE SUMMARY INFORMATION:

INLET/MANHOLE STRUCTURE

- STRUCTURE a
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.70
  INV. OUT NW 12"hp= 854.64
- STRUCTURE b
  NEW 2.0'dia. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-2560-E1 WITH NEENAH R-1733 FRAME)
  T.C.= 857.75
  INV. IN SE 12"hp= 854.33
  INV. OUT N 12"hp= 854.23
- STRUCTURE c
  NEW 2.0'dia. PRECAST CONCRETE STORM INLET (24"deep SUMP)
  (CASTING: NEENAH R-2560-E1 WITH NEENAH R-1733 FRAME)
  T.C.= 857.75
  INV. IN S 12"hp= 853.98
  INV. OUT E 12"hp= 853.88
- STRUCTURE d
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET (24"deep SUMP)
  (CASTING: NEENAH R-3433)
  T.C.= 857.30
  INV. OUT S 12"hp= 853.87
- STRUCTURE e
  NEW 6.0'sq. PRECAST CONCRETE STORM STRICTURE WITH 6"wide WEIR WALL ELEV.= 854.15
  (CASTING: NEENAH R-1733)
  T.C.= 859.18
  INV. IN W 12"hp= 853.66
  INV. IN N 12"hp= 853.66
  INV. IN E 10"corrugated plastic= 853.66
  INV. OUT S 24"hp= 853.66
  INV. OUT W 18"hp= 853.75
- STRUCTURE No.f
  (139) NEW "SC-740" 'STORMTECH' STORAGE CHAMBERS ARRANGED PER PLAN
  (1) INV. IN N 24"hp INFLUENT PIPES INV.= 853.65 (ISOLATOR ROW)
  (3) INV. IN N 12"hp INFLUENT PIPES INV.= 853.74
  (4) INV. OUT S 12"hp EFFLUENT PIPES INV.= 853.74
  BOTTOM OF TANK / TOP OF 6" STONE BASE= 853.64
- STRUCTURE g
  NEW 3.0'dia. PRECAST CONCRETE STORM MANHOLE
  (CASTING: NEENAH R-1733)
  T.C.= 859.90
  INV. IN NW 6"pvc= 853.14
  INV. IN W 24"hp= 853.74
  INV. OUT E 24"hp= 853.14
- STRUCTURE h
  NEW 4.0'dia. PRECAST CONCRETE STORM MANHOLE
  (CASTING: NEENAH R-1733)
  T.C.= 859.90
  INV. IN W 24"hp= 853.14
  INV. OUT NE 6"pvc= 853.14
  INV. OUT N 24"hp= 853.74
- STRUCTURE No.i
  (166) NEW "SC-740" 'STORMTECH' STORAGE CHAMBERS ARRANGED PER PLAN
  (4) INV. IN W 12"hp INFLUENT PIPES INV.= 853.74
  (2) INV. IN E 24"hp INFLUENT PIPES INV.= 853.65
  (4) INV. IN W 12"hp INFLUENT PIPES INV.= 853.74
  (8) INV. OUT W 12"hp EFFLUENT PIPES INV.= 853.74
  BOTTOM OF TANK / TOP OF 6" STONE BASE= 853.64
- STRUCTURE j
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.75
  INV. OUT NE 12"hp= 854.53
- STRUCTURE k
  NEW 2.0'dia. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.75
  INV. IN N 6"corrugated plastic= 854.25
  INV. IN SE 12"hp= 854.25
  INV. OUT NW 12"hp= 854.15
- STRUCTURE l
  NEW 2.0'dia. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.45
  INV. IN SE 12"hp= 853.87
  INV. OUT N 12"hp= 853.77
- STRUCTURE m
  NEW 2.0'dia. PRECAST CONCRETE STORM INLET (24"deep SUMP)
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.75
  INV. IN S 12"hp= 853.66
  INV. OUT N 12"hp= 853.66
- STRUCTURE n
  NEW 4.0'dia. PRECAST CONCRETE STORM STRICTURE WITH 6"wide WEIR WALL ELEV.= 854.15
  (CASTING: NEENAH R-1733)
  T.C.= 858.89
  INV. IN S 15"hp= 853.65
  INV. OUT W 24"hp= 853.65
  INV. OUT E 12"hp= 853.75
  INV. OUT N 12"hp= 853.75
- STRUCTURE o
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.40
  INV. IN S 10"corrugated plastic= 854.62
  INV. OUT E 12"hp= 854.29
- STRUCTURE p
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.25
  INV. OUT W 12"hp= 854.29
- STRUCTURE q
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.00
  INV. IN W 12"hp= 854.00
  INV. IN E 12"hp= 854.00
  INV. OUT E 15"hp= 853.75
- STRUCTURE r
  NEW 2.0'sq. PRECAST CONCRETE STORM INLET (24"deep SUMP)
  (CASTING: NEENAH R-3234-B1)
  T.C.= 858.75
  INV. IN W 15"hp= 853.66
  INV. OUT E 15"hp= 853.66
- STRUCTURE s
  NEW 4.0'dia. PRECAST CONCRETE STORM STRICTURE WITH 6"wide WEIR WALL ELEV.= 854.15
  (CASTING: NEENAH R-1733)
  T.C.= 858.89
  INV. IN N 15"hp= 853.65
  INV. OUT W 24"hp= 853.65
  INV. OUT E 12"hp= 853.75
  INV. OUT S 12"hp= 853.75
- STRUCTURE t
  NEW 5.5'x 5.0' PRECAST CONCRETE STORM STRICTURE WITH 6"wide WEIR WALL ELEV.= 856.69 WITH (1) 4"dia. OPENING INV. ELEV.= 853.14
  (CASTING: NEENAH R-1733)
  T.C.= 860.35
  INV. IN W 6"pvc= 853.14
  INV. IN W 12"hp= 853.74
  INV. IN S 36"hp= 853.74
  INV. OUT E 24"rcp= 853.14
- STRUCTURE u
  NEW 4.0'dia. PRECAST CONCRETE STORM MANHOLE
  (CASTING: NEENAH R-2560-E1 WITH NEENAH R-1733 FRAME)
  T.C.= 856.50
  INV. IN W 24"rcp= 852.93
  INV. OUT NE 24"rcp= 852.83
- STRUCTURE v
  NEW 4.0'dia. PRECAST CONCRETE STORM MANHOLE
  (CASTING: NEENAH R-1733)
  T.C.= 858.60
  INV. IN SW 24"rcp= 852.78
  INV. OUT E 24"rcp= 852.68

PIPE STRUCTURES

- NEW STRUCTURE 1
  97.21 L.F. OF NEW 12"hp AT 0.316% SLOPE
- NEW STRUCTURE 2
  80.00 L.F. OF NEW 12"hp AT 0.312% SLOPE
- NEW STRUCTURE 3
  53.28 L.F. OF NEW 12"hp AT 0.601% SLOPE
- NEW STRUCTURE 4
  64.86 L.F. OF NEW 12"hp AT 0.323% SLOPE
- NEW STRUCTURE 5
  2.75 L.F. OF NEW 24"hp AT 0.354% SLOPE
- NEW STRUCTURE 6
  10.00 L.F. OF NEW 18"hp AT 0.100% SLOPE WITH (2) 12"hp SOUTH INTO STORAGE CHAMBERS (SEE ABOVE FOR INVERTS)
- NEW STRUCTURE 7
  30.96 L.F. OF NEW 24"hp AT 0.000% SLOPE WITH (4) 12"hp NORTH OUT OF STORAGE CHAMBERS (SEE ABOVE FOR INVERTS)
- NEW STRUCTURE 8
  182.20 L.F. OF NEW 24"hp AT 0.000% SLOPE
- NEW STRUCTURE 9
  42.60 L.F. OF NEW 24"hp AT 0.000% SLOPE WITH (4) 12"hp EAST INTO STORAGE CHAMBERS (SEE ABOVE FOR INVERTS)
- NEW STRUCTURE 10
  90.18 L.F. OF NEW 12"hp AT 0.311% SLOPE
- NEW STRUCTURE 11
  90.56 L.F. OF NEW 12"hp AT 0.309% SLOPE
- NEW STRUCTURE 12
  34.31 L.F. OF NEW 12"hp AT 0.321% SLOPE
- NEW STRUCTURE 13
  8.00 L.F. OF NEW 15"hp AT 0.125% SLOPE
- NEW STRUCTURE 14
  6.10 L.F. OF NEW 24"hp AT 0.000% SLOPE
- NEW STRUCTURE 15
  10.84 L.F. OF NEW 12"hp AT 0.092% SLOPE
- NEW STRUCTURE 16
  6.10 L.F. OF NEW 12"hp AT 0.164% SLOPE
- NEW STRUCTURE 17
  94.74 L.F. OF NEW 12"hp AT 0.306% SLOPE
- NEW STRUCTURE 18
  93.71 L.F. OF NEW 12"hp AT 0.309% SLOPE
- NEW STRUCTURE 19
  51.88 L.F. OF NEW 15"hp AT 0.174% SLOPE
- NEW STRUCTURE 20
  8.00 L.F. OF NEW 15"hp AT 0.125% SLOPE
- NEW STRUCTURE 21
  6.10 L.F. OF NEW 24"hp AT 0.000% SLOPE
- NEW STRUCTURE 22
  10.84 L.F. OF NEW 12"hp AT 0.092% SLOPE
- NEW STRUCTURE 23
  6.10 L.F. OF NEW 12"hp AT 0.164% SLOPE
- NEW STRUCTURE 24
  10.00 L.F. OF NEW 12"hp AT 0.000% SLOPE
- NEW STRUCTURE 25
  36.00 L.F. OF NEW 36"hp AT 0.000% SLOPE WITH (7) 12"hp WEST OUT OF STORAGE CHAMBERS (SEE ABOVE FOR INVERTS)
- NEW STRUCTURE 26
  111.95 L.F. OF NEW 24"rcp AT 0.187% SLOPE
- NEW STRUCTURE 27
  30.21 L.F. OF NEW 24"rcp AT 0.180% SLOPE
- NEW STRUCTURE 28
  8.85 L.F. OF NEW 24"rcp AT 0.180% SLOPE

SITE STORM SEWER PIPING PLAN
SCALE: 1"= 30.0'

Indiana 811
Know what's below. Call before you dig.

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N

REVISION

07/08/2022	revised pipe material for str. 26, 27, and 28
07/14/2022	revised sanitary sewer notes
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack– caw
03/14/2023	revised storm sewer piping from rcp to hp pipe
03/29/2023	revised storm pipes 26,27,28 from to rcp pipe

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Treoy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Storm Sewer Piping Plan

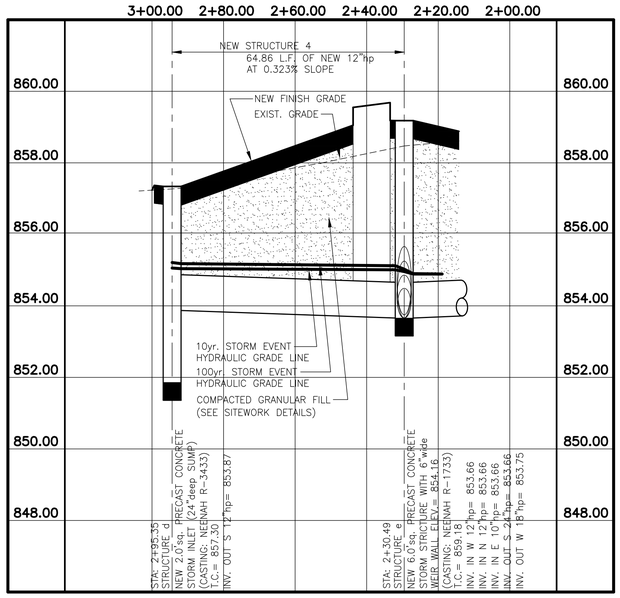
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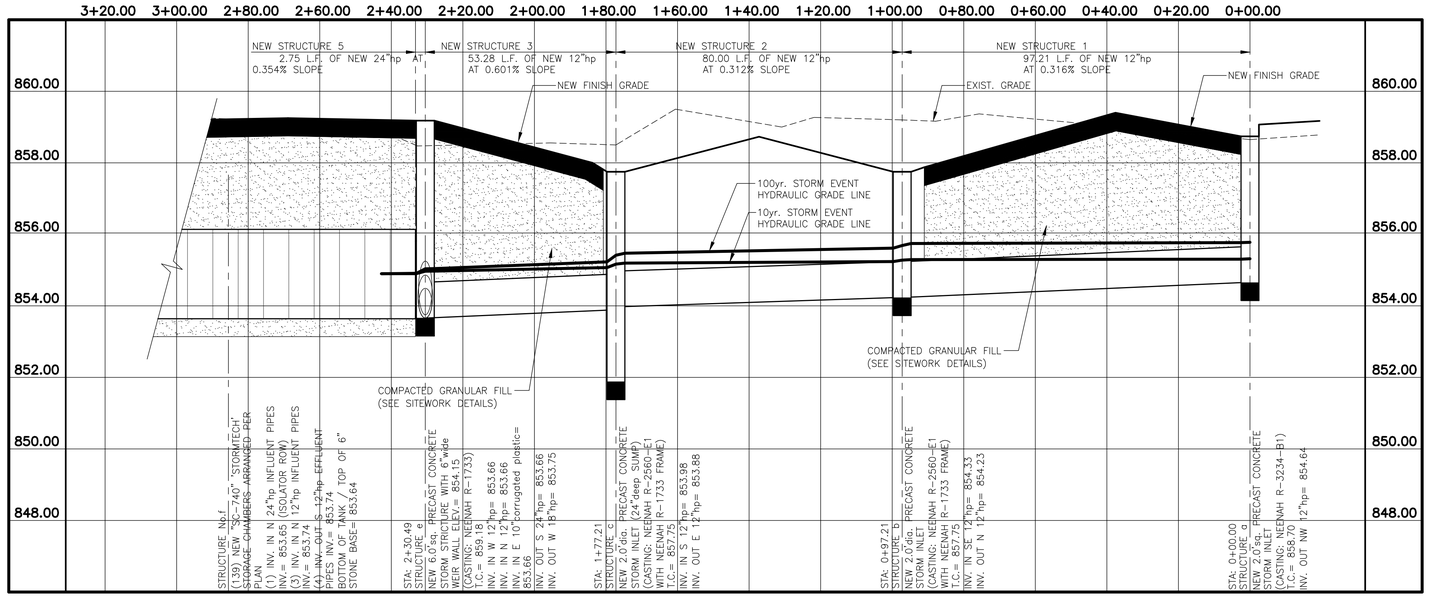
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IRENT A. BAXTER
REGISTERED
No. 19700309
STATE OF INDIANA
PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

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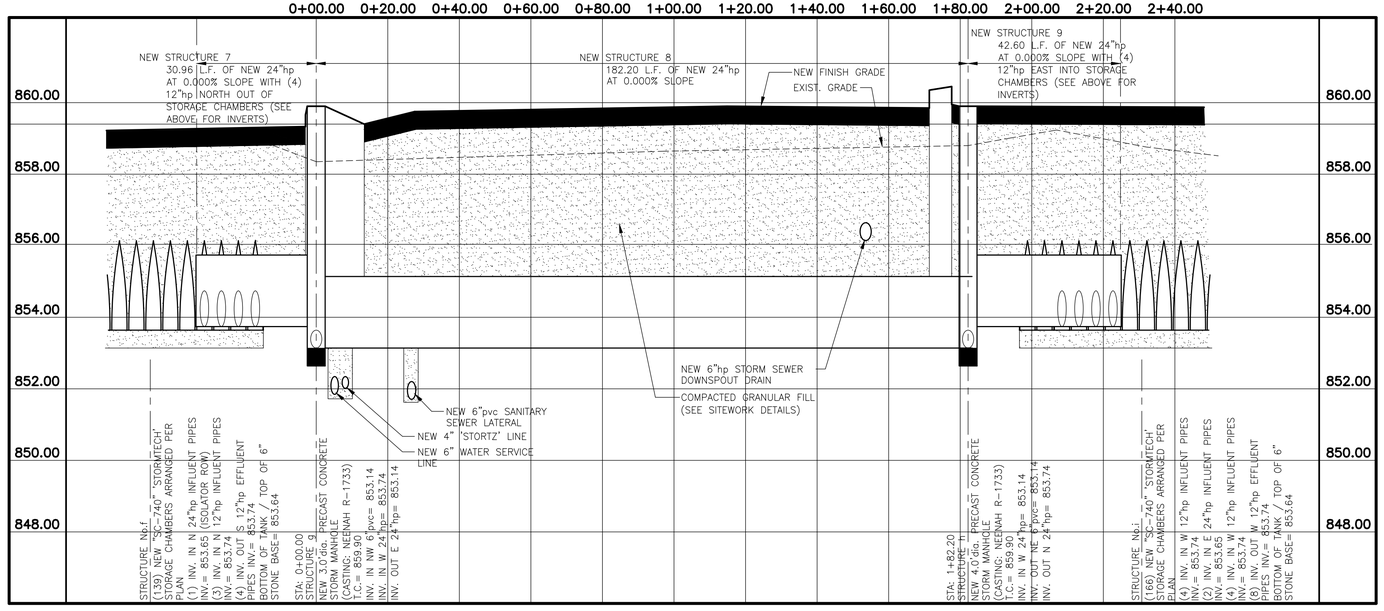
SHEET TITLE:
C420





NORTHWEST STORM SEWER PROFILE
STRUCTURE No.d thru e
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)

SOUTHWEST STORM SEWER PROFILE
STRUCTURE No.a thru e and f
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)



SOUTHERN STORM SEWER STORAGE
CONNECTION PROFILE STRUCTURE No.f thru i
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)

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REVISION

11/17/2022	revised park lot, landscape, storm sewer, and added bike rack– caw
03/14/2023	revised storm sewer piping from rcp to hp pipe
03/29/2023	added hgl

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New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Storm Sewer Profiles Plan

Job No.:	Date Stamped:
21081	03/31/2022
Drawn By: caw	Checked By: tab
	Scale: 1"= 20.0'

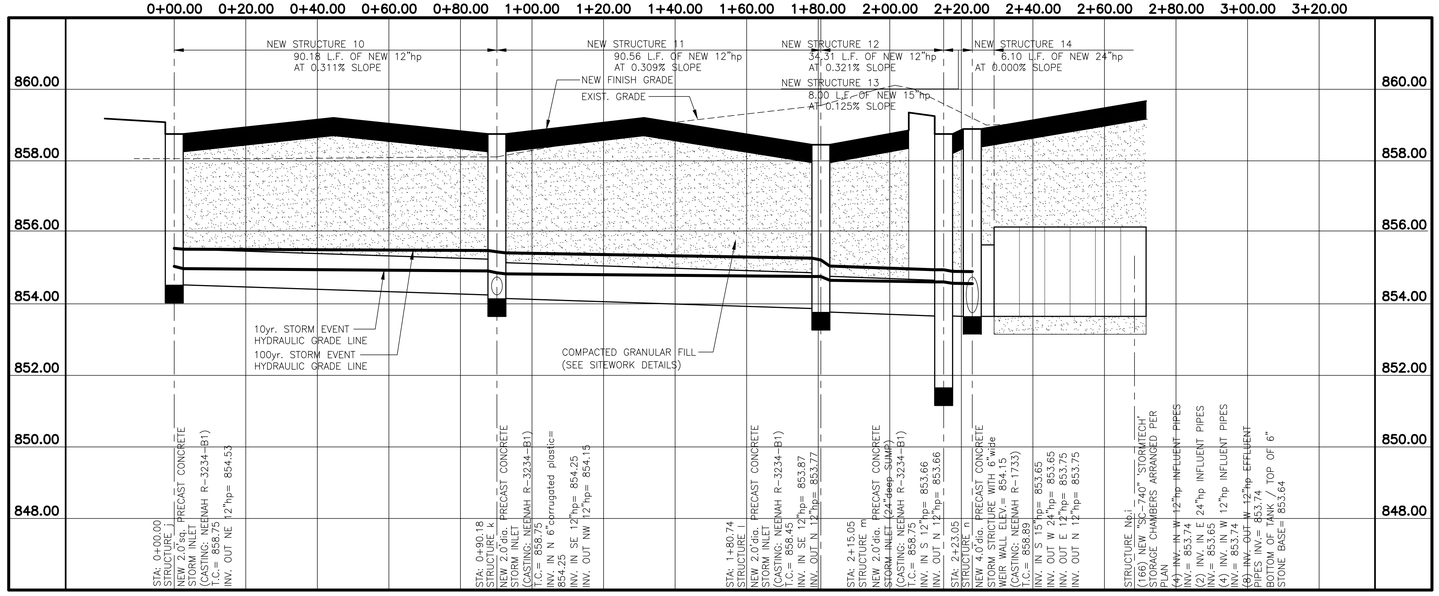
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TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

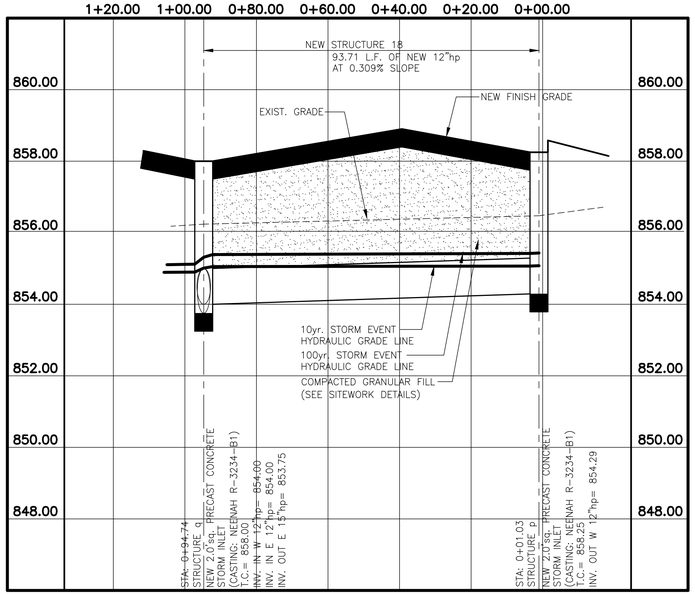
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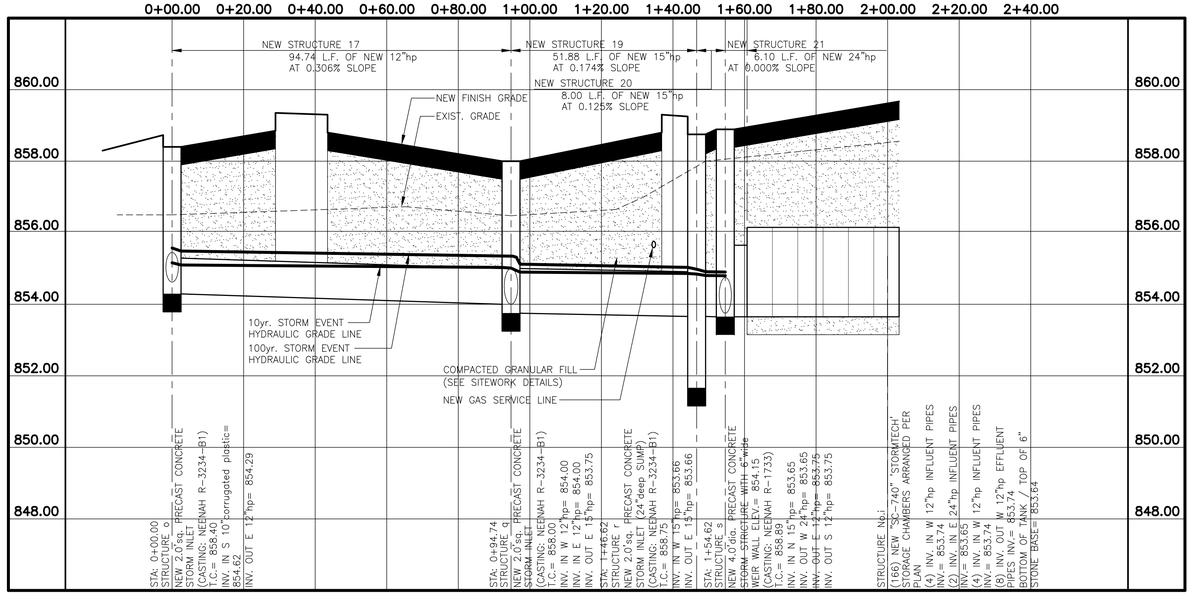
C430



SOUTH STORM SEWER PROFILE
STRUCTURE No.j thru n and i
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)



SOUTH STORM SEWER PROFILE
STRUCTURE No.p and q
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)



SOUTH STORM SEWER PROFILE
STRUCTURE No.o and q thru s AND i
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)

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REVISION

11/17/2022	revised park lot, landscape, storm sewer, and added bike rack– caw
03/14/2023	revised storm sewer piping from rcp to hp pipe
03/29/2023	added hgl

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Ph: 317.535.3579 Fax: 317.535.3581

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6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Storm Sewer Profiles Plan

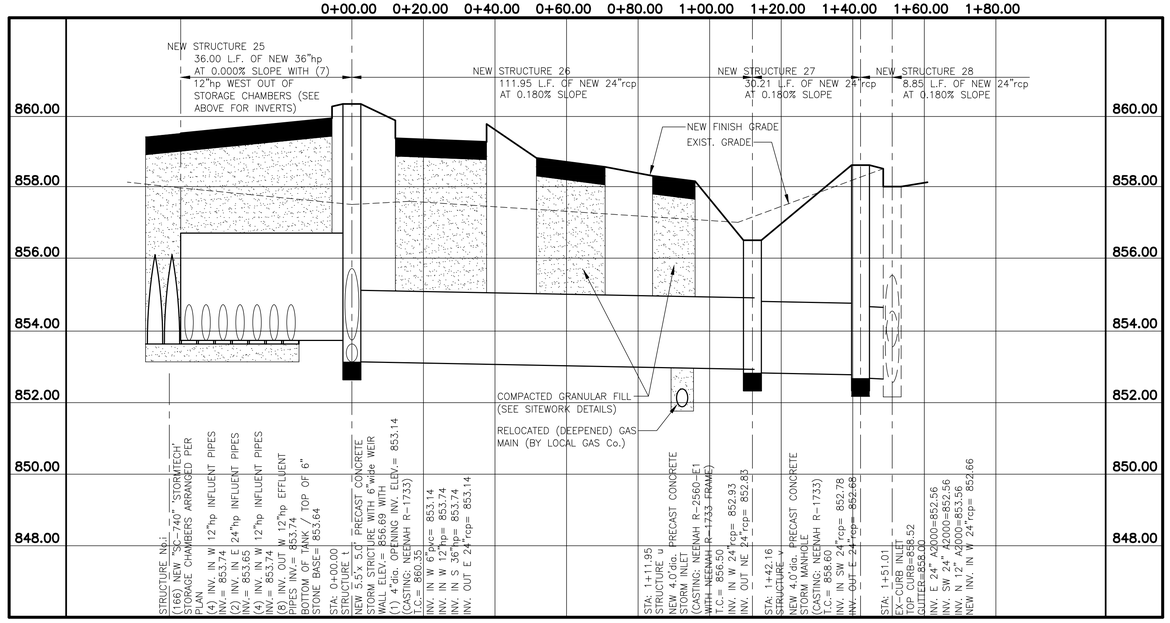
Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
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Trent A Baxter
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C440



SOUTHWEST STORM SEWER PROFILE
STRUCTURE No.t thru v
SCALE: 1"= 20.0' (HORIZ.)
SCALE: 1"= 2.0' (VERTICAL)

REVISION

07/08/2022	revised pipe material for str. 26, 27, and 28
11/17/2022	revised park lot, landscape, storm sewer, and added bike rack- caw
03/14/2023	revised storm sewer piping from hp to hp pipe
03/29/2023	revised storm pipes 26,27,28 from to rcp pipe

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New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

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Storm Sewer Profiles Plan

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21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
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Trent A Baxter
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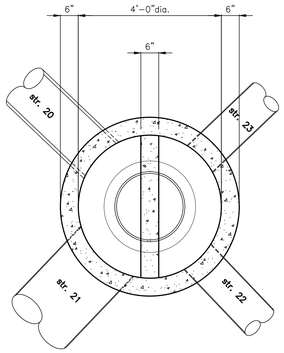
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C450

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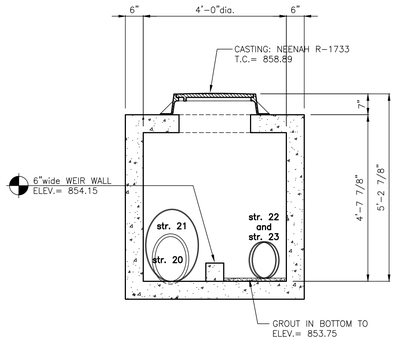
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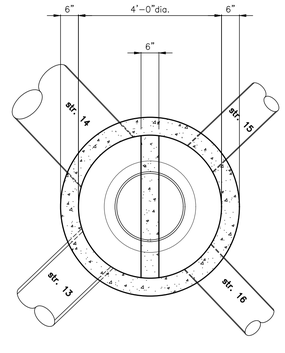


● STRUCTURE s
NEW 4.0'dia. PRECAST CONCRETE
STORM STRICTURE WITH 6"wide WEIR WALL
ELEV.= 854.15
(CASTING: NEENAH R-1733)
T.C.= 858.89
INV. IN N 15"hp= 853.65
INV. OUT W 24"hp= 853.65
INV. OUT E 12"hp= 853.75
INV. OUT S 12"hp= 853.75

STRUCTURE s (PLAN VIEW)
SCALE: 1/2"= 1'-0"

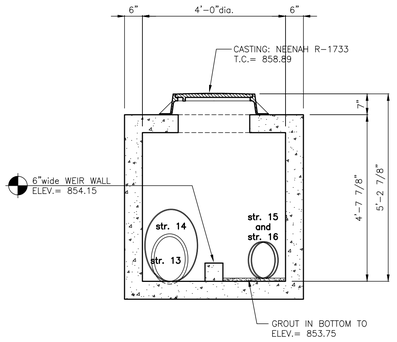


STRUCTURE s (SECTION VIEW)
SCALE: 1/2"= 1'-0"

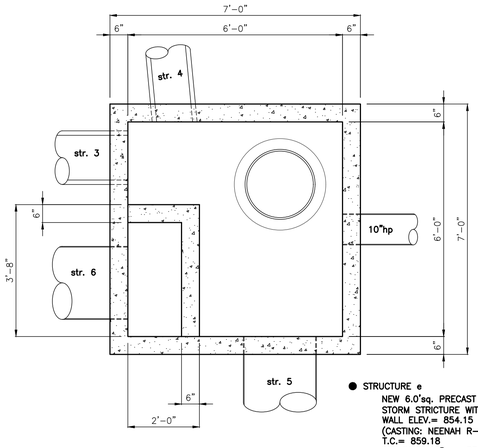


● STRUCTURE n
NEW 4.0'dia. PRECAST CONCRETE
STORM STRICTURE WITH 6"wide WEIR WALL
ELEV.= 854.15
(CASTING: NEENAH R-1733)
T.C.= 858.89
INV. IN S 15"hp= 853.65
INV. OUT W 24"hp= 853.65
INV. OUT E 12"hp= 853.75
INV. OUT N 12"hp= 853.75

STRUCTURE n (PLAN VIEW)
SCALE: 1/2"= 1'-0"

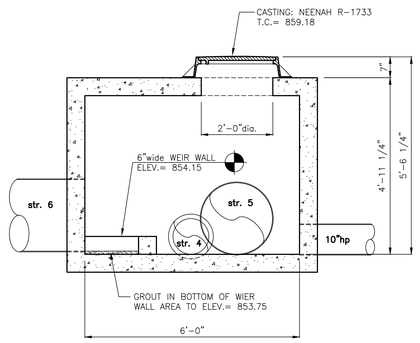


STRUCTURE n (SECTION VIEW)
SCALE: 1/2"= 1'-0"

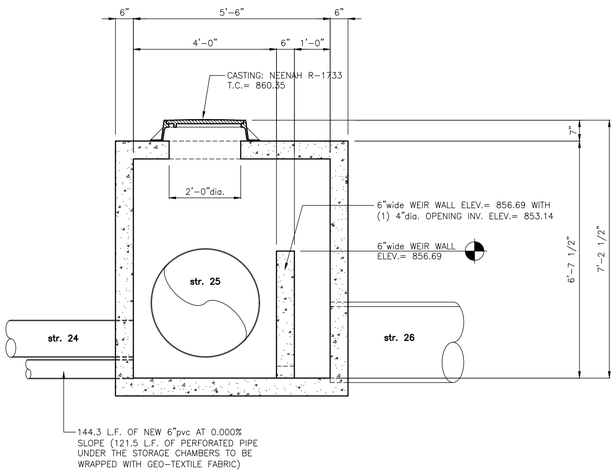


● STRUCTURE e
NEW 6.0'sq. PRECAST CONCRETE
STORM STRICTURE WITH 6"wide WEIR
WALL ELEV.= 854.15
(CASTING: NEENAH R-1733)
T.C.= 859.18
INV. IN W 12"hp= 853.66
INV. IN N 12"hp= 853.66
INV. IN E 10"corrugated plastic=
853.66
INV. OUT S 24"hp= 853.66
INV. OUT W 18"hp= 853.75

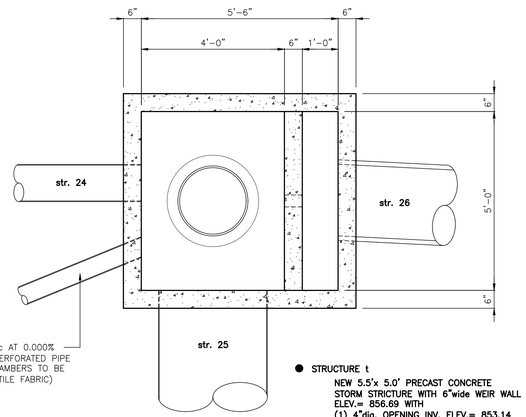
STRUCTURE e (PLAN VIEW)
SCALE: 1/2"= 1'-0"



STRUCTURE e (SECTION VIEW)
SCALE: 1/2"= 1'-0"



STRUCTURE t (SECTION VIEW)
SCALE: 1/2"= 1'-0"



● STRUCTURE t
NEW 5.5'x 5.0' PRECAST CONCRETE
STORM STRICTURE WITH 6"wide WEIR WALL
ELEV.= 856.69 WITH
(1) 4"dia. OPENING INV. ELEV.= 853.14
(CASTING: NEENAH R-1733)
T.C.= 860.35
INV. IN W 6"pvc= 853.14
INV. IN W 12"hp= 853.74
INV. IN S 36"hp= 853.74
INV. OUT E 24"hp= 853.14

STRUCTURE t (PLAN VIEW)
SCALE: 1/2"= 1'-0"

REVISION
11/17/2022 revised park lot, landscape, storm sewer, and added bike rack-- caw
03/14/2023 revised storm sewer piping from rcp to hp pipe

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Treey Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Storm Sewer Control Structure Details

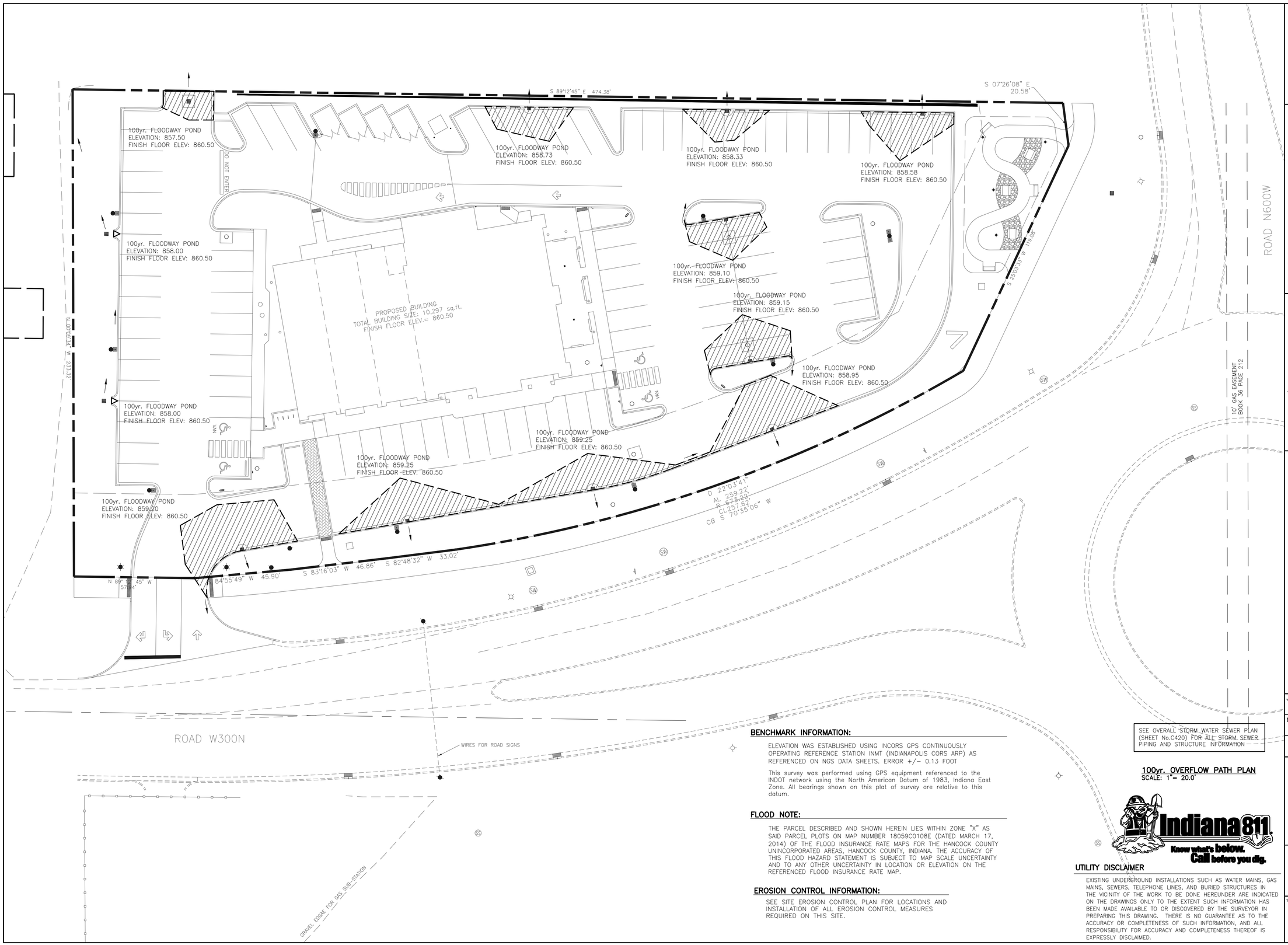
Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	as noted

CAD FILE:
G:\21081\c460 control structure plan.dwg

BRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
CERTIFIED BY:

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SHEET TITLE:
C460



SEE OVERALL STORM WATER SEWER PLAN (SHEET No.C420) FOR ALL STORM SEWER PIPING AND STRUCTURE INFORMATION

100yr. OVERFLOW PATH PLAN
SCALE: 1"= 20.0'

BENCHMARK INFORMATION:

ELEVATION WAS ESTABLISHED USING INCORS GPS CONTINUOUSLY OPERATING REFERENCE STATION INMT (INDIANAPOLIS CORS ARP) AS REFERENCED ON NGS DATA SHEETS. ERROR +/- 0.13 FOOT

This survey was performed using GPS equipment referenced to the INDOT network using the North American Datum of 1983, Indiana East Zone. All bearings shown on this plat of survey are relative to this datum.

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONE "X" AS SAID PARCEL PLOTS ON MAP NUMBER 18059C0108E (DATED MARCH 17, 2014) OF THE FLOOD INSURANCE RATE MAPS FOR THE HANCOCK COUNTY UNINCORPORATED AREAS, HANCOCK COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

EROSION CONTROL INFORMATION:

SEE SITE EROSION CONTROL PLAN FOR LOCATIONS AND INSTALLATION OF ALL EROSION CONTROL MEASURES REQUIRED ON THIS SITE.

Indiana811 Know what's below. Call before you dig.

UTILITY DISCLAIMER

EXISTING UNDERGROUND INSTALLATIONS SUCH AS WATER MAINS, GAS MAINS, SEWERS, TELEPHONE LINES, AND BURIED STRUCTURES IN THE VICINITY OF THE WORK TO BE DONE HEREUNDER ARE INDICATED ON THE DRAWINGS ONLY TO THE EXTENT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE SURVEYOR IN PREPARING THIS DRAWING. THERE IS NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION, AND ALL RESPONSIBILITY FOR ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED.

N

REVISION
11/17/2022 revised park. lot, landscape, storm sewer, and added bike rack– caw

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

100yr. Overflow Path Plan

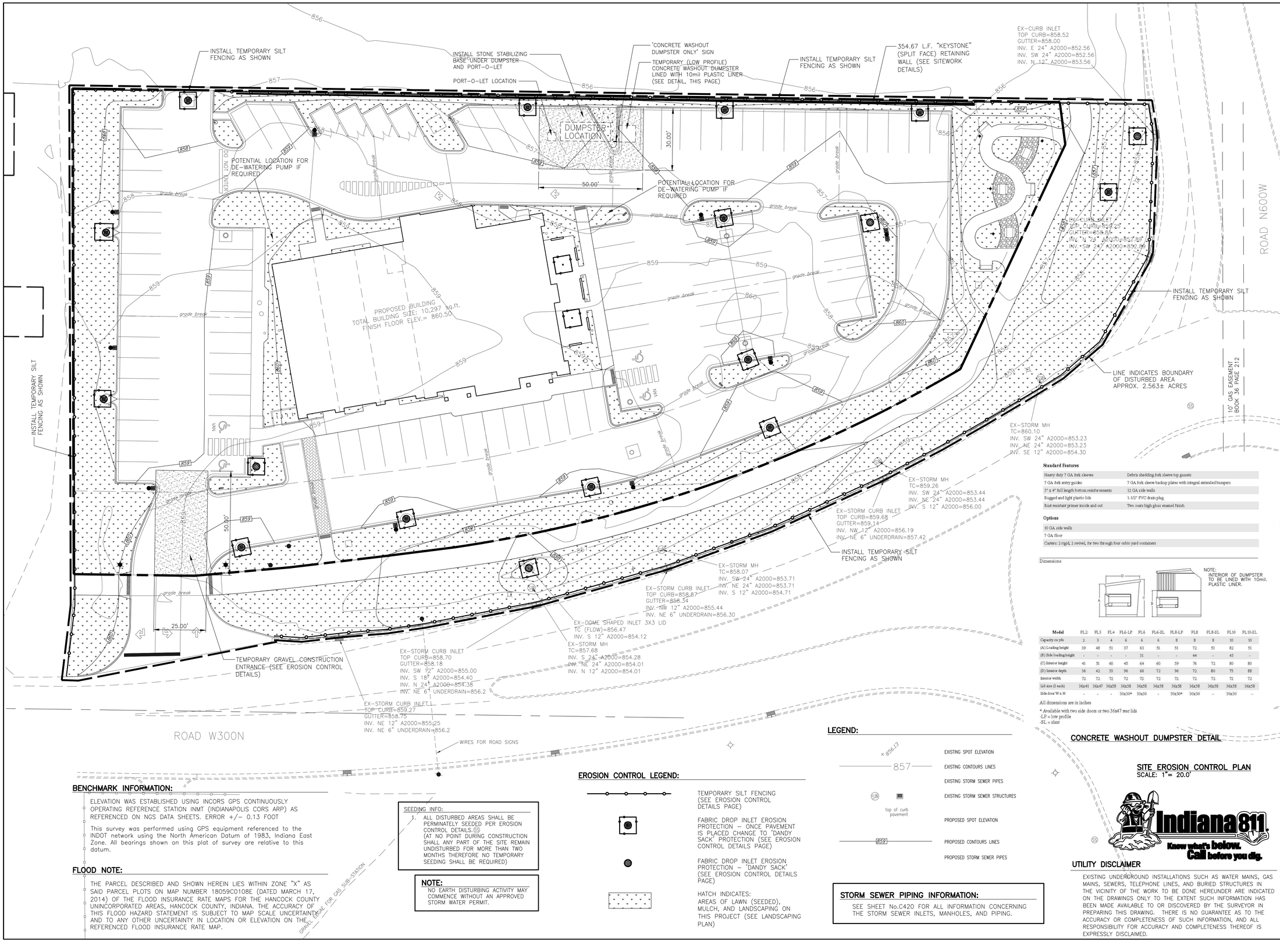
Job No.:	Date Stamped:	
21081	03/21/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
G:\21081\c470 100yr overflow path plan.dwg

TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

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SHEET TITLE:
C470



Standard Features

Heavy duty 7 GA fork sleeves	Debris shedding fork sleeve top gussets
7 GA fork entry guides	7 GA fork sleeve backup plates with integral extended bumpers
3" x 4" full length bottom reinforcements	12 GA side walls
Rugged and light plastic lids	1-1/2" PVC drain plug
Rust resistant primer inside and out	Two coats high gloss enamel finish

Options

10 GA side walls
7 GA floor
Casters: 2 rigid, 2 swivel, for two through four cubic yard containers

Dimensions

NOTE:
INTERIOR OF DUMPSTER TO BE LINED WITH 10mil. PLASTIC LINER.

Model	FL2	FL3	FL4	FL6-LP	FL6	FL6-SL	FL8-LP	FL8	FL8-SL	FL10	FL10-SL
Capacity cu yds	2	3	4	6	6	6	8	8	8	10	10
(A) Loading height	39	48	51	37	63	51	51	72	51	82	51
(B) Side loading height	-	-	-	-	31	-	-	44	-	45	-
(C) Interior height	41	51	60	45	64	60	59	76	72	80	80
(D) Interior depth	36	42	53	96	66	72	96	72	80	75	88
Interior width	72	72	72	72	72	72	72	72	72	72	72
Lid size (2 each)	36x41	36x47	36x58	36x58	36x58	36x58	36x58	36x58	36x58	36x58	36x58
Side door W x H	-	-	-	30x30*	30x30	-	30x30*	30x30	-	30x30	-

All dimensions are in inches

* Available with two side doors or two 36x47 rear lids
-LP = low profile
-SL = slant

CONCRETE WASHOUT DUMPSTER DETAIL

SITE EROSION CONTROL PLAN
SCALE: 1"= 20.0'

BENCHMARK INFORMATION:

ELEVATION WAS ESTABLISHED USING INCORS GPS CONTINUOUSLY OPERATING REFERENCE STATION INMT (INDIANAPOLIS CORS ARP) AS REFERENCED ON NGS DATA SHEETS. ERROR +/- 0.13 FOOT

This survey was performed using GPS equipment referenced to the INDOT network using the North American Datum of 1983, Indiana East Zone. All bearings shown on this plat of survey are relative to this datum.

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONE "X" AS SAID PARCEL PLOTS ON MAP NUMBER 18059C0108E (DATED MARCH 17, 2014) OF THE FLOOD INSURANCE RATE MAPS FOR THE HANCOCK COUNTY UNINCORPORATED AREAS, HANCOCK COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

SEEDING INFO:

1. ALL DISTURBED AREAS SHALL BE PERMINATELY SEEDED PER EROSION CONTROL DETAILS (SS) (AT NO POINT DURING CONSTRUCTION SHALL ANY PART OF THE SITE REMAIN UNDISTURBED FOR MORE THAN TWO MONTHS THEREFORE NO TEMPORARY SEEDING SHALL BE REQUIRED)

NOTE:
NO EARTH DISTURBING ACTIVITY MAY COMMENCE WITHOUT AN APPROVED STORM WATER PERMIT.

EROSION CONTROL LEGEND:

TEMPORARY SILT FENCING (SEE EROSION CONTROL DETAILS PAGE)

FABRIC DROP INLET EROSION PROTECTION – ONCE PAVEMENT IS PLACED CHANGE TO 'DANDY SACK' PROTECTION (SEE EROSION CONTROL DETAILS PAGE)

FABRIC DROP INLET EROSION PROTECTION – 'DANDY SACK' (SEE EROSION CONTROL DETAILS PAGE)

HATCH INDICATES:
AREAS OF LAWN (SEEDED), MULCH, AND LANDSCAPING ON THIS PROJECT (SEE LANDSCAPING PLAN)

LEGEND:

EXISTING SPOT ELEVATION

EXISTING CONTOURS LINES

EXISTING STORM SEWER PIPES

EXISTING STORM SEWER STRUCTURES

PROPOSED SPOT ELEVATION

PROPOSED CONTOURS LINES

PROPOSED STORM SEWER PIPES

STORM SEWER PIPING INFORMATION:

SEE SHEET No.C420 FOR ALL INFORMATION CONCERNING THE STORM SEWER INLETS, MANHOLES, AND PIPING.

Indiana811 Know what's below. Call before you dig.

UTILITY DISCLAIMER

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N

REVISION
11/17/2022 revised park. lot, landscape, storm sewer. and added bike rack- caw

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Troy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Site Erosion Control Plan

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By:	Checked By:	Scale:
caw	tab	1"= 20.0'

CAD FILE:
G:\21081\c500 site erosion control plan.dwg

IVEN A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
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SHEET TITLE:
C500

EROSION CONTROL RESPONSIBILITY:

INSTALLATION RESPONSIBILITY:

Versatile Construction Group, LLC
Project Supervisor: Josiah Tworek
570 E. Tracy Road, Suite 610
New Whiteland, Indiana 46184
Phone: (317) 535-3579

CURRENT LAND OWNER:

AJE Properties, LLC
4292 W. 186th Street
Sheridan, IN 46069
PHONE: (317) 340-6819

PROJECT ADDRESS:

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 North
Mt. Comfort, Indiana 46140

EROSION CONTROL CONTRACTOR RESPONSIBILITY:

RESPONSIBILITIES OF CONTRACTOR REGARDING THE CONSTRUCTION GENERAL PERMIT: The Contractor shall manage the discharge of storm water from the site in accordance with the NPDES Construction General Permit for Construction Activities conditions and the following provisions of this section of the specifications. The Contractor shall be responsible for conducting the storm water management practices in accordance with the permit. The Contractor shall be responsible for providing qualified inspectors to conduct the inspections required by the SWPPP. The Contractor shall be responsible for any enforcement action taken or imposed by federal, state, or local agencies, including the cost of fines, construction delays, and remedial actions resulting from the Contractor's failure to comply with the permit provisions. It shall be the responsibility of the Contractor to make any changes to the SWPPP necessary when the Contractor or any of his subcontractors elects to use borrow or fill or material storage sites, either contiguous to or remote from the construction site, when such sites are used solely for this construction site. Such sites are considered to be part of the construction site covered by the permit and this SWPPP. Off-site borrow, fill, or material storage sites which are used for multiple construction projects are not subject to this requirement, unless specifically required by state or local jurisdictional entity regulations. The Contractor should consider this requirement in negotiating with earthwork subcontractors, since the choice of an off-site borrow, fill, or material storage site may impact their duty to implement, make changes to, and perform inspections required by the SWPPP for the site.

SWPPP LEDGER: Two (2) copies of the SWPPP Ledger, in three (3) ring binders shall be provided by the Operator's Engineer. One (1) copy shall be provided to the Construction Site Superintendent and one (1) copy shall be provided to the Operator's Project Manager.

1. Table of Contents
2. A copy of the Stormwater Polution Prevention Plan, Details, and Notes. (Sheets C500, C510, C520, and C530)
3. Construction Site Notice (Form A-1)
4. Modification Report (Form C-1)
5. Reportable Quantity Release Form (Form E-1)
6. Construction Site Inspection and Maintenance Log

The Operator's Project Manager must review and evaluate for compliance the SWPPP Ledger at each Project Review.

STORM WATER POLLUTION PREVENTION PROGRAM LOCATION REQUIREMENTS: The SWPPP Ledger is meant to be a working document that shall be maintained at the site of the Construction Activities at all times throughout the project, shall be readily available upon request by the Operator's personnel or IDEM or any other agency with regulatory authority over storm water issues, and shall be kept on-site until the site complies with the Final Stabilization section of this document. A sign or other notice must be posted near the main entrance of the construction site which contains the location of the SWPPP and the name and phone number of a contact person responsible for scheduling SWPPP viewing times, and any other State Of Indiana specific requirements. The Notice of Coverage (NOC) or other form notifying the applicant that coverage under the applicable permit has been obtained must also be posted, once received.

SWPPP MODIFICATIONS: The inspection report should also identify if any revisions to the SWPPP are warranted due to unexpected conditions. The SWPPP is meant to be a dynamic working guide that is to be kept current and amended whenever:

1. There is a change in design, construction, operation, or maintenance at the construction site that has or could have a significant effect on the discharge of pollutants to the waters of the United States that has not been previously addressed in the SWPPP. In addition to modifying the SWPPP, the site map may also require an amendment.
2. Inspections or investigations by site staff, or by local, state or federal officials, determine that the discharges the SWPPP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.
3. Based on the results of an inspection, it must be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP must be completed within seven (7) calendar days following the inspection.
4. There is a release containing a hazardous substance or oil in an amount equal or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302 occurs during a 24 hour period. Revisions to the SWPPP must be completed within seven (7) calendar days of knowledge of the release.
5. There is an off-site borrow or fill area that is used solely for the Don Rigo Mexican Cuisine construction project. The modification will include, at a minimum, a revision to the SWPPP and site maps and may impact the Contractor's duty to implement and conduct inspections.

Any such changes to the SWPPP must be made in writing on the Requested Changes to the SWPPP (Form C-1) within 7 days of the date such modification or amendment is made. The Contractor's failure to modify the SWPPP to include off-site borrow or fill areas used solely for the project or to monitor or report deficiencies to the Operator will result in the Contractor being liable for fines and construction delays resulting from any federal, state, or local agency enforcement action.

Report to IDEM within 24 hours any noncompliance with the SWPPP that will endanger public health or the environment. Follow up with a written report within 5 days of the noncompliance event. The following events require 24 hour reporting: a) any unanticipated bypass which exceeds any effluent limitation in the permit, b) any upset which exceeds any effluent limitation in the permit, and c) a violation of a maximum daily discharge limitation for any of the pollutants listed by the EPA in the permit to be reported within 24 hours. The written submission must contain a description of the non-compliance and its cause; the period of non-compliance, including exact dates and times, and if the non-compliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance.

Record-Keeping Requirements

The Contractor shall keep the following records related to construction activities at the site:

- Dates when major grading activities occur and the areas which were graded
- Dates and details concerning the installation of structural controls
- Dates when construction activities cease in an area
- Dates when an areas is stabilized, either temporarily or permanently
- Dates of rainfall and the amount of rainfall
- Dates and descriptions of the character and amount of any spills of hazardous materials
- Records of reports filed with regulatory agencies if reportable quantities of hazardous materials spilled

CONTROL OF NON-STORM WATER DISCHARGES

Certain types of discharges are allowable under the IDEM General Permit for Construction Activity, and it is the intent of this SWPPP to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this SWPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Furthermore, Indiana may prohibit any non-storm water discharges, allow a limited number of types of non-storm water discharges and/or will require coverage for non-storm water discharges under a separate permit. The following non-storm water discharges are allowed by the IDEM and may occur at the job site:
Possible non-storm water discharges that must be diverted to the sanitary system: discharges from fire fighting activities, fire hydrant flushing, potable water sources such as water line flushings, routine exterior building wash-down (with detergents presents). Contractor shall neutralize any super-chlorinated water from water distribution pipes before releasing it into the environment.

Possible non-storm water discharges where detergents are not used should be diverted to the storm sewer system: discharges from waters used to wash vehicles or control dust in order to minimize offsite sediment tracking, pavement wash waters where spills or leaks of hazardous materials have not occurred or detergents have not been used, irrigation drainage from watering vegetation ,springs or other uncontaminated groundwater, including dewatering groundwater infiltration.

SPILL RESPONSE FOR CONTRACTOR

Spill Prevention and Response Procedures

The Contractor will train all personnel in the proper handling and cleanup of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the job site superintendent to properly train all personnel in spill prevention and clean up procedures.

A. In order to minimize the potential for a spill of hazardous materials to come into contact with storm water, the following steps will be implemented:
   1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
   2. The minimum practical quantity of all such materials will be kept on the job site.
   3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site.
   4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

B. In the event of a spill, the following procedures should be followed
   1. All spills will be cleaned up immediately after discovery.
   2. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.
   3. The project manager and the Engineer of Record will be notified immediately.
      Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill. Spills of amounts that exceed Reportable Quantities of certain substances specifically mentioned in federal regulations (40 CFR 110, 40 CFR 117, and 40 CFR 302) must be immediately reported to the EPA National Response Center, telephone 1-800-424-8802, IDEM, telephone (317) 233-7745, and the Greenfield City Hall 1-317-477-4300, and the Buck Creek Township Fire Department 1-317-866-1050.
   4. If the spill exceeds a Reportable Quantity, the SWPPP must be modified within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans must identify measures to prevent the recurrence of such releases and to respond to such releases. Form E-1 must be completed in accordance with this

C. The job site superintendent will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the

Releases of hazardous substances or oil in excess of reportable quantities (as established under 40 CFR 110, 40 CFR 117 or 40 CFR 302) must be reported. Form E-1 provides further details on the notification and reporting process.

INSPECTIONS AND MAINTENANCE
Inspections and maintenance shall comply with the INSPECTION AND MAINTENANE DETAILS located on Sheet C530 of these plans. Inspections must be conducted by a "Qualified" Inspector. "Qualified" is defined as a person knowledgeable in the principles and practices of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.

INSPECTION AND MAINTENANCE PROCEDURES IN ADDITION TO DETAILS

The following inspection and maintenance practices will be used to maintain erosion and sediment controls and stabilization measures in addition to the INSPECTION AND MAINTENANCE DETAILS:

1. All control measures will be inspected as outlined in the INSPECTION GUIDELINES TABLE.
2. All measures will be maintained in good working order; if repairs or other measures are found to be necessary, they will be initiated within 24 hours of report.
3. Temporary and permanent seeding and all other stabilization measures will be inspected for bare spots, washouts, and healthy growth.
4. Gravel shall be added to transit paths as needed to prevent vehicle tracking of sediments.
5. The paved streets adjacent to the site entrance will be inspected daily and swept as necessary to remove any excess mud, dirt, or rock tracked from the site.
6. The job site superintendent will be responsible for selecting and training the individuals who will be responsible for these inspections, maintenance and repair activities,
7. Personnel selected for the inspection and maintenance responsibilities shall be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls that are used onsite in good working order.
8. Disturbed areas and materials storage areas will be inspected for evidence of or potential for pollutants entering stormwater systems.

EROSION CONTROL INSTALLATION AND CONSTRUCTION SEQUENCING

The Contractor will be responsible for implementing the following erosion control and storm water management control measures. The Contractor may designate these tasks to certain subcontractors as he sees fit, but the ultimate responsibility for implementing these controls and ensuring their proper functioning remains with the Contractor. The order of activities will be as follows:

A. Conduct an Erosion and Sediment control pre-construction meeting with the City of Greenfield.
B. Install temporary site construction entrance.
C. Install silt fence perimeter control and silt inlet protection.
D. Install dumpster protection and concrete wash out stone pad.
E. Commence site grading and building pad construction.
F. Any disturbed areas of the site where construction activity has ceased for more than 14 days shall be temporarily seeded and watered.
G. Install all storm sewers and structures.
H. Install protection at the locations of all ends of exposed storm sewer pipes.
I. Begin construction of building.
J. Finalize pavement sub-grade preparation.
K. Install base material as required for asphaltic pavement
L. Construct all curbs and sidewalks.
M. Construct asphaltic parking lot and road pavement
N. Change temporary inlet protection to "Dandy Sacks".
O. Carry out final seeding and planting
P. Remove silt fencing and "Dandy Sacks" only after all paving is complete and exposed surfaces are stabilized.

EROSION CONTROL INSTALLATION DETAILS

TREE PRESERVATION

TREE PROTECTION

Protect trees from equipment damage. (Wounds provide entry for insects and disease and reduce transport of sap.)

If trees are damaged, repair immediately. (Repair of wounded areas allows trees to heal quickly, thus reducing insect and disease problems.)

MATERIALS

1. Fencing (orange safety fencing for increased visibility), snow fence and support posts.
2. Signage.
3. Wood mulch, chips, etc.
4. Specialized equipment (brush cutter, rotary axe, hand tools).

APPLICATION

1. Install fencing around a specimen tree(s) as far out as its crown to keep equipment off the rooting area.
2. If a fence cannot be erected, cushion the rooting area with six inches of wood chips, wood, or brick paths.
3. Protect trees from equipment damage by creating some type of barrier, fencing them off, or wrapping individual trees with snow fencing.
4. Prune low-hanging limbs that could otherwise be broken off by equipment.

TEMPORARY CONSTRUCTION ENTRANCE

DIMENSION

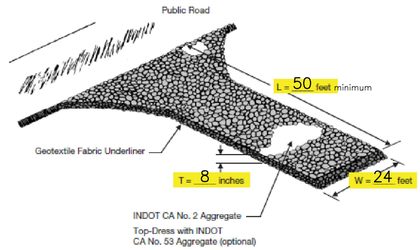
1. Width – 12 feet minimum or full width of entrance/exit drive, whichever is greater.
2. Length – 50 feet minimum or full length of drive, whichever is greater.
3. Thickness – six inches minimum.

MATERIALS

1. One to two and one-half inch diameter washed aggregate [INDOT CA No. 2.
2. One-half to one and one-half inch washed aggregate [INDOT CA No. 53 optional, used primarily where the purpose of the pad is to keep soil from adhering to vehicle tires].
3. Geotextile fabric underlayment (used as a separation layer to prevent intermixing of aggregate and the underlying soil material and to provide greater bearing strength when encountering wet conditions or soils with a seasonal high water table limitation).

INSTALLATION

1. Remove all vegetation and other objectionable material from the foundation area.
2. Grade the foundation and crown for positive drainage.
3. Install a culvert pipe under the pad if needed to maintain proper public road drainage.
4. If wet conditions are anticipated, place geotextile fabric on the graded foundation to improve stability.
5. Place aggregate (INDOT CA No. 2) to the dimensions and grade shown in the construction plans, leaving the surface smooth and sloped for drainage.
6. Top-dress the drive with washed aggregate (INDOT CA No.53).
7. Where possible, divert all storm water runoff and drainage from the temporary construction ingress/egress pad to a sediment trap or basin.



L = Ingress/Egress Pad Length
W = Ingress/Egress Pad Width
T = Aggregate Thickness

TOPSOIL SALVAGE AND UTILIZATION

SOIL STOCKPILE AREA

1. Free of stumps, rock, and construction debris.
2. Stockpile covered with vegetation or a tarp.
3. Surrounded by a sediment barrier or sediment filter.

APPLICATION

1. Prior to stripping topsoil, install any site-specific down slope measures needed to control storm water runoff and sedimentation.
2. Remove soil material no deeper than the surface soil (e.g., A or Ap horizon).
3. Stockpiled soil should be temporarily seeded or covered with a tarp and/or surrounded by a sediment control measure.
4. Prior to applying topsoil, grade the subsoil and roughen the top three to four inches by disking. (This helps the topsoil bond with the subsoil. If the topsoil and existing soil surface are not properly bonded, water will not infiltrate evenly and it will be difficult to establish vegetation.)
5. Apply topsoil evenly to a depth of at least four inches, then compact slightly to improve contact with the subsoil.
   a. Depths of four inches or greater are recommended if the underlying material is bedrock, fine-textured clayey soils, loose sand, rock fragments, aggregate, or other unsuitable soil material.
   b. Do not apply topsoil when the site is wet, muddy, or frozen because it makes spreading difficult, inhibits bonding, can cause compaction problems, and forms a cloddy seedbed. Whenever possible avoid applying topsoil to the existing soil surface if the two layers have contrasting textures. Clayey topsoil over sandy subsoil is a particularly poor combination, as water creeps along the junction between the two soil layers and may cause the topsoil to slough.
   c. Applying topsoil on slopes with a ratio of 2:1 or greater may result in soil slippage and may require additional measures to provide good bonding of the soil material.
6. After spreading the topsoil, grade and stabilize the site.

EROSION CONTROL INSTALLATION DETAILS (CONT.)

TEMPORARY SEEDING

MATERIALS

1. Soil Amendments – Select materials and rates as determined by a soil test (contact your county soil and water conservation district or cooperative extension office for assistance and soil information, including available soil testing services) or 400 to 600 pounds of 12-0-12 analysis fertilizer, or equivalent. Consider the use of reduced phosphorus application where soil tests indicate adequate phosphorous levels in the soil profile.
2. Seed – Select appropriate plant species seed or seed mixtures on the basis of quick germination, growth, and time of year to be seeded (see Table 1).
3. Mulch –
   a. Straw, hay, wood fiber, etc. (to protect seedbed, retain moisture, and encourage plant growth).
   b. Anchored to prevent removal by wind or water or covered with manufactured erosion control blankets.

Table 1. Temporary Seeding Specifications

Seed Species[1]	Rate per Acre	Planting Depth	Optimum Dates[2]
Wheat or Rye	150 lbs.	1 to 1½ inches	Sept. 15 – Oct. 30
Spring Oats	100 lbs.	1 inch	March 1 – April 15
Annual Ryegrass	40 lbs.	¼ inch	March 1 – May 1 Aug. 1 – Sept. 1
German Millet	40 lbs.	1 to 2 inches	May 1 – June 1
Sudangrass	35 lbs.	1 to 2 inches	May 1 – July 30
Buckwheat	60 lbs.	1 to 2 inches	April 15 – June 1
Corn (broadcast)	300 lbs.	1 to 2 inches	May 11 – Aug. 10
Sorghum	35 lbs.	1 to 2 inches	May 1 – July 15

[1] Perennial species may be used as a temporary cover, especially if the area to be seeded will remain idle for more than one year (see Permanent Seeding Sheet C510-C520.
[2] Seeding done outside the optimum seeding dates increases the chances of seeding failure. Dates may be extended or shortened based on the location of the project site within the state.

Notes:
Mulch alone is an acceptable temporary cover and may be used in lieu of temporary seeding, provided that it is appropriately anchored.
A high potential for fertilizer, seed, and mulch to wash exists on steep banks, cuts, and in channels and areas of concentrated flow.

SEEDBED PREPARATION

1. Test soil to determine pH and nutrient levels.
2. Apply soil amendments as recommended by the soil test. If testing is not done, apply 400 to 600 pounds per acre of 12-0-12 analysis fertilizer, or equivalent.
3. Work the soil amendments into the upper two to four inches of the soil with a disk or rake operated across the slope.

SEEDING

1. Select a seed species or an appropriate seed mixture and application rate from Table 1.
2. Apply seed uniformly with a drill or cultipacker seeder or by broadcasting. Plant or cover seed to the depth shown in Table 1.

Notes:
1. If drilling or broadcasting the seed, ensure good seed-to-soil contact by firming the seedbed with a roller or cultipacker after completing seeding operations.
2. Daily seeding when the soil is moist is usually most effective.
3. If seeding is done with a hydroseeder, fertilizer and mulch can be applied with the seed in a slurry mixture.

3. Apply mulch (Mulching Sheet C520) and anchor it in place.

TEMPORARY SEEDING DATES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WHEAT OR RYE												
OATS												
ANNU. RYEGRASS												

IRRIGATION NEEDED THIS PERIOD. TO CONTROL EROSION AT TIMES OTHER THAN IN THE SHADED AREA USE MULCH

PERMANENT SEEDING

MATERIALS

1. Soil Amendments – (contact your county soil and water conservation district or cooperative extension office for assistance and soil information, including available soil testing services) or 400 to 600 pounds of 12-0-12 analysis fertilizer, or equivalent. Consider the use of reduced phosphorus application where soil tests indicate adequate phosphorous levels in the soil profile.
2. Seed – Select appropriate plant species seed or seed mixtures on the basis of quick germination, growth, and time of year to be seeded (see Table 1).
3. Mulch –
   a. Straw, hay, wood fiber, etc. (to protect seedbed, retain moisture, and encourage plant growth).
   b. Anchored to prevent removal by wind or water or covered with manufactured erosion control blankets.

SITE PREPARATION

1. Grade the site to achieve positive drainage.
2. Add topsoil (see Topsoil Salvage and Utilization Sheet C510) or mulch (see Mulching Sheet C520) to achieve needed depth for establishment of vegetation. (Compost material may be added to improve soil moisture holding capacity, soil friability, and nutrient availability.)

SEEDBED PREPARATION

1. Test soil to determine pH and nutrient levels.
2. Apply soil amendments as recommended by the soil test and work into the upper two to four inches of soil. If testing is not done, apply 400 to 600 pounds per acre of 12-0-12 analysis fertilizer, or equivalent.
3. Till the soil to obtain a uniform seedbed. Use a disk or rake, operated across the slope, to work the soil amendments into the upper two to four inches of the soil.
3. Mulch all seeded areas (see Mulching Sheet C520)

SEEDING

Optimum seeding dates are March 1 to May 10 and August 10 to September 30. Permanent seeding done between May 10 and August 10 may need to be irrigated. Seeding outside or beyond optimum seeding dates is still possible with the understanding that reseeding or overseeding may be required if adequate surface cover is not achieved. Reseeding or overseeding can be easily accomplished if the soil surface remains well protected with mulch.

1. Select a seeding mixture and rate from Table 1. Select seed mixture based on site conditions, soil pH, intended land use, and expected level of maintenance.
2. Apply seed uniformly with a drill or cultipacker seeder or by broadcasting. Plant or cover the seed to a depth of one-fourth to one-half inch. If drilling or broadcasting the seed, ensure good seed-to-soil contact by firming the seedbed with a roller or cultipacker after completing seeding operations. (If seeding is done with a hydroseeder fertilizer and mulch can be applied with the seed in a slurry mixture.) and use appropriate methods to anchor the mulch in place. Consider using erosion control blankets on sloping areas and conveyance channels (see Erosion Control Blanket Sheet 520).

REVISION

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Erosion Control Details

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By: tab	Checked By: tab	Scale:

CAD FILE:
Q:\21081\c510 erosion control details.dwg

TRENT A. BAXTER – REGISTERED – No. 19700309 – PROFESSIONAL ENGINEER

CERTIFIED BY:

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SHEET TITLE:

C510

EROSION CONTROL INSTALLATION DETAILS (CONT.)

PERMANENT SEEDING (CONT.)

Table 1. Permanent Seeding Recommendations
This table provides several seed mixture options. Additional seed mixtures are available commercially. When selecting a mixture, consider intended land use and site conditions, including soil properties (e.g., soil pH and drainage), slope aspect, and the tolerance of each species to shade and drought.

Open Low-Maintenance Areas (remaining idle more than six months)

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Perennial ryegrass - white clover[1]	70 lbs. 2 lbs.	5.6 to 7.0
2. Perennial ryegrass - tall fescue[2]	70 lbs. 50 lbs.	5.6 to 7.0
3. Tall fescue[2] - white clover[1]	70 lbs. 2 lbs.	5.5 to 7.5

Steep Banks and Cuts, Low-Maintenance Areas (not mowed)

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Smooth brome grass - red clover[1]	35 lbs. 20 lbs.	5.5 to 7.0
2. Tall fescue[2] - white clover[1]	50 lbs. 2 lbs.	5.5 to 7.5
3. Tall fescue[2] - red clover[1]	50 lbs. 20 lbs.	5.5 to 7.5
4. Orchard grass - red clover[1] - white clover[1]	30 lbs. 20 lbs. 2 lbs.	5.6 to 7.0
5. Crownvetch[1] - tall fescue[2]	12 lbs. 30 lbs.	5.6 to 7.0

Lawns and High-Maintenance Areas

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Bluegrass	140 lbs.	5.5 to 7.0
2. Perennial ryegrass (turf type)	60 lbs. 90 lbs.	5.6 to 7.0
3. Tall fescue (turf type)[2] - bluegrass	170 lbs. 30 lbs.	5.6 to 7.5

Channels and Areas of Concentrated Flow

Seed Mixtures	Rate per Acre Pure Live Seed	Optimum Soil pH
1. Perennial ryegrass - white[1]	150 lbs. 2 lbs.	5.5 to 7.0
2. Kentucky bluegrass - smooth bromegrass - switchgrass - timothy - perennial ryegrass - white clover[2]	20 lbs. 10 lbs. 3 lbs. 4 lbs. 10 lbs. 2 lbs.	5.5 to 7.5
3. Tall fescue[1] - white clover[2]	150 lbs. 2 lbs.	5.5 to 7.5
4. Tall fescue[2] - perennial ryegrass - Kentucky bluegrass	150 lbs. 20 lbs. 20 lbs.	5.5 to 7.5

Notes:
1. An oat or wheat companion or nurse crop may be used with any of the above permanent seeding mixtures, at the following rates:
   (a) spring oats – one-fourth to three-fourths bushel per acre
   (b) wheat – no more than one-half bushel per acre
2. A high potential for fertilizer, seed, and mulch to wash exists on steep banks, cuts, and in channels and areas of concentrated flow.

PERMANENT SEEDING DATES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Non-irrigated(1)												
Irrigated												
Dormant(2)												

IRRIGATION NEEDED THIS PERIOD. TO CONTROL EROSION AT TIMES OTHER THAN IN THE SHADED AREA USE MULCH

(1) LATE SUMMER SEEDING DATES MAY BE EXTENDED 5 DAYS IF MULCH IS APPLIED
(2) INCREASE SEEDING APPLICATION BY 50%

MULCHING

MATERIALS

Table 1. Mulch Specifications

Material[1]	Rate per Acre	Comments
Straw or hay	2 tons	Should be dry, free of undesirable seeds. Spread by hand or machine. Must be crimped or anchored (see *Table 2*).
Wood fiber or cellulose	1 ton	Apply with a hydraulic mulch machine and use with tacking agent.

[1] Mulching is not recommended in concentrated flows. Consider erosion control blankets or other stabilization methods.

MULCHING (CONT.)

Table 2. Mulch Anchoring Methods

Anchoring Method[1]	How to Apply
Mulch anchoring tool or farm disk (dull, serrated, and blades set straight)	Crimp or punch the straw or hay two to four inches into the soil. Operate machinery on the contour of the slope.
Cleating with dozer tracks	Operate dozer up and down slope to prevent formation of rills by dozer cleats.
Wood hydromulch fibers	Apply according to manufacturer's recommendations.
Synthetic tackifiers, binders, or soil stabilizers	Apply according to manufacturer's recommendations.
Netting (synthetic or biodegradable material)	Install netting immediately after applying mulch. Anchor netting with staples. Edges of netting strips should overlap with each up-slope strip overlapping four to six inches over the adjacent down-slope strip. Best suited to slope applications. In most instances, installation details are site specific, so manufacturer's recommendations should be followed.

[1] All forms of mulch must be anchored to prevent displacement by wind and/or water.

APPLICATION

1. Apply mulch at the recommended rate shown in Table 1.
2. Spread the mulch material uniformly by hand, hayfork, mulch blower, or hydraulic mulch machine. After spreading, no more than 25 percent of the ground should be visible.
3. Anchor straw or hay mulch immediately after application. The mulch can be anchored using one of the methods listed below:
   a. Crimp with a mulch anchoring tool, a weighted farm disk with dull serrated blades set straight, or track cleats of a bulldozer,
   b. Apply hydraulic mulch with short cellulose fibers,
   c. Apply a liquid tackifier, or
   d. Cover with netting secured by staples.

EROSION CONTROL BLANKET

MATERIALS

1. Organic (straw, excelsior, woven paper, coconut fiber, etc.) or synthetic mulch incorporated with a polypropylene, natural fiber or similar netting material (The netting may be biodegradable, photodegradable or permanent.)
2. Six to 12-inch staples, pins, or stakes.

INSTALLATION

1. Select the type and weight of erosion control blanket to fit the site conditions (e.g., slope, channel, flow velocity) per the manufacturer's specifications.
2. Prepare the seedbed, add soil amendments, and permanently seed (see Permanent Seeding Sheet C510, C520) the area immediately following seedbed preparation.
3. Lay erosion control blankets on the seeded area so that they are in continuous contact with the soil with each up-slope or up-stream blanket overlapping the down-slope or down-stream blanket by at least eight inches, or follow manufacturer's recommendations
4. Tuck the uppermost edge of the upper blankets into a check slot (slit trench), backfill with soil and tamp down. In certain applications, the manufacturer may require additional check slots at specific locations down slope from the uppermost edge of the upper blankets.
5. Anchor the blankets in place by driving staples, pins, or stakes through the blanket and into the underlying soil. Follow an anchoring pattern appropriate for the site conditions and as recommended by the manufacturer.

TURF REINFORCEMENT MAT

MATERIALS

1. Anchoring
   Staples, pins, or stakes used to prevent movement or displacement of mat. (Follow manufacturer's recommendations for specific applications.)
2. Turf reinforcement mat (typically consists of a three-dimensional matrix of polypropylene, nylon, or other material).
3. Six to 12-inch staples, pins, or stakes.

INSTALLATION

1. Select a turf reinforcement mat appropriate for the site conditions (e.g., slope, channel, flow velocity) per the manufacturer's specifications.
2. Grade and prepare the soil foundation for mat installation.
3. Install the mat according to the manufacturer's instructions, including burying the edges in check slots or slit trenches.
4. Anchor the mat in place by driving staples, pins, or stakes through the mat and into the underlying soil. Follow an anchoring pattern appropriate for the site conditions and as recommended by the manufacturer.
5. Backfill the mat with topsoil, filling to the top of the mat.
6. Seed the area after the mat has been installed and backfilled with soil.
7. Install erosion control blankets over the seeded turf reinforcement mat to stabilize the surface.

ROCK CHECK DAM

MATERIALS

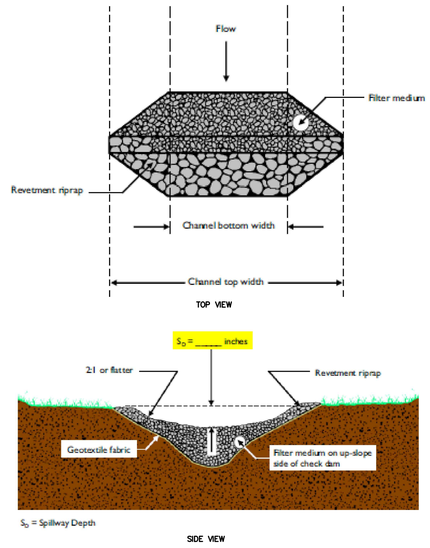
1. Geotextile fabric (8 ounce or heavier; nonwoven).
2. Indiana Department of Transportation Revetment riprap for dam.
3. INDOT CA No. 5 aggregate for use as filter medium (Aggregate must be well-graded).
   Note: INDOT CA No. 8 aggregate is acceptable if No. 5 aggregate is not available. The use of No. 8 aggregate may result in more frequent overtopping of the structure and will increase the frequency of structure maintenance.

INSTALLATION

1. Lay out the location of the check dam.
2. Excavate a cutoff trench into the channel bottom and ditch banks, extending it a minimum of 18 inches beyond the top of the ditch bank.
3. Install and anchor filter fabric in the channel and cutoff trench.
4. Place riprap in the cutoff trench and channel to the lines and dimensions shown in the construction plans. The center of each dam must be at least nine inches lower than the uppermost points of contact between the riprap dam and channel banks.
5. Extend the riprap at least 18 inches beyond the top of the channel banks to keep overflow water from eroding areas adjacent to the channel banks before it re-enters the channel.

ROCK CHECK DAM (CONT.)

6. Place filter medium (INDOT CA No. 5 aggregate) on the up-slope side of the dam. Place filter medium over the entire face of the dam up to the base of the overflow weir notch.
7. Stabilize the channel above the uppermost dam.
8. Install an erosion-resistant lining in the channel below the lowermost dam. The lining should extend a minimum distance of six feet below the dam.
9. Additional sediment storage can be provided by excavating a small sediment trap on the upstream side of the check dam.



GEOTEXTILE FABRIC DROP INLET PROTECTION

MATERIALS

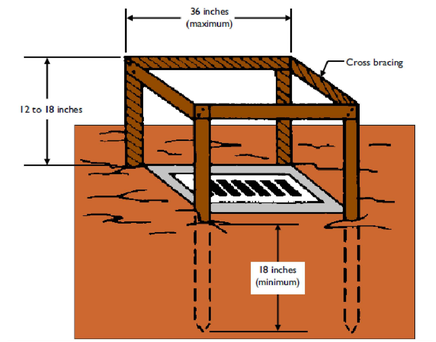
1. Support posts
2. 2 x 2 inch or 2 x 4 inch hardwood posts.
3. Three feet length, minimum.
4. 1 x 2 inch or 1 x 3 inch hardwood cross bracing lumber.
5. Lathe.
6. Staples or nails.
7. Geotextile fabric

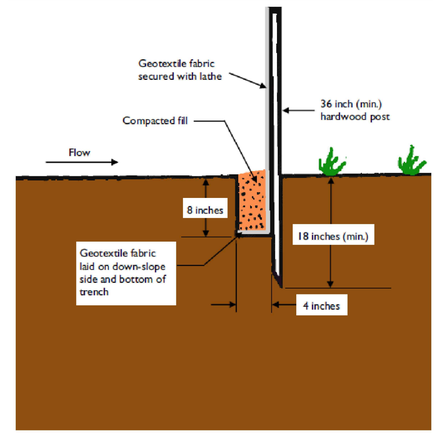
Table 1. Geotextile Fabric Specifications

Physical Property	Woven	Non-Woven
Filtering Efficiency	85%	85%
UV Resistance (Inhibitors and stabilizers to ensure six month minimum life at temperatures of 0° to 120° F)	70%	85%
Tensile Strength at 20% Elongation:		
Standard Strength	30 lbs./linear inch	50 lbs./linear inch
Extra Strength	50 lbs./linear inch	70 lbs./linear inch
Slurry Flow Rate	0.3 gal./min./sq. ft.	4.5 gal./min./sq. ft.
Water Flow Rate	15 gal./min./sq. ft.	220 gal./min./sq. ft.

INSTALLATION

1. Dig an eight-inch deep, four-inch wide trench around the perimeter of the inlet.
2. If using pre-assembled geotextile fabric and posts, drive the posts into the soil, tightly stretching the geotextile fabric between posts as each is driven. (Posts must be placed on the inlet side of the anchor trench with the geotextile fabric on the side of the trench farthest from the inlet.)
   Note: If assembling the geotextile fabric and posts on-site, drive the posts into the soil and then secure the geotextile fabric to the posts by placing a piece of lathe over the fabric and fastening it to the post (stretching the fabric between posts as it is fastened).
3. Use the wrap join method when joining posts (see Silt Fence on sheet C520, C530).
4. Place the bottom 12 inches of geotextile fabric into the eight-inch deep trench, laying the remaining four inches in the bottom of the trench and extending away from the inlet.
5. Backfill the trench with soil material and compact it in place.
6. Brace the posts by nailing braces into each corner post or utilize rigid panels to support fabric.
   Note: In situations where storm water may bypass the structure, either:
   1. Set the top of the geotextile fabric filter at least six inches lower than the ground elevation on the down-slope side of the storm drain inlet,
   2. Build a temporary dike, compacted to six inches higher than the fabric, on the down-slope side of the storm drain inlet, AND/OR





SILT FENCE

MATERIALS

1. Fabric – woven or non-woven geotextile fabric meeting specified minimums outlined in Table 2.
   a. Height – a minimum of 18 inches above ground level (30 inches maximum).
   b. Reinforcement – fabric securely fastened to posts with wood lathe.
2. Support Posts
   a. 2 x 2 inch hardwood posts. Steel fence posts may be substituted for hardwood posts (steel posts should have projections for fastening fabric).
   b. Spacing – Eight feet maximum if fence is supported by wire mesh fencing. Six feet maximum for extra-strength fabric without wire backing.

Table 1. Slope Steepness Restrictions

Percent Slope		Maximum Distance
< 2%	< 50:1	100 feet
2% – 5%	50:1 to 20:1	75 feet
5% – 10%[1]	20:1 to 10:1	50 feet
10% – 20%[1]	10:1 to 5:1	25 feet
> 20%[1]	> 5:1	15 feet

[1] Consider other alternatives.

Note: Multiple rows of silt fence are not recommended on the same slope.

Table 2. Geotextile Fabric Specifications for Silt Fence (minimum)

Physical Property	Woven Geotextile Fabric	Non-Woven Geotextile Fabric
Filtering efficiency	85%	85%
Textile strength at 20% elongation Standard strength Extra strength	30 lbs. per linear inch 50 lbs. per linear inch	50 lbs. per linear inch 70 lbs. per linear inch
Slurry flow rate	0.3 gal./min./square feet	4.5 gal./min./square feet
Water flow rate	15 gal./min./square feet	220 gal./min./square feet
UV resistance	70%	85%
Post spacing	7 feet	5 feet

Note: Silt fences can be purchased commercially.

REVISION

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Erosion Control Details

Job No.:	Date Stamped:
21081	03/31/2022
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Scale:	

CAD FILE:
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TRENT A. BAXTER REGISTERED No. 19700309 PROFESSIONAL ENGINEER
CERTIFIED BY:

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SHEET TITLE:
C520

SILT FENCE (CONT.)

INSTALLATION

Prefabricated silt fence (see Exhibits 1, 2, and 3)

1. Lay out the location of the fence so that it is parallel to the contour of the slope and at least 10 feet beyond the toe of the slope to provide a sediment storage area. Turn the ends of the fence up slope such that the point of contact between the ground and the bottom of the fence end terminates at a higher elevation than the top of the fence at its lowest point (see Exhibit 1).
2. Excavate an eight–inch deep by four–inch wide trench along the entire length of the fence line (see Exhibit 2). Installation by plowing is also acceptable.
3. Install the silt fence with the filter fabric located on the up–slope side of the excavated trench and the support posts on the down–slope side of the trench.
4. Drive the support posts at least 18 inches into the ground, tightly stretching the fabric between the posts as each is driven into the soil. A minimum of 12 inches of the filter fabric should extend into the trench. (If it is necessary to join the ends of two fences, use the wrap joint method shown in Exhibit 3.)
5. Lay the lower four inches of filter fabric on the bottom of the trench and extend it toward the up–slope side of the trench.
6. Backfill the trench with soil material and compact it in place.

Note: If the silt fence is being constructed on–site, attach the filter fabric to the support posts (refer to Tables 1 and 2 for spacing and geotextile specifications) and attach wooden lathe to secure the fabric to the posts. Allow for at least 12 inches of fabric below ground level. Complete the silt fence installation, following steps 1 through 6 above.

Exhibit 1

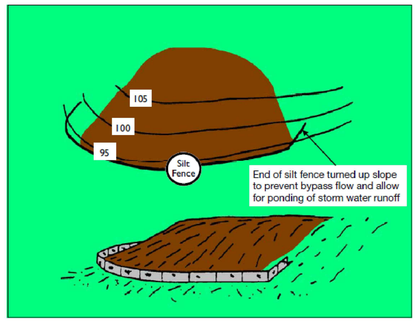


Exhibit 2

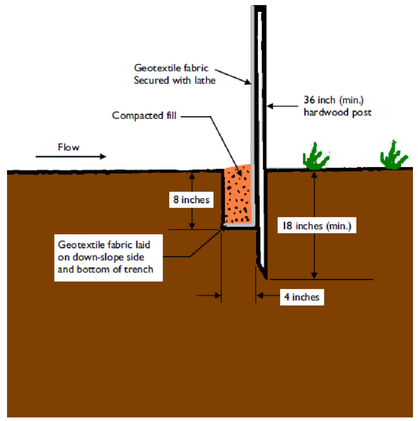
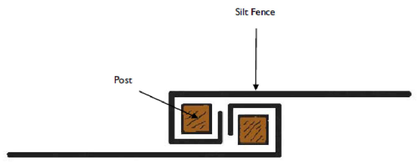
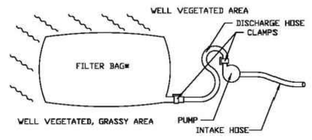


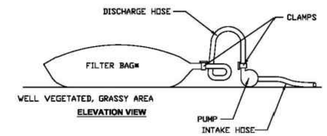
Exhibit 3



DE–WATERING SYSTEM

DETAIL 37 – PUMPED WATER FILTER BAG





U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCE CONSERVATION SERVICE | PAGE G – 29 – 3 | WATERSHED PROTECTION DIVISION DISTRICT OF COLUMBIA DEPARTMENT OF HEALTH

DEWATERING MEASURES DETAIL

PREFRABRICATED CONCRETE WASHOUT SYSTEM/CONTAINER

MATERIALS

1. Self–contained sturdy containment systems that are delivered to a site
2. Minimum of ten millimeter polyethylene sheeting that is free of holes, tears, and other defects. The sheeting selected should be of an appropriate size to fit the washout system without seams or overlap of the lining
3. Signage.

SURFACE ROUGHENING

Roughening Slopes (To Be Mowed)

1. Make slopes to be mowed no steeper than 3:1.
2. Use a tiller, disk, harrow, or culti–packer to roughen the slopes, creating shallow grooves no more than ten inches apart, one inch deep, and that run parallel to the slope contour.

Roughening Areas with Tracked Machinery

1. Limit roughening with tracked machinery to sandy or relatively dry, finertextured soils to avoid undue surface compaction. (This roughening method is generally not as effective as other roughening methods).
2. Operate the tracked machinery up and down the slope so as to leave horizontal depressions in the soil.
   Note: Do not back–blade during the final grading operation.

Seeding, Fertilizing, and Mulching Roughened Areas

1. Immediately seed, fertilize, and mulch surface–roughened areas while soil is loose and moist to aid seed germination and vegetative growth (see Temporary Seeding Sheet C510; Permanent Seeding Sheet C510, C520; Mulching Sheet C520
2. If roughening with tracked machinery, consider seeding, fertilizing, and mulching first, letting the cleats of the tracks incorporate the seed and fertilizer into the soil and anchor the mulch. This is especially well suited for temporary seeding when timeliness is critical and equipment is unavailable for planting operations.

DANDY SACKS (PAVED INLET DROP PROTECTION)

MATERIALS

THE DANDY SACK™ WILL BE **MANUFACTURED IN THE U.S.A.** FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

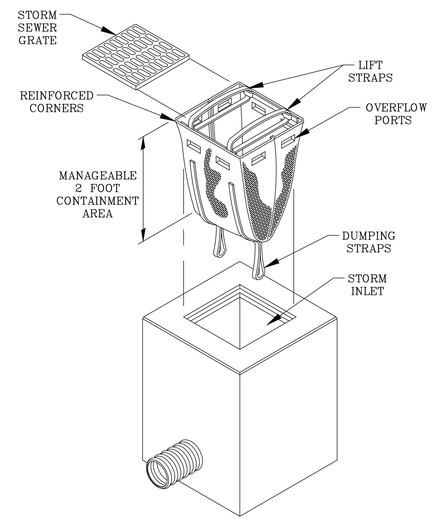
REGULAR FLOW DANDY SACK™ (BLACK)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.78 (400) x 1.40 (315)
Grab Tensile Elongation	ASTM D 4632	%	15 x 15
Puncture Strength	ASTM D 4833	kN (lbs)	0.67 (150)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	5506 (800)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.67 (150) x 0.73 (165)
UV Resistence	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	1/min/m² (gal/min/ft²)	2852 (70)
Permittivity	ASTM D 4491	Sec⁻¹	0.90

HI–FLOW DANDY SACK™ (SAFETY ORANGE)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) X 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 X 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) X 0.33 (75)
UV Resistence	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	1/min/m² (gal/min/ft²)	5907 (145)
Permittivity	ASTM D 4491	Sec⁻¹	2.1

DANDY SACKS (PAVED INLET DROP PROTECTION) (CONT.)



EROSION CONTROL INSPECTION AND MAINTENANCE GUIDELINES

EROSION CONTROL INSPECTION GUIDELINES TABLE

EROSION CONTROL MEASURE	EROSION CONTROL MEASURE INSPECTION FREQUENCY			
	DAILY	WEEKLY	AFTER RAIN EVENT	AS NEEDED
TREE PRESERVATION		X		X
CONSTRUCTION ENTANCE	X			X
TOP SOIL STOCKPILE	X			X
TEMPORARY SEEDING		X	X	X
PERMANENT SEEDING		X	X	X
MULCHING		X	X	X
CONTROL BLANKET		X	X	X
TURF REINFOR. MAT		X	X	X
ROCK CHECK DAM		X	X	X
FABRIC INLET	X		X	X
SILT FENCE		X	X	X
CONCRETE WASHOUT	X		X	X
SURFACE ROUGHENING				X
DANDY SACKS		X	X	X
DUST CONTROL				X

EROSION CONTROL MAINTENANCE GUIDELINES

TREE PRESERVATION

1. Inspect at least once every seven calendar days.
2. Repair perimeter barriers if damaged.
3. Inspect for damage from construction equipment, etc. Repair wounds simply by removing damaged bark and wood tissue. Do not use tree paint.
4. Cable and brace any trunk splits, weak forks, and large limbs.
5. Properly prune all damaged limbs. Avoid leaving stubs.
6. Aerate soil where compaction has been excessive.
7. Fertilize to improve tree growth, vigor, and appearance.
8. Water during dry periods to help offset soil compaction and root damage.

TEMPORARAY CONSTRUCTION ENTRANCE

1. Inspect daily.
2. Reshape pad as needed for drainage and runoff control.
3. Top–dress with clean aggregate as needed.
4. Immediately remove mud and sediment tracked or washed onto public roads.
5. Flushing should only be used if the water from the construction drive can be conveyed into a sediment trap or basin.

TOPSOIL SALVAGE AND UTILIZATION

1. Inspect daily.
2. Check for damage to perimeter barrier; repair immediately.
3. Check for erosion or damage to newly spread topsoil; repair immediately and revegetate.

TEMPORARY SEEDING

1. Inspect within 24 hours of each rain event and at least once every seven calendar days.
2. Check for erosion or movement of mulch and repair immediately.
3. Monitor for erosion damage and adequate cover (80 percent density); reseed, fertilize, and apply mulch where necessary.
4. If nitrogen deficiency is apparent, top–dress fall seeded wheat or rye seeding with 50 pounds per acre of nitrogen in February or March.

PERMANENT SEEDING

1. Inspect within 24 hours of each rain event and at least once every seven calendar days until the vegetation is successfully established.
2. Characteristics of a successful stand include vigorous dark green or bluishgreen seedlings with a uniform vegetative cover density of 90 percent or more.
3. Check for erosion or movement of mulch.
4. Repair damaged, bare, gullied, or sparsely vegetated areas and then fertilize, reseed, and apply and anchor mulch.
5. If plant cover is sparse or patchy, evaluate the plant materials chosen, soil fertility, moisture condition, and mulch application; repair affected areas either by overseeding or preparing a new seedbed and reseeding. Apply and anchor mulch on the newly seeded areas.
6. If vegetation fails to grow, consider soil testing to determine soil pH or nutrient deficiency problems. (Contact your soil and water conservation district or cooperative extension office for assistance.)
7. If additional fertilization is needed to get a satisfactory stand, do so according to soil test recommendations.

EROSION CONTROL INSPECTION AND MAINTENANCE GUIDELINES (CONT.)

EROSION CONTROL MAINTENANCE GUIDELINES (CONT.)

PERMANENT SEEDING (CONT.)

8. Add fertilizer the following growing season. Fertilize according to soil test recommendations.
9. Fertilize turf areas annually. Apply fertilizer in a split application. For cool–season grasses, apply one–half of the fertilizer in late spring and onehalf in early fall. For warm–season grasses, apply one–third in early spring, one–third in late spring, and the remaining one–third in middle summer.

MULCHING

1. Inspect within 24 hours of each rain event and at least once every seven calendar days.
2. Check for erosion or movement of mulch; repair damaged areas, reseed, apply new mulch and anchor the mulch in place.
3. Continue inspections until vegetation is firmly established.
4. If erosion is severe or recurring, use erosion control blankets or other more substantial stabilization methods to protect the area.

EROSION CONTROL BLANKET

1. Inspect within 24 hours of each rain event and at least once every seven calendar days.
2. Check for erosion or displacement of the blanket.
3. If any area shows erosion, pull back that portion of the blanket covering the eroded area, add soil and tamp, reseed the area, replace and staple the blanket.

TURF REINFORCEMENT MAT

1. Inspect within 24 hours of each rain event and at least once every seven calendar days.
2. Check for erosion or displacement/exposure of the mat.
3. If a specific area shows erosion, add soil and restabilize.

ROCK CHECK DAM

1. Inspect within 24 hours of each rain event and at least once every seven calendar days.
2. If significant erosion occurs between dams, install an erosion–resistant liner in that portion of the channel.
3. Remove accumulated sediment when it reaches one–half the height of the dam to maintain channel capacity, allow drainage through the dam, and prevent large flow from displacing sediment.
4. Add riprap and aggregate as needed to maintain design height and cross section of the dams.
5. When dams are no longer needed, remove the riprap and aggregate and stabilize the channel, using an erosion–resistant lining if necessary. (Riprap and aggregate from the dam may be removed or utilized to stabilize the channel.)

GEOTEXTILE FABRIC DROP INLET PROTECTION

1. Inspect daily.
2. Inspect geotextile fabric and make needed repairs immediately.
3. Remove sediment from pool area to provide storage for the next storm event. Avoid damaging or undercutting fabric during sediment removal.
4. When contributing drainage area has been stabilized, remove sediment, properly dispose of all construction material, grade area to the elevation of the storm drain inlet top, then stabilize immediately.

SILT FENCE

1. Inspect within 24 hours of a rain event and at least once every seven calendar days.
2. If fence fabric tears, starts to decompose, or in any way becomes ineffective, replace the affected portion immediately. Note: All repairs should meet specifications as outlined within this measure.
3. Remove deposited sediment when it is causing the filter fabric to bulge or when it reaches one–half the height of the fence at its lowest point. When contributing drainage area has been stabilized, remove the fence and sediment deposits, grade the site to blend with the surrounding area, and stabilize.

PREFRABRICATED CONCRETE WASHOUT SYSTEM/CONTAINER

1. Inspect daily and after each storm event.
2. Inspect the integrity of the overall structure including, where applicable, the containment system.
3. Inspect the system for leaks, spills, and tracking of soil by equipment.
4. Inspect the polyethylene lining for failure, including tears and punctures.
5. Once concrete wastes harden, remove and dispose of the material.
6. Excess concrete should be removed when the washout system reaches 50 percent of the design capacity. Use of the system should be discontinued until appropriate measures can be initiated to clean the structure. Prefabricated systems should also utilize this criterion, unless the manufacturer has alternate specifications.
7. Upon removal of the solids, inspect the structure. Repair the structure as needed or construct a new system.
8. Dispose of all concrete in a legal manner. Reuse the material on site, recycle, or haul the material to an approved construction/demolition landfill site. Recycling of material is encouraged. The waste material can be used for multiple applications including but not limited to roadbeds and building. The availability for recycling should be checked locally.
9. The plastic liner should be replaced after every cleaning; the removal of material will usually damage the lining.
10. Concrete washout systems are designed to promote evaporation. Prefabricated units are often pumped and the company supplying the unit provides this service.
11. Inspect construction activities on a regular basis to ensure suppliers, contractors, and others are utilizing designated washout areas. If concrete waste is being disposed of improperly, identify the violators and take appropriate action.

DUST CONTROL

Minimizing wind erosion and controlling dust will be accomplished by one or more of the following methods:

1. Covering 30% or more of the soil with a non–erodible material
2. Roughening the soil to produces ridges (at least 6 inches) perpendicular to the prevailing wind.
3. Frequent watering of excavation and fill ares
4. Providing gravel or paving at entrance/exit drives, parking areas, and transit paths

REVISION

VERSATILE CONSTRUCTION GROUP, LLC.

570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Erosion Control Details, Implementation and Maintenance Guidelines

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By: tab	Checked By: tab	Scale:

CAD FILE: c:\21081\c530 erosion control details.dwg

TRENT A. BAXTER — REGISTERED — No. 19700309 — STATE OF INDIANA — PROFESSIONAL ENGINEER

CERTIFIED BY:

THIS DRAWING IS THE PROPERTY OF VERSITILE CONSTRUCTION GROUP, LLC. ANY ALTERATION TO THIS DRAWING IS STRICTLY PROHIBITED WITHOUT THE PRIOR WRITTEN CONSENT AND UNDER THE DIRECTION OF THE PROFESSIONAL LICENSOR WHOSE SEAL IS AFFIXED TO THIS DRAWING.

SHEET TITLE:

C530

Construction Plan – General Plan Components (Section A)

A1 – Index of the location of required plan elements in the construction plan:
See this sheet (sheet number C540).

A2 – A vicinity map depicting the project site location in relationship to recognizable local landmarks, towns, and major roads:
See Title sheet (T100).

A3 – Narrative of the nature and purpose of the project:
The proposed site will consist of construction of a new 10,297 sq.ft. restaurant and retail center building and approximately 57,781 sq.ft. of asphalt and concrete.

A4 – Latitude and longitude to the nearest fifteen (15) seconds:
Latitude: 39.827621 – Longitude: –85.9165

A5 – Legal description of the project site:
See Plat Plan, sheet 1 of 2 and 2 of 2.

A6 – 11 X 17–inch plat showing building lot numbers/boundaries and road layout/names:
See Plat Plan, sheet 1 of 2 and 2 of 2.

A7 – Boundaries of the one hundred (100) year floodplains, floodway fringes, and floodways:
See Site Grading Plan, sheet C400. This site does not sit within a Floodplain, Floodway, or fringe.
The parcel described and shown herein lies within Zone X" as said parcel plots on map number 18059C0108E (dated March 17, 2014) of the Flood Insurance Rate Maps for the Hancock County Unincorporated Areas, Hancock County, Indiana. The Accuracy of this Flood Hazard Statement is subject to map scale uncertainty and to any other uncertainty in location or elevation on the referenced Flood Insurance Rate Map.

A8 – Land use of all adjacent properties:
North: CC– Commercial
South: IBP– Industrial
East: CN– Commercial
West: IBP– Industrial

A9 – Identification of a U.S. EPA approved or established TMDL:
Currently Buck Creek is not under any development, or Public Notice, or Approved TMDL, also, Buck Creek (in Hancock County) is not on the 303(d) list of Impaired Waters.

A10 – Name(s) of the receiving water(s):
This projects final discharge location will be Buck Creek.

A11 – Identification of discharges to a water on the current 303(d) list of impaired waters and the pollutant(s) for which it is impaired:
Buck Creek (in Hancock County) is not on the 303(d) list of Impaired Waters.

A12 – Soils map of the predominate soil types:
See Title Sheet (T100) of these plans for soils map.

The site contains 17.4% Brookston silty clay loam, 82.6% Crosby silt loam, New Castle till plain.

The Brookston series consists of very deep, poorly drained soils formed in as much as 51 cm (20 inches) of silty material and the underlying loamy till in depressions on till plains and moraines. Slope ranges from 0 to 3 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).

The Crosby soils are somewhat poorly drained and have a seasonal high water table at 0.5 to 2.0 ft. and are on rises on uplands. Slopes are 0 to 2 percent. The native vegetation is hardwoods. The surface layer is silt loam and has moderately low or moderate organic matter content (1.0 to 3.0 percent).

A13 – Identification and location of all known wetlands, lakes, and water courses on or adjacent to the project site (construction plan, existing site layout):
There are no known wetlands, lakes, and water courses on or adjacent to the project site.

A14 – Identification of any other state or federal water quality permits or authorizations that are required for construction activities:
NPDES CONSTRUCTION GENERAL PERMIT FOR STORM WATER DISCHARGE FROM CONSTRUCTION SITES: Regulations promulgated by IDEM to regulate the discharge of storm water from construction activities on sites where more than ONE (1) acres of soil is disturbed. A Notice of Intent (NOI) form must be completed and mailed to IDEM at least 48 Hours prior to any earth–disturbing activities and a Storm Water Pollution Prevention Plan (SWPPP) for the site must be prepared and followed during the construction activities.

NOTICE OF INTENT: The Operator has petitioned IDEM for the storm water discharges during construction at this site to be covered by the NPDES General Permit for Construction Activity for the State of Indiana. A Notice of Intent (NOI) (using the form required by the federal, state, and/or local permitting agency) to be covered under this permit has been filed by the Operator. The SWPPP must be prepared prior to submittal of the NOI form. The signatory on the NOI must sign all documents (i.e., inspection reports) associated with the SWPPP. If the signatory chooses not to sign all documents, he/she must designate a duly authorized representative to sign all relevant documents. This designation must be made in writing and be included in the SWPPP. The duly authorized representative may be either a named individual or any individual occupying a named position.

FINAL STABILIZATION AND TERMINATION OF PERMIT COVERAGE: A site can be considered finally stabilized when all soil disturbing activities have been completed and a uniform perennial vegetative cover with a density of 85% for the unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures have been established and the facility no longer discharges storm water associated with construction activities and a Notice of Termination (NOT) form filed by the Operator(s) with IDEM. The Operator's Project Manager must complete the NOT. The NOT must be signed by the signatory (or equivalent position) on the NOI and subsequently submitted to the appropriate agency. This filing terminates coverage under the General Permit and terminates the Contractor's responsibility to implement the SWPPP, but the Final Stabilization requirements of the SWPPP, including periodic inspections, must be continued until the NOT is filed. Upon achieving this milestone, the Contractor shall also submit Certification/Termination Checklist (Form B–1) and State Form 51514 (NOT) to the Hancock County Surveyor's Office, Town of Mt. Comfort, and IDEM. Final payment and/or the release of retainage will be withheld until all provisions of the SWPPP have been submitted, completed and accepted by the Operator.

The Contractor will obtain copies of any and all local and state regulations which are applicable to storm water management, erosion control, and pollution minimization at this job site and will comply fully with such regulations. The Contractor will submit written evidence of such compliance if requested by the Operator or any agent of a regulatory body. The Contractor will comply with all conditions of the U.S. Environmental Protection Agency and IDEM Construction General Permit, including the conditions related to maintaining the SWPPP and evidence of compliance with the SWPPP at the job site and allowing regulatory personnel access to the job site and to records in order to determine compliance. No other state or federal permit is required for this project.

A15 – Identification and delineation of existing cover, including natural buffers:
The existing site is currently an existing commercial site with grass.

A16 – Existing site topography at an interval appropriate to indicate drainage patterns:
The existing topography can be seen on the Site Demolition Plan, sheet C100.

A17– Location(s) where run–off enters the project site:
There is no stormwater run–off onto this project site.

A18 – Location(s) where run–off discharges from the project site prior to land disturbance:
The stormwater generated from this project will be collected by a new stormwater conveyance system, routed through underground storage and discharged into an existing stormwater pipe at the northeast corner of this site. The post development stormwater run–off discharge location ca be found on the Site Grading Plan (C400) and the Site Storm Water Piping Plan (C420).

A19 – Location of all existing structures on the project site:
See Site Demolition Plan (C100).

A20 – Existing permanent retention or detention facilities, including manmade wetlands, designed for the purpose of stormwater management:
There are no existing detention facilities or manmade wetlands.

A21 – Locations where stormwater may be directly discharged into ground water, such as abandoned wells, sinkholes, or karst features:
There are no know locations where stormwater will be directly discharged into ground water.

A22 – Size of the project area expressed in acres:
The overall project area will be approximately 2.063± acres.

A23 – Total expected land disturbance expressed in acres:
The overall disturbed area will be approximately 2.639± acres.

A24 – Proposed final topography:
See Site Grading Plan (c400).

A25 – Locations and approximate boundaries of all disturbed areas:
See Site Erosion Control Plan (C500). Approx. 2.563± acres.

A26 – Locations, size, and dimensions of all stormwater drainage system such as culverts, stormwater sewer, and conveyance channels:
See Site Storm Water Piping Plan (C420).

A27 – Locations of specific points where stormwater and non–stormwater discharges will leave the project site:
See Site Grading Plan (C400) and Site Storm Water Piping Plan (C420).

A28 – Location of all proposed site improvements, including roads, utilities, lot delineation and identification, proposed structures, and common areas:
See Site Layout Plan (C200), Site Utility Plan (C300), Site Grading Plan (C400), and Site Storm Water Piping Plan (C420).

A29 – Location of all on–site and off–site soil stockpiles and borrow areas:
There will be no soil stockpiling. All excess soils shall be exported to Brookville Sand and Gravel located at 8587 N 850 W, Fairland, IN 46126.

A30 – Construction support activities that are expected to be part of the project:
See Site Erosion Control Plan (C500).

A31 – Location of any in–stream activities that are planned for the project, but not limited to, stream crossings and pump arounds:
There are no in–stream activities that are planned for the project.

Stormwater Pollution Prevention – Construction Component (Section B)

B1 – Description of the potential pollutant generating sources and pollutants, including all potential non–stormwater discharges:
The following materials or substances are expected to be present onsite during construction:

Concrete/Additives/Wastes	Cleaning solvents
Detergents	Petroleum based products
Paints/Solvents	Pesticides
Acids	Fertilizers
Solid and construction wastes	Sanitary wastes
Soil stabilization additives	Exposed soils

B2 – Stable construction entrance locations and specifications:
A Temporary stone construction entrance will be established. See Site Erosion Control Plan (C500) and Site Erosion Control Details (C510).

B3 – Specifications for temporary and permanent stabilization:
Temporary, Permanent seeding and rough surface grading shall be used for soil stabilization. See Site Erosion Control (C500) and all Site Erosion Control Detail Pages (C510– C530).

B4 – Sediment control measures for concentrated flow areas:
There are no concentrated flow areas.

B5 – Sediment control measures for sheet flow areas:
Silt Fencing will be used for sheet flow areas. See Site Erosion Control (C500) and all Site Erosion Control Detail Pages (C510– C530).

B6 – Run–off control measures:
Not applicable.

B7 – Stormwater outlet protection location and specifications:
Not applicable.

B8 – Grade stabilization structure locations and specifications:
Not applicable.

B9 – Dewatering applications and management methods:
See Site Erosion Control (C500) and all Site Erosion Control Detail Pages (C530) for location and dewatering details.

B10 – Measures utilized for work within waterbodies:
There is no work within waterbodies on this project.

B11 – Maintenance guidelines for each proposed stormwater quality measure:
See all Site Erosion Control Detail Pages (C510– C530).

B12 – Planned construction sequence that describes the implementation of stormwater quality measures in relation to land disturbance:
See Site Erosion Control Details (C510).

B13 – Provisions for erosion and sediment control on individual residential building lots regulated under the proposed project:
This is a commercial building project and will have no residential building.

B14 – Material handling and spill prevention and spill response plan meeting the requirements in 327 IAC 2–6.1:

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff. The job site superintendent will be responsible for ensuring that these procedures are followed.

A. Good Housekeeping The following good housekeeping practices will be followed onsite during the construction project.
1. An effort will be made to store only enough products required to do the job.
2. All materials stored onsite will be stored in a neat, orderly manner and, if possible, under a roof or in a containment area. At a minimum, all containers will be stored with their lids on when not in use. Drip pans shall be provided under all dispensers.
3. Products will be kept in their original containers with the original manufacturer's label in legible condition.
4. Substances will not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product will be used up before disposing of the container.
6. Manufacturer's recommendations for proper use and disposal will be followed. 7.The job site superintendent will be responsible for daily inspections to ensure proper use and disposal of materials.

B. Hazardous Products: These practices will be used to reduce the risks associated with hazardous materials. Material Safety Data Sheets (MSDS's) for each substance with hazardous properties that is used on the job site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the SWPPP file at the job site construction trailer office. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product he/she is using, particularly regarding spill control techniques.
1. Products will be kept in original containers with the original labels in legible condition.
2. Original labels and material safety data sheets (MSDS's) will be procured and used for each material.
3. If surplus product must be disposed of, manufacturer's or local/state/federal recommended methods for proper disposal will be followed.

C. Hazardous Waste: All hazardous waste materials will be disposed of by the Contractor in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the job site superintendent, who will also be responsible for seeing that these practices are followed.

D. Product Specific Practices: The following product specific practices will be followed on the job site.
1. Petroleum Products All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any petroleum storage tanks stored onsite will be located within a containment area that is designed with an impervious surface between the tank and the ground. The secondary containment must be designed to provide a containment volume that is equal to 110% of the volume of the largest tank. Drip pans shall be provided for all dispensers. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations. The location of any fuel tanks and/or equipment storage areas must be identified on the construction drawings by the contractor once the locations have been determined.
2. Fertilizers Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked in the soil to limit exposure to stormwater. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
3. Paints, Paint Solvents, and Cleaning Solvents All containers will be tightly sealed and stored when not in use. Excess paint and solvents will not be discharged to the storm sewer system but will be properly disposed of according to manufacturer's instructions or state and federal regulations.
4. Concrete Wastes Concrete trucks will be allowed to wash out, discharge surplus concrete or drum wash water on the site, but only in the specifically designated concrete wash–out (lined dumpsters) which have diked areas to prevent contact between the concrete and/or wash out and storm water which will be discharged from the site or Concrete trucks can dump surplus concrete in locations where waste concrete can be poured into forms to make riprap or other useful concrete products. The hardened residue from the concrete wash out lined dumpsters will be disposed of in the same manner as other non–hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor. Disposal shall occur when lined dumpster is full. When not in use, lined dumpster shall be covered by a water–proof tarp or other means to prevent storm water from entering the dumpster. The job site superintendent will be responsible for seeing that these procedures are followed. The project may require the use of multiple concrete wash out areas. All concrete wash out areas will be located in an area where the likelihood of the area contributing to storm water discharges is negligible. If required, additional BMPs must be implemented to prevent concrete wastes from contributing to storm water discharges. The location of concrete wash out area(s) have been identified on the construction drawings.
5. Solid and Construction Wastes All waste materials will be collected and stored in an appropriately covered container and/or securely lidded metal dumpster rented from a local waste management company which must be a solid waste management company licensed to do business in the State of Indiana and Hancock County. The dumpster will comply with all local and state solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of twice per week or more often if necessary, and the trash will be hauled to a landfill approved by the State of Indiana and Hancock County. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal. All waste dumpsters and roll–off containers will be located in an area where the likelihood of the containers contributing to storm water discharges is negligible.If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges. The location of waste dumpsters and roll–off containers have been identified on the construction drawings.
6. Sanitary Wastes All sanitary waste will be collected from the portable units a minimum of three times per week by a licensed portable facility provider in complete compliance with local and state regulations. All sanitary waste units will be located in an area where the likelihood of the unit contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges. The location of sanitary waste units must be identified on the construction drawings by the contractor once the locations have been determined.
7. Contaminated Soils Any contaminated soils (resulting from spills of materials with hazardous properties) which may result from construction activities will be contained and cleaned up immediately in accordance with the procedures given in the Materials Management Plan and in accordance with applicable state and federal regulations.
8. Exposed Soils Exposed soils shall be treated as listed in B7 Runoff Control Measures and/or B11 Temporary Surface Stabilization, and/or B12 Permanent Surface Stabilization Spill Prevention and Response Procedures See SPILL RESPONSE FOR CONTRACTOR on Sheet C520 Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill. Spills of amounts that exceed Reportable Quantities of certain substances specifically mentioned in federal regulations (40 CFR 110, 40 CFR 117, and 40 CFR 302) must be immediately reported to the EPA National Response Center, telephone 1–800–424–8802, IDEM, telephone (317) 233–7745, and the Greenfield City Hall 1–317–477–4300, and the Buck Creek Township Fire Department 1–317–866–1050.

B15 – Material handling and storage procedures associated with construction activity:
All appropriate measures will be implemented to manage wastes or unused building materials including, but not limited to garbage, debris, cleaning wastes, wastewater, concrete or cementitious washout water, mortar/masonry products, soil stabilizers, lime stabilization materials, and other substances. All concrete/grout materials will be handled through a concrete wash–out area, garbage will be contained in an on–site dumpster which will be emptied in a timely manner, and all other chemical materials will remain in their storage containers until being used.

Stormwater Pollution Prevention – Post–construction Component (Section C)

The post–construction stormwater pollution prevention plan must include the implementation of stormwater quality measures to address pollutants that will be associated with the final land use of the project. Post–construction stormwater quality measures should be functional upon completion of the project. Long–term functionality of the measures is critical to their performance and should be monitored and maintained.

Post–construction is not required for:
- Land–disturbing activities where there will be no additional impervious surfaces added.
- Single–family residential developments of four lots or less.
- Single–family residential strip developments.
- Individual building lots within a permitted project site.
- Single family residences and private ponds that are not part of a larger common plan of development or sale.

Off road courses or other sites that will remain disturbed in perpetuity, must utilize post construction measures to control sediment and other pollutants that may be associated with the post–construction land use.

C1 – Description of pollutants and their sources associated with the proposed land use:
Potential pollutant Sources that may appear at the site due to proposed land use activities include, but are not limited to, vehicles, exposed soils, and trash. Potential pollutants include, but are not limited to, oil, grease, diesel fuel, gasoline, anti–freeze, auto soap, and fertilizer.

C2 – Description of proposed post–construction stormwater measures:
Isolator rows in the Stormtech stormwater storage facilities shall be used as post construction stormwater measure.

C3 – Plan details for each stormwater measures:
See Site Erosion Control Plan (C500) and all Site Erosion Control Details pages (C510– C530 and Sitework Details (C620).

C4 – Sequence describing stormwater measure implementation.
The Contractor will be responsible for implementing the following erosion control and storm water management control measures. The Contractor may designate these tasks to certain subcontractors as he sees fit, but the ultimate responsibility for implementing these controls and ensuring their proper functioning remains with the Contractor. The order of activities will be as follows:

A. Conduct an Erosion and Sediment control pre–construction meeting with the City of Greenfield.
B. Install temporary site construction entrance.
C. Install silt fence perimeter control and silt inlet protection.
D. Install dumpster protection and concrete wash out stone pad.
E. Commence site grading and building pad construction.
F. Any disturbed areas of the site where construction activity has ceased for more than 14 days shall be temporarily seeded and watered.
G. Install all storm sewers and Stormtech storage structures.
H. Install protection at the locations of all ends of exposed storm sewer pipes.
I. Begin construction of building.
J. Finalize pavement sub–grade preparation.
K. Install base material as required for asphaltic pavement
L. Construct all curbs and sidewalks.
M. Construct asphaltic parking lot and road pavement
N. Change temporary inlet protection to 'Dandy Sacks'.
O. Carry out final seeding and planting
P. Remove silt fencing and 'Dandy Sacks' only after all paving is complete and exposed surfaces are stabilized.

C5 – Maintenance guidelines for proposed post–construction stormwater measures:
Isolator rows in the Stormtech stormwater storage facilities shall be used as post construction stormwater measure.
Removal of all trash and debris from the site and the storm sewers, The pavement should be swept and kept free of sediments carried by vehicles. A dry absorbent material such as "Floor Dry" should be used to soak up liquids left by vehicles. Keep all landscaped and grass areas irrigated to promote vigorous growth. Add or replace mulch in landscaped areas as needed.

C6 – Entity that will be responsible for operation and maintenance of the post construction stormwater measures:
AJE Properties, LLC
Responsibility: AJE Properties, LLC
4292 W. 186th Street
Sheridan, Indiana 46069
Phone: (317) 340–6819

REVISION
07/08/2022 revised plan to new formot
04/06/2023 revised plan per reviewers comments

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

Stormwater Pollution Prevention Assessment Sheet

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By: tab	Checked By: tab	Scale:

CAD FILE: G:\21081\c550 swppp.dwg

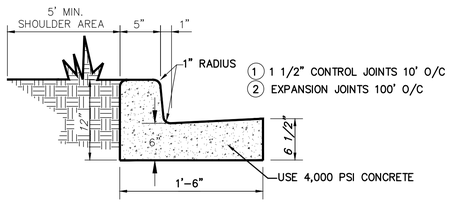
TIMOTHY A. BAKER REGISTERED No. 19700309 PROFESSIONAL ENGINEER STATE OF INDIANA

CERTIFIED BY:

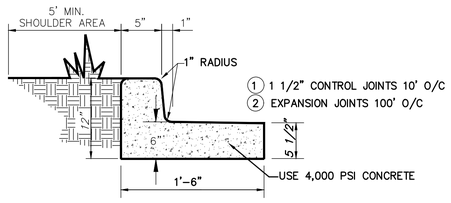
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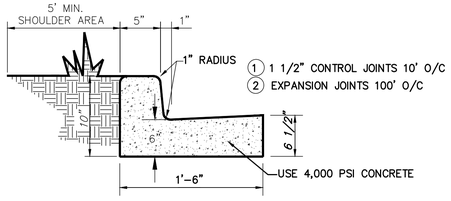
C540



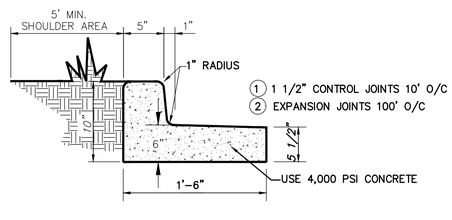
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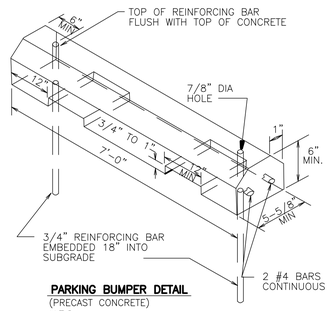
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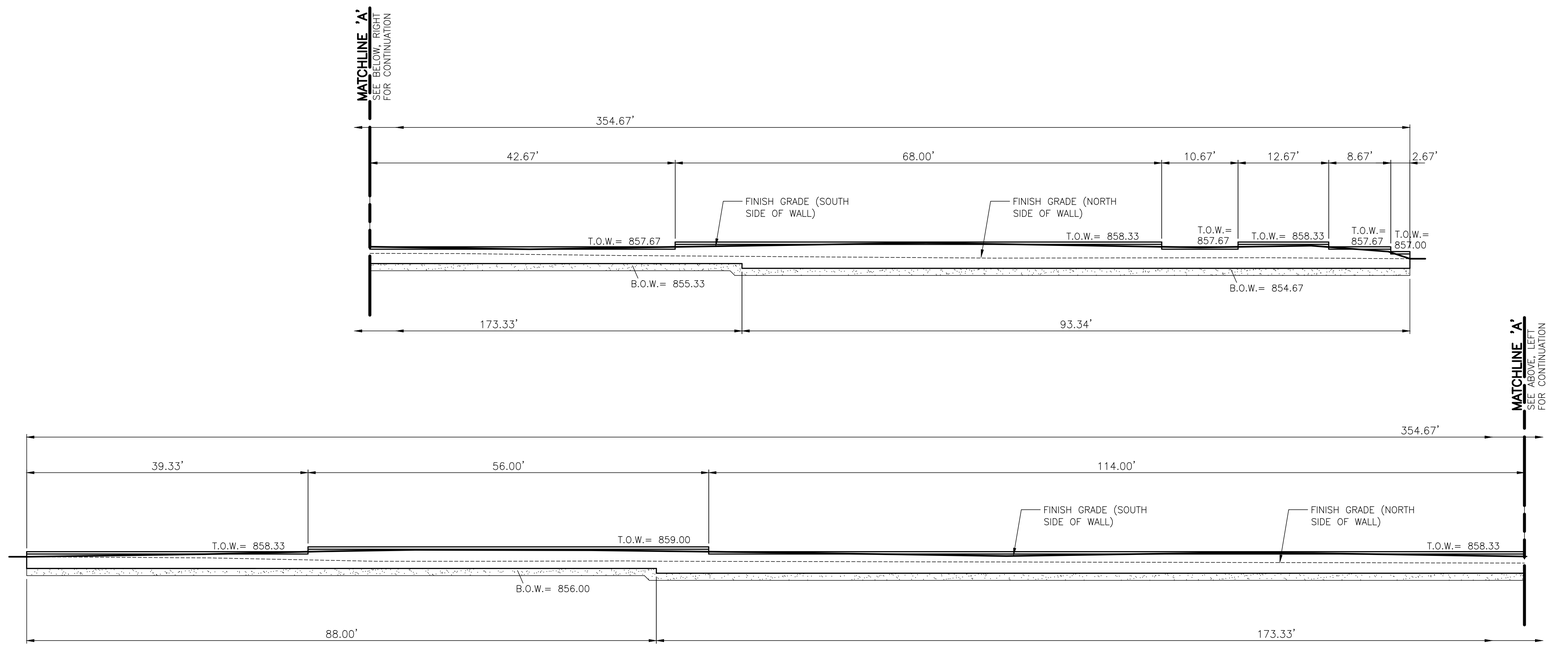
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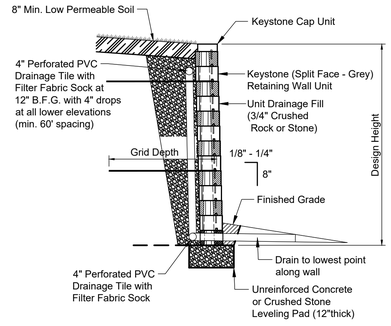
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NO SCALE



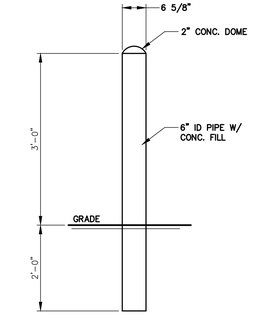
PARKING BUMPER DETAIL
(PRECAST CONCRETE)
N.T.S.



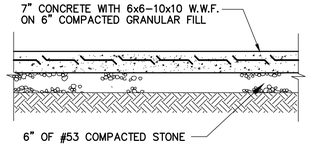
354.67 L.F. "KEYSTONE" (SPLIT FACE) RETAINING WALL
SCALE: 1"= 10.0'



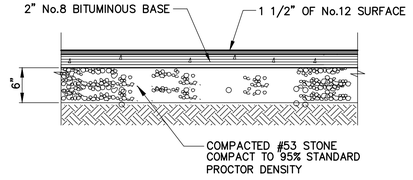
Typical Reinforced Keystone Wall Section
Keystone Retaining Wall Unit - Near Vertical Setback



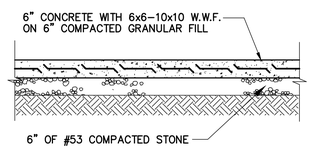
TYPE 6"dia. PIPE BOLLARD DETAIL
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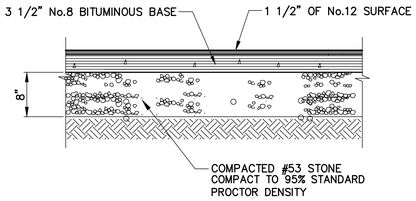
TYPICAL CONCRETE DUMPSTER PAVEMENT
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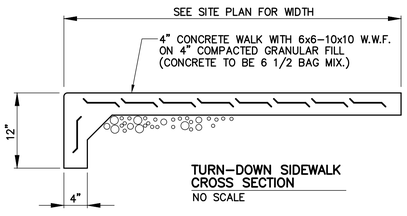
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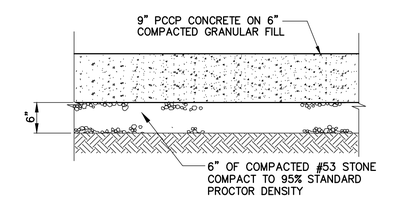
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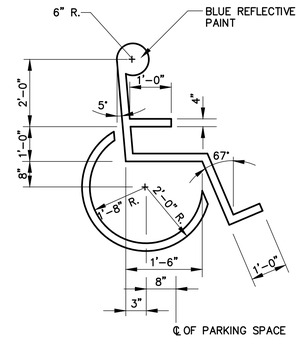
TYPICAL HEAVY DUTY ASPHALT PAVEMENT DETAIL
NO SCALE



TURN-DOWN SIDEWALK CROSS SECTION
NO SCALE



TYPICAL CONCRETE RIGHT-OF-WAY PAVEMENT
NO SCALE



INTERNATIONAL HANDICAP DETAIL
NO SCALE

REVISION

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Treey Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

General Sitework Details

Job No.:	Date Stamped:
21081	03/31/2022
Drawn By: caw	Checked By: tab / Scale: 1"= 10.0'

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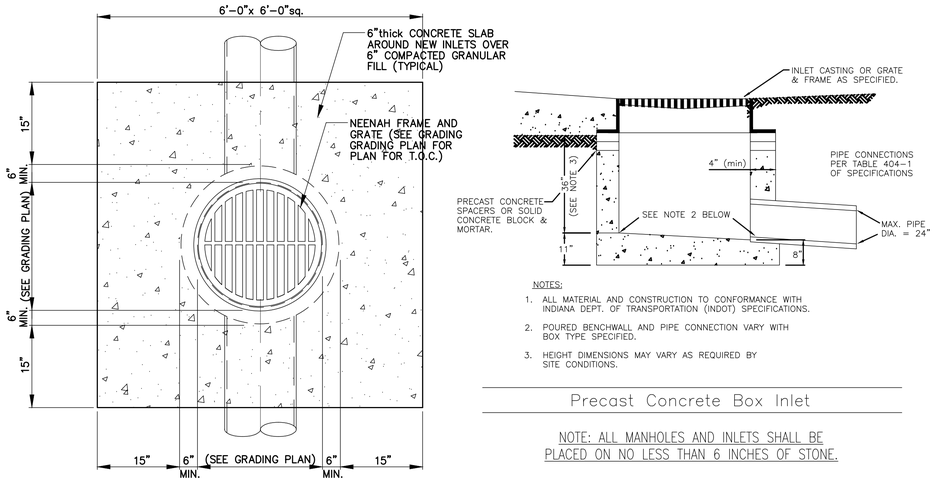
TRENT A. BAXTER
REGISTERED
No. 19700309
STATE OF INDIANA
PROFESSIONAL ENGINEER

CERTIFIED BY:

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C600

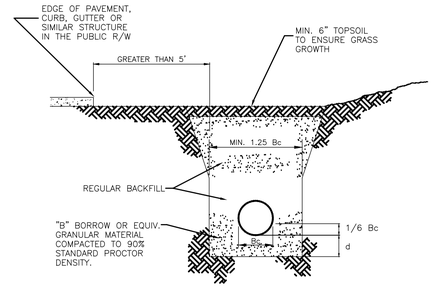


NOTES:

1. ALL MATERIAL AND CONSTRUCTION TO CONFORMANCE WITH INDIANA DEPT. OF TRANSPORTATION (INDOT) SPECIFICATIONS.
2. POURED BENCHWALL AND PIPE CONNECTION VARY WITH BOX TYPE SPECIFIED.
3. HEIGHT DIMENSIONS MAY VARY AS REQUIRED BY SITE CONDITIONS.

Precast Concrete Box Inlet

NOTE: ALL MANHOLES AND INLETS SHALL BE PLACED ON NO LESS THAN 6 INCHES OF STONE.



GREATER THAN 5' FROM EDGE OF PAVEMENT

DEPTH OF BEDDING MATERIAL BELOW PIPE D	(d) MIN.
27" & SMALLER	3"
30" TO 60"	4"
66" & LARGER	6"

NOTE:
ALL BEDDING AND INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.

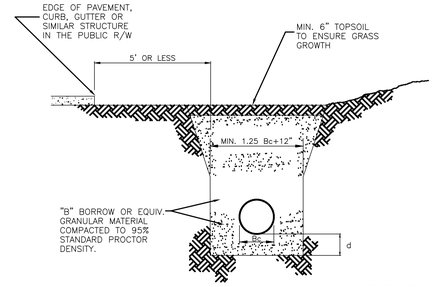
A MINIMUM 9" CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

LEGEND

Bc = OUTSIDE DIAMETER
D = INSIDE DIAMETER
d = DEPTH OF BEDDING MATERIAL BELOW PIPE

REINFORCED CONCRETE PIPE (RCP) TRENCH DETAIL

GREATER THAN 5' FROM EDGE OF PAVEMENT



WITHIN 5' OF EDGE OF PAVEMENT

DEPTH OF BEDDING MATERIAL BELOW PIPE D	(d) MIN.
27" & SMALLER	3"
30" TO 60"	4"
66" & LARGER	6"

NOTE:
ALL BEDDING AND INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.

A MINIMUM 9" CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

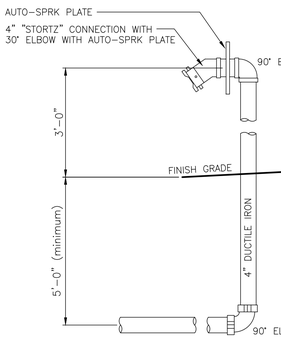
LEGEND

Bc = OUTSIDE DIAMETER
D = INSIDE DIAMETER
d = DEPTH OF BEDDING MATERIAL BELOW PIPE

REINFORCED CONCRETE PIPE (RCP) TRENCH DETAIL

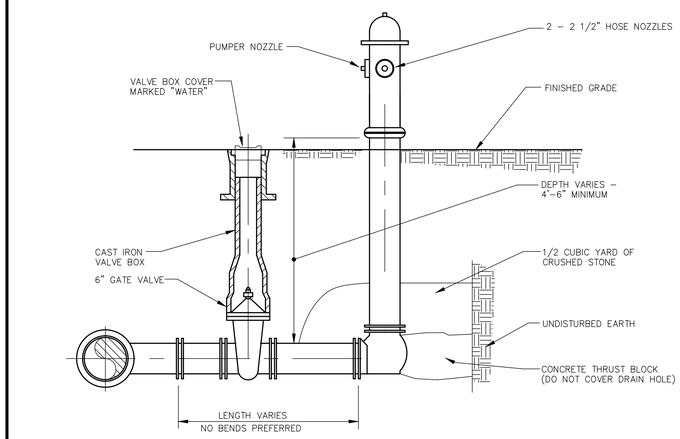
WITHIN 5' OF EDGE OF PAVEMENT

REVISION



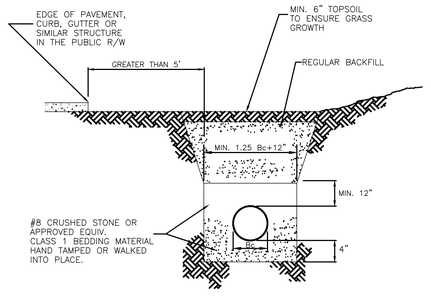
"STORTZ" CONNECTION DETAIL

NO SCALE



FIRE HYDRANT DETAIL

NO SCALE



GREATER THAN 5' FROM EDGE OF PAVEMENT

NOTE:
ALL BEDDING AND INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.

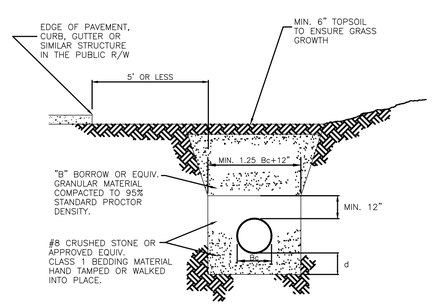
A MINIMUM 9" CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

LEGEND

Bc = OUTSIDE DIAMETER
D = INSIDE DIAMETER
d = DEPTH OF BEDDING MATERIAL BELOW PIPE

PLASTIC PIPE (PVC & HDPE) TRENCH DETAIL

GREATER THAN 5' FROM EDGE OF PAVEMENT



WITHIN 5' OF EDGE OF PAVEMENT

NOTE:
ALL BEDDING AND INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.

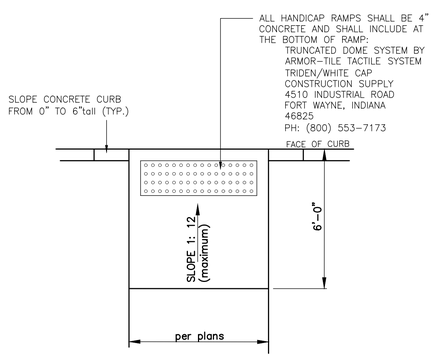
A MINIMUM 9" CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

LEGEND

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D = INSIDE DIAMETER
d = DEPTH OF BEDDING MATERIAL BELOW PIPE

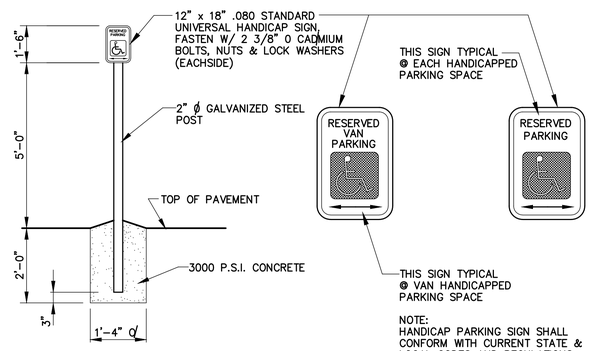
PLASTIC PIPE (PVC & HDPE) TRENCH DETAIL

WITHIN 5' OF EDGE OF PAVEMENT



TYPICAL CONCRETE SIDEWALK HANDICAP RAMP

NO SCALE



NOTE:
HANDICAP PARKING SIGN SHALL CONFORM WITH CURRENT STATE & LOCAL CODES AND REGULATIONS.

HANDICAP PARKING SIGNS

NO SCALE

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

General Sitework Details

Job No.:	Date Stamped:	
21081	03/31/2022	
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caw	tab	1"= 10.0'

CAD FILE:
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TRENT A. BAYER REGISTERED No. 19700309 PROFESSIONAL ENGINEER

CERTIFIED BY:

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SHEET TITLE:

C610

ADVANCED DRAINAGE SYSTEMS, INC.

STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740 OR SC-310.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418-16 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

REQUIRED STORMTECH CHAMBER ELEVATIONS

1. BOTTOM OF STONE BASE= 853.14
2. TOP OF STONE BASE/BOTTOM OF STORMTECH CHAMBERS= 853.64
3. TOP OF STORMTECH CHAMBERS= 856.14
4. MINIMUM PAVEMENT ELEVATIONS ABOVE STORMTECH CHAMBERS= 858.00

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310/SC-740 SYSTEM

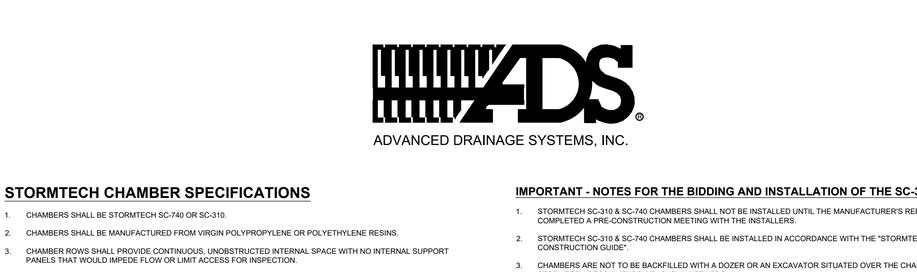
1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

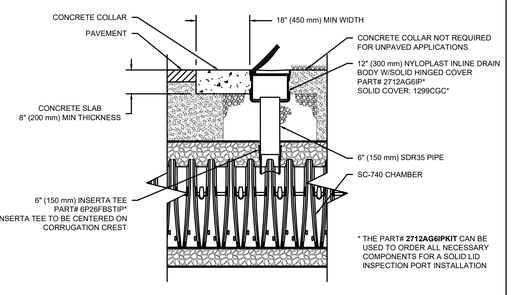
1. STORMTECH SC-310 & SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.



SC-740 ISOLATOR ROW DETAIL



SC-740 6" (150 mm) INSPECTION PORT DETAIL

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

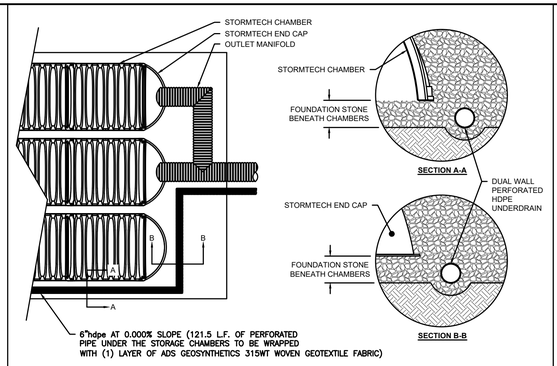
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

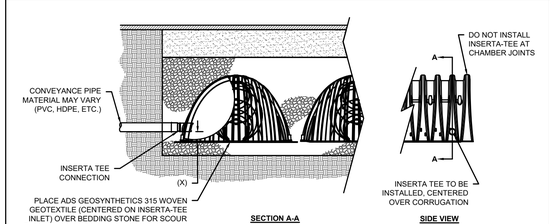
STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



UNDERDRAIN DETAIL



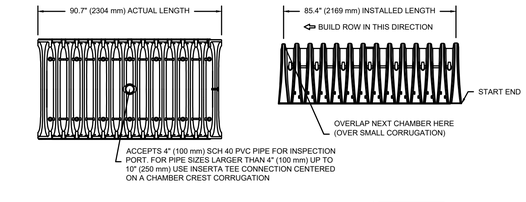
CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

INSERTA-TEE SIDE INLET DETAIL

SC-740 TECHNICAL SPECIFICATION

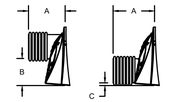
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

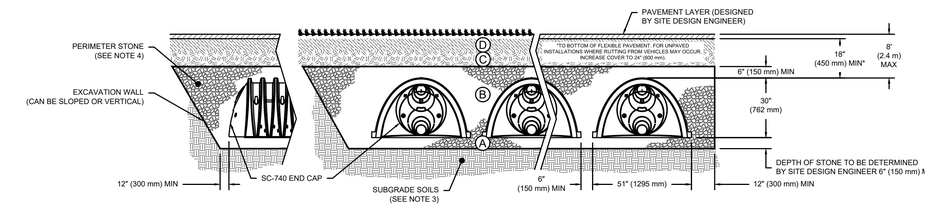
NOTE: ALL DIMENSIONS ARE NOMINAL

SC-740 TECHNICAL SPECIFICATIONS

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-740 CROSS SECTION DETAIL

REVISION

04/06/2023	added relevant stormtech stormwater storage chamber system elevations per comments

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

General Sitework Details

Job No.: 21081	Date Stamped: 03/31/2022	
Drawn By: caw	Checked By: tab	Scale:

CAD FILE: G:\21081\c620 general details.dwg

TRENT A. BAXTER — REGISTERED — No. 19700309 — STATE OF INDIANA — PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

THIS DRAWING IS THE PROPERTY OF VERSITILE CONSTRUCTION GROUP, LLC. ANY ALTERATION TO THIS DRAWING IS STRICTLY PROHIBITED WITHOUT THE PRIOR WRITTEN CONSENT AND UNDER THE DIRECTION OF THE PROFESSIONAL LICENSOR WHOSE SEAL IS AFFIXED TO THIS DRAWING.

SHEET TITLE:

C620

AQUA SM Indiana

STANDARD DETAILS

DIRECTIONS FOR USE

1. THE ENTIRE SET OF FULL SIZE STANDARDS SHALL BE ATTACHED TO THE CONSTRUCTION DRAWINGS AND SHALL BE CONSIDERED PART THERETO. PARTIAL SET MAY BE USED FOR SMALL PROJECTS WHEN APPROVED BY *AQUA INDIANA*.
2. DETAILS PREPARED BY OUTSIDE SOURCES SHALL NOT BE INCLUDED IN THE CONSTRUCTION DRAWINGS WHEN SAID DETAILS COVER WORK WHICH IS COVERED BY *AQUA INDIANA* STANDARDS.
3. INDIVIDUAL *AQUA INDIANA* STANDARDS THAT DO NOT APPLY MAY BE CROSSED OUT BY DESIGN ENGINEER THROUGH THE PLACEMENT OF A SINGLE LARGE X OVER DETAIL. MINOR REFERENCE NOTATIONS MAY BE PLACED ADJACENT TO INDIVIDUAL STANDARD TITLES FOR COORDINATION. HOWEVER, THE STANDARDS THEMSELVES SHALL NOT BE MODIFIED IN ANY WAY.
4. DETAILS PREPARED BY OUTSIDE SOURCES COVERING WORK WHICH IS NOT COVERED BY AQUA INDIANA STANDARDS ARE THE SOLE RESPONSIBILITY OF THE DESIGN ENGINEER AND SHALL BE PLACED ON SHEETS OTHER THAN THE *AQUA INDIANA* STANDARDS SHEETS.

GENERAL NOTES

1. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION OR EXCAVATION. DURING CONSTRUCTION ALL UTILITIES SHALL BE ADEQUATELY SUPPORTED TO MINIMIZE DAMAGE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING DAMAGED UTILITIES TO THE SATISFACTION OF *AQUA INDIANA* AND THE OWNER OF THE AFFECTED UTILITY.
2. ALL CONSTRUCTION DRAWINGS SHALL BE SUBMITTED TO AQUA INDIANA IN ELECTRONIC FORMAT, CADD AND PDF. ALL COORDINATE DATA SHALL BE U.S. SURVEY FEET. ALL BENCHMARKS AND ELEVATIONS SHALL BE FROM STATE PLANE NAVD 1988 DATUM.
3. WHEREVER PROPRIETARY EQUIPMENT IS SPECIFIED, ALL PROPOSALS FOR SUBSTITUTION SHALL BE SUBMITTED IN WRITING TO *AQUA INDIANA* AND SHALL BE SUBJECT FOR REVIEW.
4. INSTALLATION OF OR PROVISIONS FOR THE INSTALLATION OF ALL UNDERGROUND UTILITIES INCLUDING SERVICE LATERALS TO BE PLACED UNDER PAVEMENT AREAS SHALL BE ESTABLISHED PRIOR TO THE CONSTRUCTION OF THE PAVEMENTS.
5. CONTRACTOR SHALL CONTACT *AQUA INDIANA* FOR ELECTRICAL STANDARDS, TERMS, AND CONDITIONS DURING PROJECT PLANNING AND AT LEAST 1 MONTH PRIOR TO CONSTRUCTION OR EXCAVATION.

DRAWING INDEX

SHEET NO.	DESCRIPTION
1	MANHOLE DETAILS
2	SANITARY SEWER DETAILS
3	MISCELLANEOUS DETAILS
4–4A	LIFT STATION DETAILS
5	LOW PRESSURE SEWER SYSTEM DETAILS
6–14	SANITARY SEWER SPECIFICATIONS
14–18	LIFT STATION SPECIFICATIONS
19–20	LOW PRESSURE SEWER PUMP SYSTEM SPECIFICATIONS

REVISIONS

REVISION NO.	SHEET NO.	DESCRIPTION	DATE
1			

APPROVED BY

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

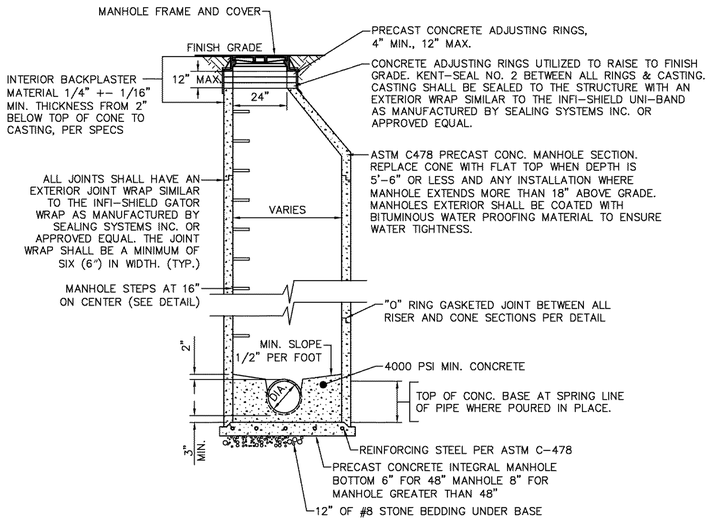
3/1/2021

JAMES E. SHIELDS, JR.
PROFESSIONAL ENGINEER No. PE10201333
STATE OF INDIANA

DATE OF ISSUANCE: 3/1/2021

811 Know what's below. Call before you dig.

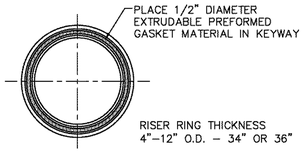
PLOT SCALE: 1:1 EDIT DATE: 10/26/16 — 11:29 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20161964.UI.DS.01(R4).DWG



NOTES;

1. MANHOLE SHALL CONFORM TO ASTM C-478.
2. JOINTS SHALL CONFORM TO ASTM C-433.
3. PIPE CONNECTIONS TO MANHOLES SHALL BE MADE WITH WATERTIGHT FLEXIBLE RUBBER BOOTS WITH STAINLESS STEEL BANDS OR FLEXIBLE WATERTIGHT GASKETS. ACCEPTABLE PRODUCTS ARE: KOR-N-SEAL AS MANUFACTURED BY CORE AND SEAL COMPANY, DURA-SEAL III AS MANUFACTURED BY DURA TECH, INC., PSX AS MANUFACTURED BY THE PRESS SEAL GASKET CORPORATION, OR APPROVED EQUAL. PIPE SEAL SHALL MEET ASTM C-443.
4. PIPE OPENINGS IN BASE AND RISER SECTIONS SHALL BE FORMED OR CORE-DRILLED.

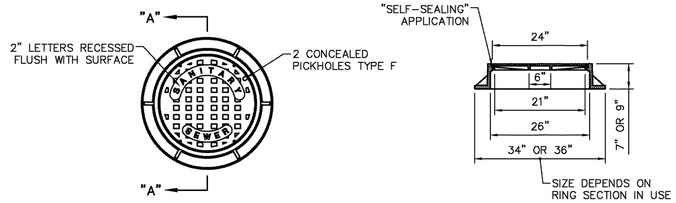
STANDARD PRECAST CONCRETE MANHOLE
(FOR PIPE SIZES 8" TO 24")
NOT TO SCALE



ADJUSTING RING
NOT TO SCALE

MANHOLE FRAME:

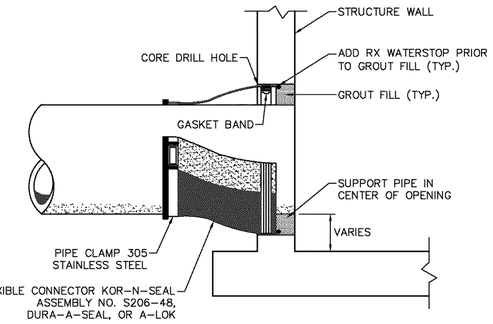
1. SELF SEALING GASKETED LIDS FOR SANITARY WITH SANITARY SEWER STAMPED ON THE LID. EAST JORDAN 1022Z1, NEENAH R-1772, OR APPROVED EQUAL.
2. IF CASTING IS LESS THAN 18" ABOVE THE 100-YEAR FLOOD ELEVATION OF ALL WATERWAYS, BOLT DOWN CASTING REQUIRED
3. SELF SEALING LIDS SHOULD BE STAMPED "SANITARY SEWER"
4. AS REQUIRED BY STATE ENGINEER: PERMANENTLY SECURE ALL WATER TIGHT BOLT DOWN CASTING FRAMES TO ECCENTRIC CONE OR FLAT CAP SECTION BY INSTALLATION OF FOUR (4) EQUALLY SPACED 5/8" DIAMETER STAINLESS STEEL ALL-THREAD DOWEL RODS OR 5/8" HILTI EXPANSION ANCHORS. SIKA EPOXY, OR APPROVED EQUAL, SHALL BE USED WITH EACH STAINLESS STEEL ALL-THREAD DOWEL ROD.



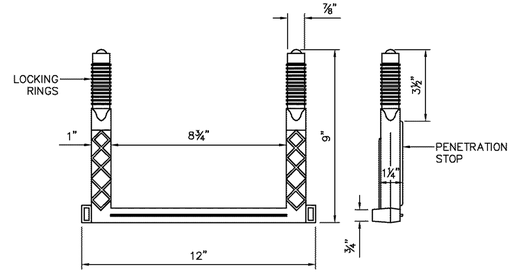
PLAN VIEW

SECTION "A-A"

SANITARY SEWER MANHOLE
FRAME AND COVER
NOT TO SCALE



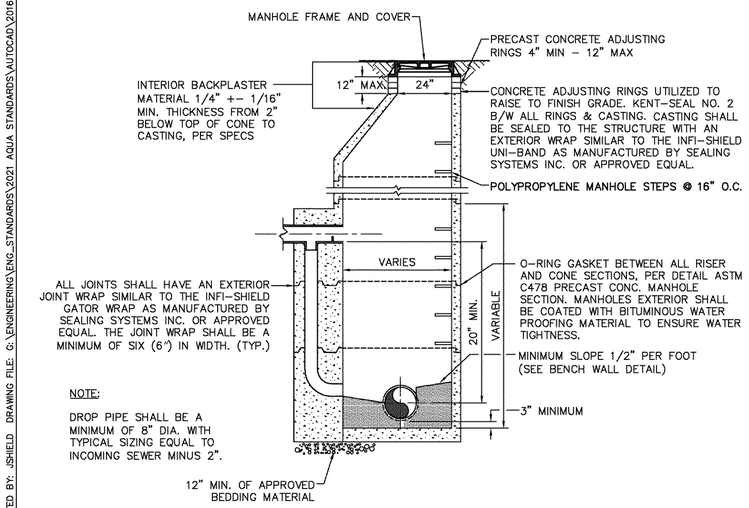
NEW CONNECTION TO EXISTING MANHOLE
NOT TO SCALE



NOTES;

1. TO BE INSTALLED WITH NON-SHRINK MORTAR OR EPOXY GROUT.
2. STEPS SHALL NOT BE SITUATED DIRECTLY ABOVE INLET OR OUTLET PIPES.

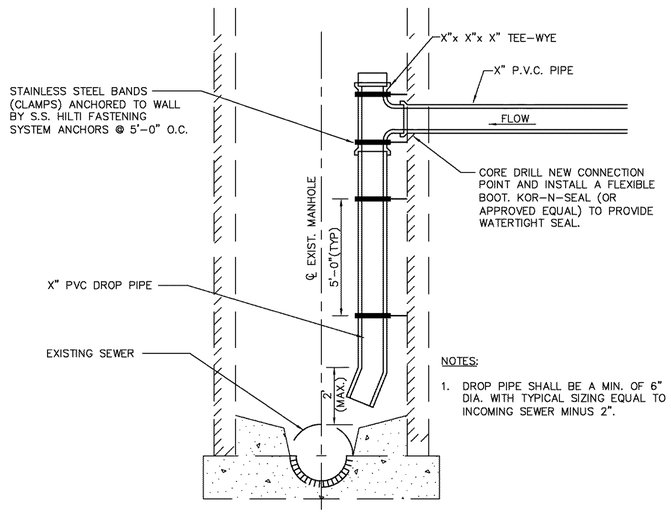
FIBERGLASS REINFORCED POLYPROPYLENE MANHOLE STEPS
NOT TO SCALE



BENCH WALL DETAIL

LARGE PIPE DROP DETAIL

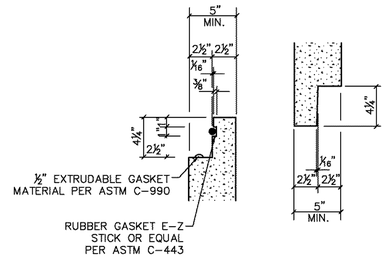
PRECAST OUTSIDE DROP CONNECTION
NOT TO SCALE



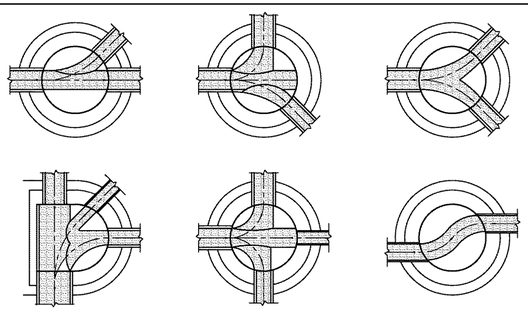
NOTES:

1. DROP PIPE SHALL BE A MIN. OF 6" DIA. WITH TYPICAL SIZING EQUAL TO INCOMING SEWER MINUS 2".

INTERIOR DROP CONNECTION
(AT EXISTING MANHOLE)
NOT TO SCALE



O-RING JOINT
NOT TO SCALE



SANITARY SEWER
BENCH SLOPE = 1/2" PER FOOT
TROUGH WIDTH = PIPE DIAMETER x 1.3

STANDARD MANHOLE BENCHES
NOT TO SCALE

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

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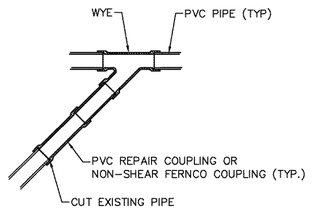
REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

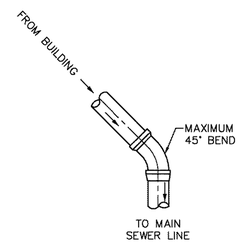
MANHOLE DETAILS

1

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EXISTING LATERAL RECONNECTION DETAIL
NOT TO SCALE

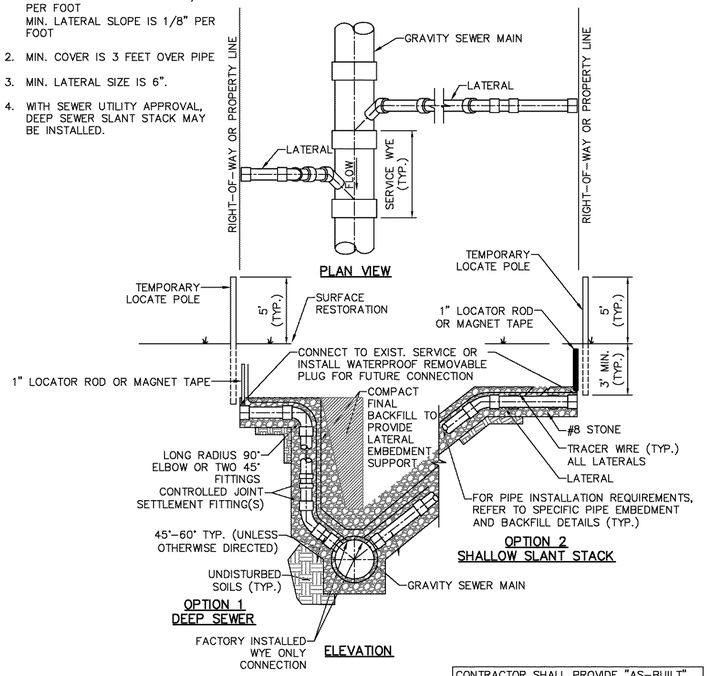


45° OR LESS PLAN VIEW

TYPICAL HORIZONTAL BEND IN LATERAL DETAIL
NOT TO SCALE

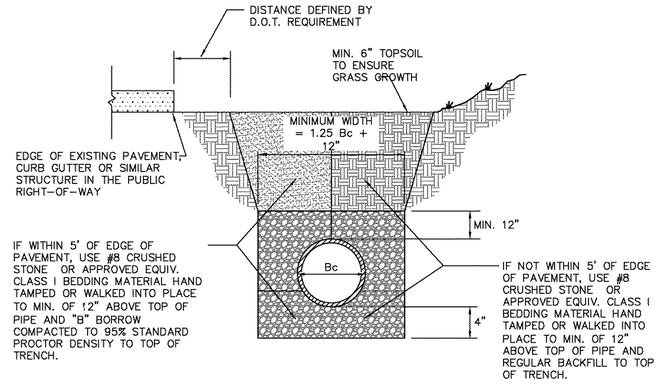
NOTES:

1. NORMAL LATERAL SLOPE IS 1/4" PER FOOT
   MIN. LATERAL SLOPE IS 1/8" PER FOOT
2. MIN. COVER IS 3 FEET OVER PIPE
3. MIN. LATERAL SIZE IS 6".
4. WITH SEWER UTILITY APPROVAL, DEEP SEWER SLANT STACK MAY BE INSTALLED.



CONTRACTOR SHALL PROVIDE "AS-BUILT" SERVICE CONNECTION TIES TO THE OWNER, ENGINEER, AND PROPERTY OWNER (TYP.)

TYPICAL SERVICE CONNECTION
NOT TO SCALE



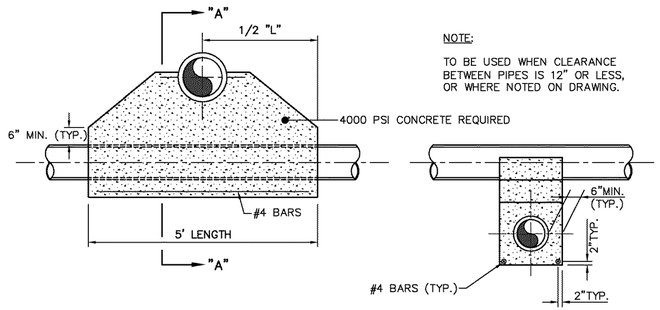
LEGEND

Bc= OUTSIDE DIAMETER
D= INSIDE DIAMETER
d= DEPTH OF BEDDING MATERIAL BELOW PIPE

NOTES:

1. ALL INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.
2. A MIN. 9" OF CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

PLASTIC PIPE (PVC & HDPE) BEDDING DETAIL
NOT TO SCALE



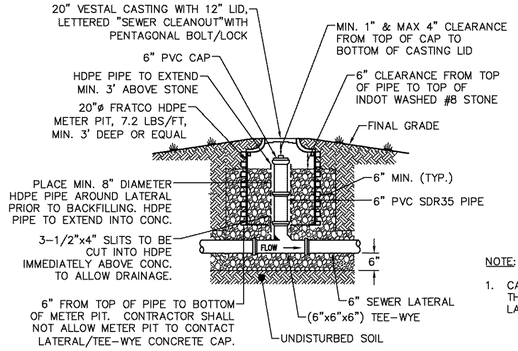
NOTE:

TO BE USED WHEN CLEARANCE BETWEEN PIPES IS 12" OR LESS, OR WHERE NOTED ON DRAWING.

PROFILE VIEW

SECTION "A – A"

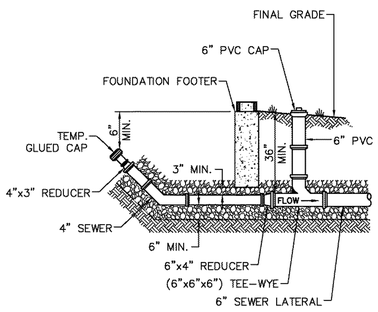
CONCRETE SADDLE DETAIL
NOT TO SCALE



NOTE:

1. CASTING SHALL BE INSTALLED SO THAT THEY DO NOT CONTACT THE LATERAL OR LATERAL CAP.

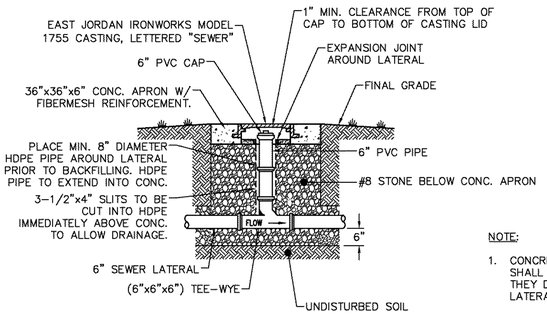
CLEANOUT, TYPE III
GRASS OR LANDSCAPE SURFACES BEYOND 3' OF BLDG)
NOT TO SCALE



NOTES:

1. ALL SLAB AND CRAWL SPACE CONNECTIONS MUST BE A MINIMUM OF 3" BELOW THE FOOTER AND EXIT THE BUILDING AT THE FRONT OF THE STRUCTURE TO PROVIDE THE SHORTEST, MOST DIRECT ROUTE FROM THE BUILDING TO THE EXISTING LATERAL STUB.
2. LATERAL CONTRACTOR TO INSTALL IN TOP OF CLEANOUT CAP A 1-1/2" X 1/4" MAG NAIL AS MANUFACTURED BY CHRISNIK, INC. OF CINCINNATI, OHIO OR APPROVED EQUAL AND SEALED WITH EXTERIOR CLEAR SILICONE SEALANT.
3. TOP OF CASTING OR CLEANOUT CAP SHALL EXTEND 0.20 FEET MINIMUM ABOVE FINISHED GRADE UNLESS CONSTRUCTED WITHIN PEDESTRIAN OR VEHICULAR TRAFFIC WAY. UNLESS APPROVED BY ENGINEER, SANITARY SEWER CASTINGS OR CLEANOUTS MUST NOT BE WITHIN ONE (1) FOOT HORIZONTAL DISTANCE OF ANY PAVED OR CONCRETE SURFACES.
4. ALL CLEANOUT PIPE AND FITTINGS TO BE PVC SCHEDULE 80 OR SDR 26 WHEN SHALLOWER THAN TWELVE (12) FEET. AT DEPTHS GREATER THAN TWELVE (12) FEET MATERIAL OF CONSTRUCTION WILL BE DETERMINED BY ENGINEER.

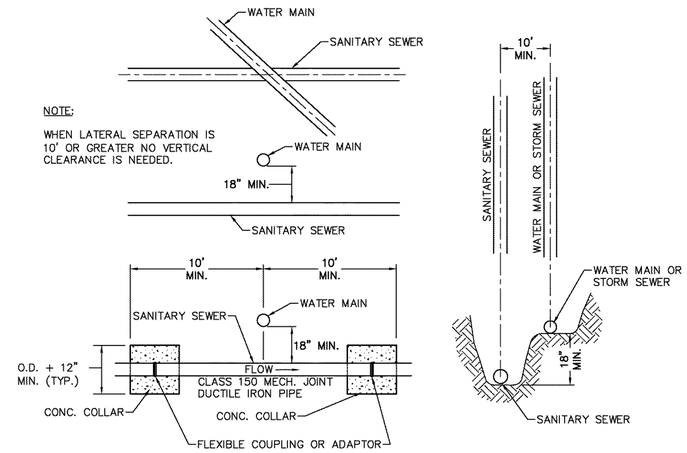
CLEANOUT, TYPE I
(ONLY LANDSCAPED SURFACES WITHIN 3' OF BLDG)
NOT TO SCALE



NOTE:

1. CONCRETE APRON AND CASTING SHALL BE INSTALLED SO THAT THEY DO NOT CONTACT THE LATERAL OR LATERAL CAP.

CLEANOUT, TYPE II
(HARDSCAPE SURFACES & ALL OTHER INSTALLATIONS BEYOND 3' OF BLDG)
NOT TO SCALE



CROSSOVER & SEPARATION NOTES:

1. WHEN LATERAL SEPARATION IS 10' OR GREATER NO VERTICAL CLEARANCE IS NEEDED.
2. WHEN SANITARY SEWER CROSSES WATER MAIN, THE CROSSING MUST BE A MINIMUM OF 45° MEASURED FROM THE CENTERLINES OF THE SEWER AND WATER MAIN WITH A MINIMUM OF 18-INCHES VERTICALLY BETWEEN THE PIPES. THE VERTICAL SEPARATION SHALL BE MAINTAINED FOR 10 FEET EACH WAY OF THE CROSSING.
3. IF THE CROSSING ANGLE IS LESS THAN 45° OR THE DISTANCE BETWEEN PARALLEL MAINS IS LESS THAN 10 FEET, THE SANITARY SEWER SHALL BE TESTED AS IF IT IS A WATER MAIN (327 IAC 8-3.2.17(a)), SHALL BE CONSTRUCTED OF WATER MAIN MATERIAL, DUCTILE IRON, OR PVC WITH A SDR OF 21, THE PIPES SHALL NOT TOUCH, SEWER JOINTS SHALL BE A COMPRESSION TYPE JOINT PLACED EQUIDISTANT FROM THE WATER MAIN, WATER AND SEWER SHALL BE ON SEPARATE TRENCH SHELVES.
4. MANHOLES SHALL BE A MINIMUM OF 8 FEET (OUTSIDE TO OUTSIDE) FROM A WATER MAIN.

MIN. CROSSOVER AND SEPERATION REQUIREMENTS FOR WATER MAINS AND SANITARY SEWERS
NOT TO SCALE

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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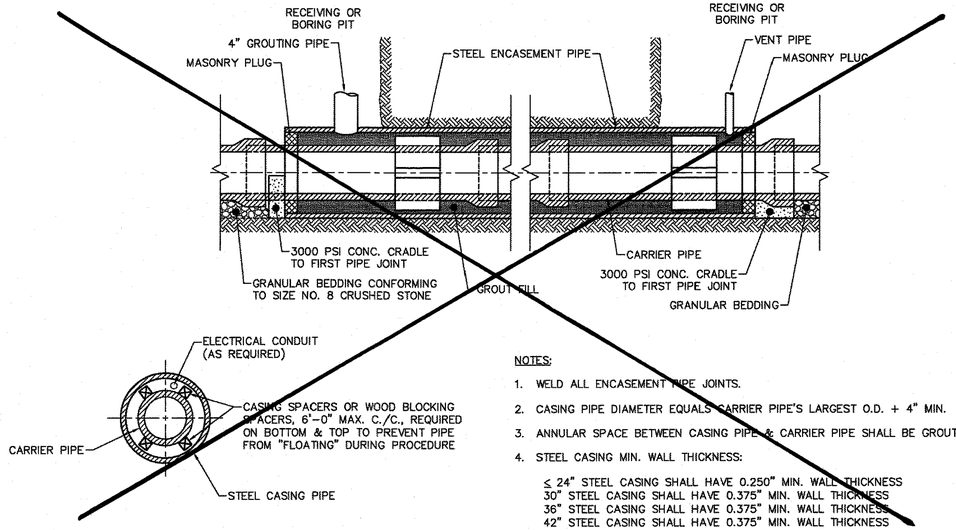
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SANITARY SEWER DETAILS

2

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Not Required



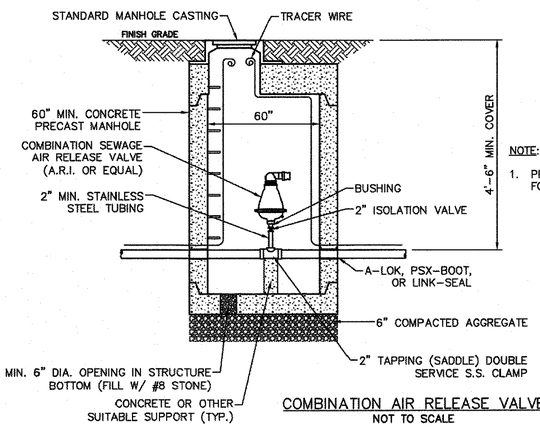
HORIZONTAL BORING DETAIL
NOT TO SCALE

NOTES:

1. WELD ALL ENCASEMENT PIPE JOINTS.
2. CASING PIPE DIAMETER EQUALS CARRIER PIPE'S LARGEST O.D. + 4" MIN.
3. ANNULAR SPACE BETWEEN CASING PIPE & CARRIER PIPE SHALL BE GROUT FILLED.
4. STEEL CASING MIN. WALL THICKNESS:

   ≤ 24" STEEL CASING SHALL HAVE 0.250" MIN. WALL THICKNESS
   30" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS
   36" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS
   42" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS

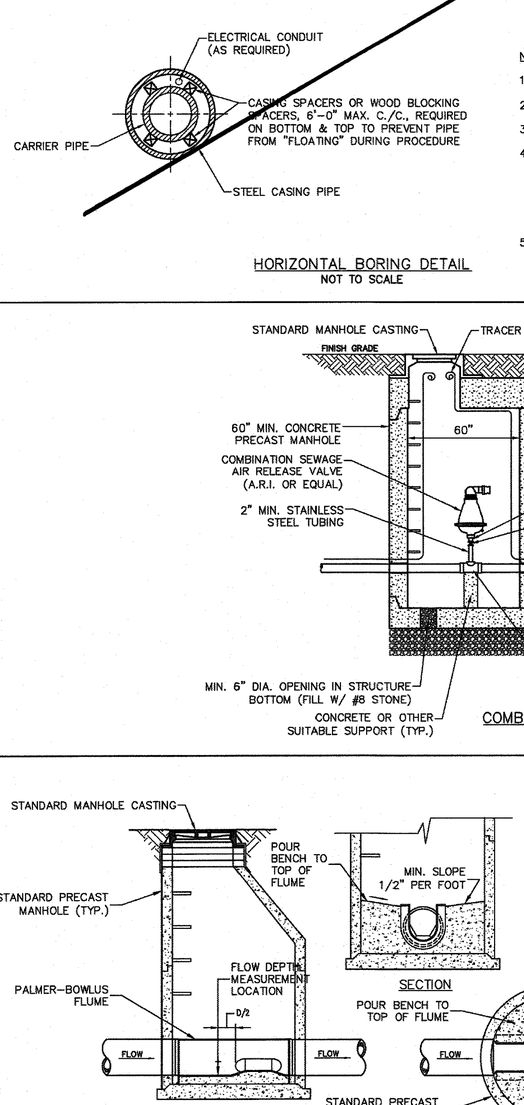
5. STEEL CASING WALL THICKNESS SHALL MEET THE REQUIREMENTS OF INDOT AND JURISDICTIONAL RAILROADS WHEN APPLICABLE.



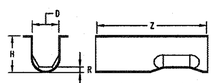
NOTE:

1. PIPE SIZES MAY VARY BASED ON FORCE MAIN DIAMETER.

COMBINATION AIR RELEASE VALVE
NOT TO SCALE



FLUME										MANHOLE SIZE	SLOPE UPSTREAM (%)
MAXIMM DISCHARGE			HEAD	MODEL	DIMENSIONS (INCHES)						
GPM	MGD	CFS	INCHES		D	D/2	R	H	Z	MIN.	MAX.
165	0.238	0.388	4.70	PBF-6	6	2	1.00	8	25	6' DIA.	2.2
343	0.494	0.764	6.30	PBF-8	8	3	1.33	10	33	6' DIA.	2.0
603	0.868	1.344	7.90	PBF-10	10	4	1.67	12	41	6' DIA.	1.8

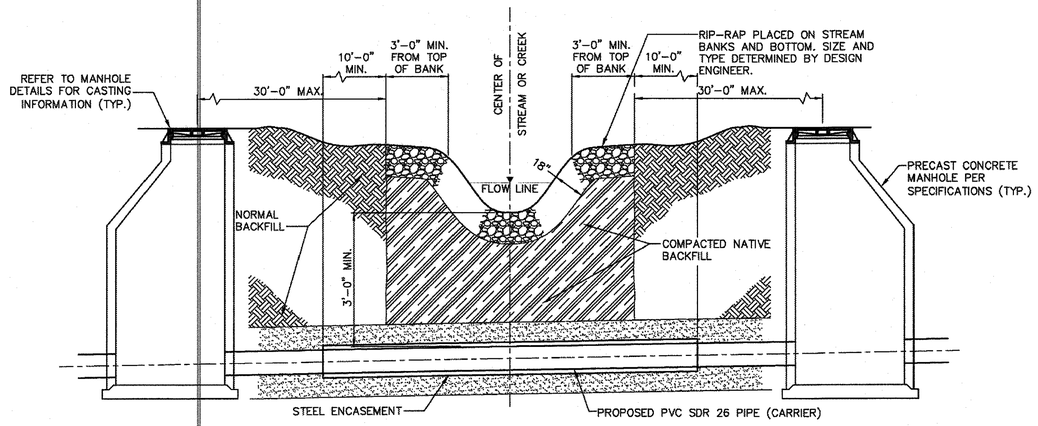


PALMER-BOWLUS FLUME

NOTES:

1. FLUME SHALL BE A PALMER-BOWLUS FLUME.
2. FIELD POUR CONCRETE BENCH WITH FLUME INSTALLED IN MANHOLE AT LINE SLOPE.
3. FLUME SELECTION SHALL BE BASED UPON THE FLOW TO BE MEASURED AND NOT UPON THE PIPE SIZE.

SAMPLING AND METERING CONTROL MANHOLE DETAIL
NOT TO SCALE

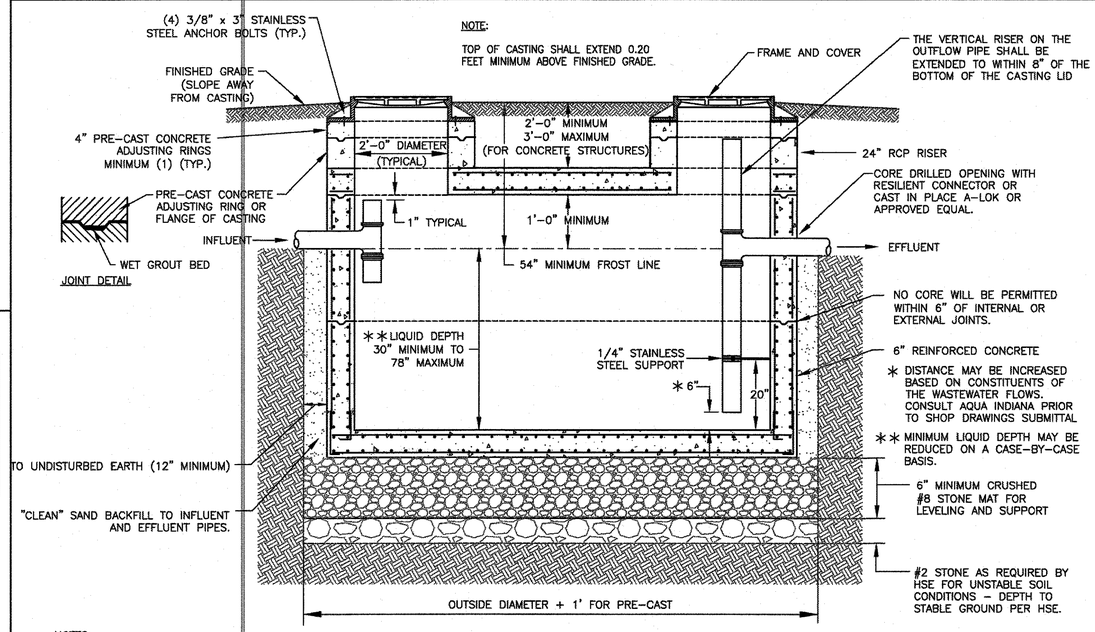


NOTES:

1. RIPRAP SHALL EXTEND FROM TOP OF BANK TO TOE OF SLOPE.
2. WIDTH OF RIPRAP SHALL EXTEND TO THOSE AREA ALONG THE BANK THAT HAVE BEEN DISTURBED DURING TRENCHING A MAXIMUM OF 10" WIDE.
3. CROSSING OF STREAMS SHALL BE DONE DURING PERIODS OF LOW FLOW.
4. RESTORATION OF STREAM BEDS AND BANKS SHALL IMMEDIATELY FOLLOW TRENCHING ACTIVITIES/PIPE INSTALLATION ACROSS THE STREAM BED AS REQUIRED BY ENVIRONMENTAL PERMIT AGENCY.
5. TOP ELEVATION OF RIPRAP SHALL BE FLUSH WITH THE EXISTING BOTTOM ELEVATION OF THE CHANNEL AND SURROUNDING STREAM BANK.
6. CASING PIPE DIAMETER EQUALS CARRIER PIPE'S LARGEST O.D. + 4" MINIMUM.
7. STEEL CASING MIN. WALL THICKNESS:

   ≤ 24" STEEL CASING SHALL HAVE 0.250" MIN. WALL THICKNESS
   30" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS
   36" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS
   42" STEEL CASING SHALL HAVE 0.375" MIN. WALL THICKNESS

TYPICAL STREAM CROSSING RESTORATION FOR OPEN CUT PIPE INSTALLATION
NOT TO SCALE



NOTES:

1. GREASE TRAPS MUST BE A MINIMUM OF 1000 GALLONS AND SIZED ACCORDING TO 410 IAC 6-10.1-66.
2. GREASE TRAP SHALL CONFORM TO ASTM C 478 UTILIZING 4,000 PSI CONCRETE. CONTRACTOR MAY SUPPLY GREASE TRAP AS MANUFACTURED BY ZURN SERIES Z-1170 OR JAY R. SMITH MANUFACTURING COMPANY SERIES 8000 OR EQUAL.
3. EXTERIOR INSTALLATION MUST BE CONCRETE.

EXTERIOR GREASE TRAP DETAIL
NOT TO SCALE

AQUA. Indiana

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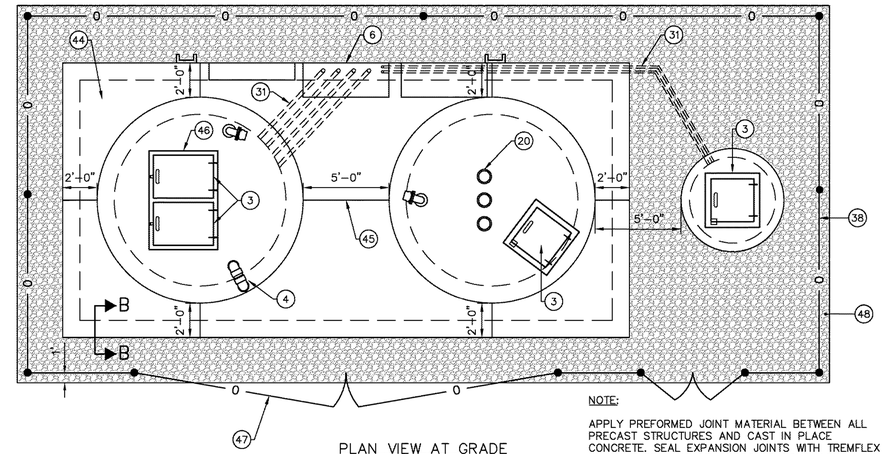
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MISCELLANEOUS DETAILS

3

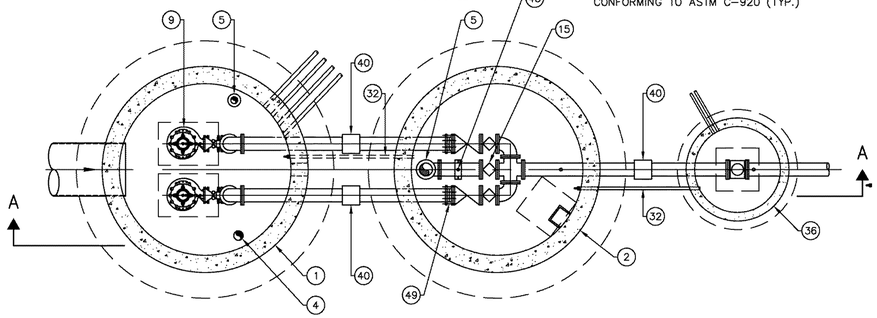
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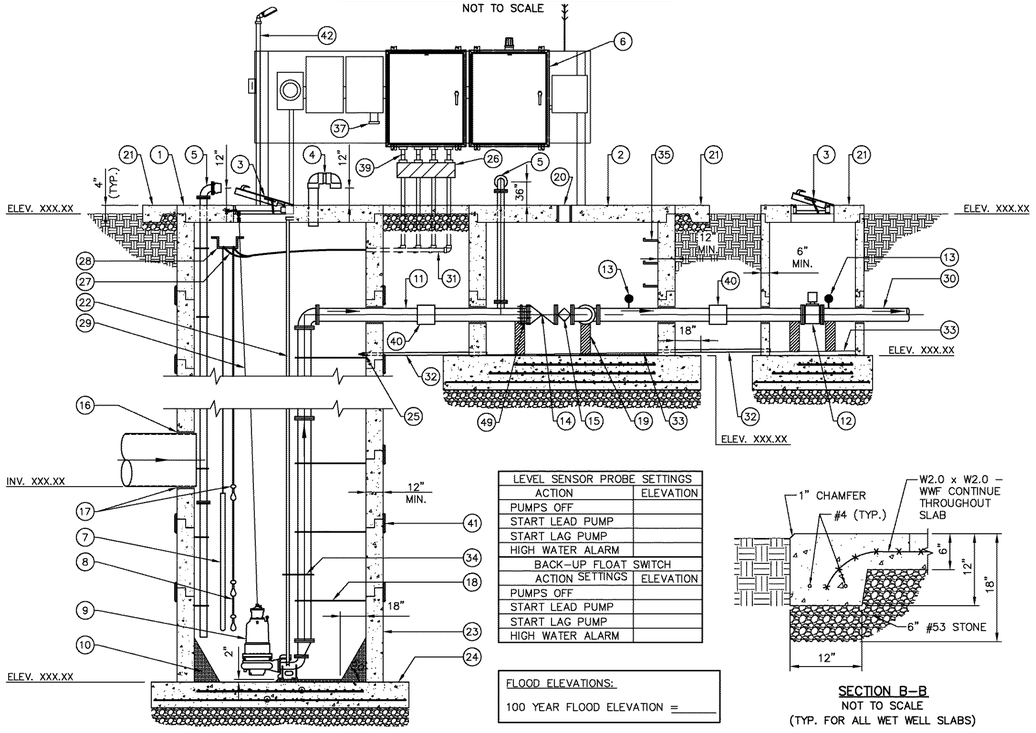
NOTE:

APPLY PREFORMED JOINT MATERIAL BETWEEN ALL PRECAST STRUCTURES AND CAST IN PLACE CONCRETE. SEAL EXPANSION JOINTS WITH TREMFLEX SL JOINT SEALANT OR APPROVED EQUIVALENT CONFORMING TO ASTM C-920 (TYP.)

PLAN VIEW AT GRADE
NOT TO SCALE



LIFT STATION PLAN VIEW BELOW TOP SLAB
NOT TO SCALE



LEVEL SENSOR PROBE SETTINGS	
ACTION	ELEVATION
PUMPS OFF	
START LEAD PUMP	
START LAG PUMP	
HIGH WATER ALARM	

BACK-UP FLOAT SWITCH	
ACTION SETTINGS	ELEVATION
PUMPS OFF	
START LEAD PUMP	
START LAG PUMP	
HIGH WATER ALARM	

FLOOD ELEVATIONS:

100 YEAR FLOOD ELEVATION = _____

SECTION B-B
NOT TO SCALE
(TYP. FOR ALL WET WELL SLABS)

LIFT STATION SECTION A-A
NOT TO SCALE

INFORMATION

AQUA DIVISION: _____

COUNTY: _____ TOWNSHIP: _____

SECTION: _____ TWP: _____ RANGE: _____

PROJECT: _____

LOCATION: _____

STATION PIPE SIZE, INCHES: _____ FORCE MAIN TYPE: _____

FORCE MAIN SIZE, INCHES: _____ LIFT STATION I.D.: _____

FORCE MAIN LENGTH, FEET: _____

PUMP DATA

DISCHARGE SIZE: _____

GPM: _____

TDH: _____

HP: _____

RPM: _____

VOLTAGE: _____

PHASE: _____

MODEL: _____

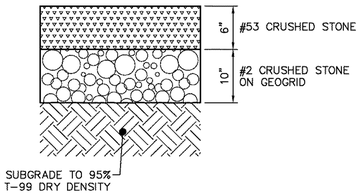
IMPELLER SIZE: _____

GENERAL NOTES:

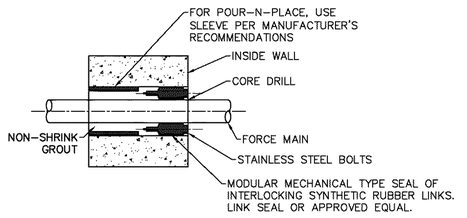
1. PUMP CONTROL PANEL SHALL BE PROVIDED BY PUMP SUPPLIER AND SHALL BE COMPATIBLE WITH PUMP SYSTEM. THE PANEL SHALL CONTROL A DUPLEX SYSTEM.
2. ALL PIPING IN AND BETWEEN WET WELL, VALVE VAULT, AND METER VAULT, SHALL BE DUCTILE IRON.
3. DUCTILE IRON PIPE: A. SHALL CONFORM TO ANSI SPEC. A-21.51 B. SHALL CONFORM TO AWWA C-151, CURRENT REV. C. DUCTILE IRON PIPE SHALL BE PRESSURE CLASS 350 (MIN.)
4. WET WELL HATCH SHALL BE COMPATIBLE WITH THE GUIDE RAIL SYSTEM AND SHALL BE LOCATED AS SHOWN SUCH THAT PUMPS CAN BE EASILY REMOVED FROM THE WET WELL. SAFETY GRATE SHALL ALLOW OBSERVATION OF WET WELL WHILE PREVENTING FALLS INTO WET WELL.
5. MAINTAIN 24 INCHES BETWEEN ALL STRUCTURES, SLAB, AND FENCING.
6. RESILIENT WEDGE VALVES SHALL BE OPERABLE FROM THE TOP SLAB. CONTRACTOR SHALL PROVIDE ONE (1) 'TEE' HANDLED VALVE KEY TO MATCH RESILIENT WEDGE VALVE OPERATING NUTS.
7. ALL PIPING, STRUCTURE EXCAVATION AND TRENCHES SHALL BE BACKFILLED WITH AN APPROVED STRUCTURAL BACKFILL.

(X) LIFT STATION KEY

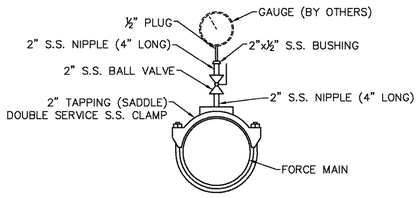
1. WET WELL MIN 60" DIAMETER
2. VALVE VAULT, MIN 60" DIAMETER
3. LOCKABLE ALUMINUM ACCESS HATCH WITH FALL PROTECTION, 36"x36" MIN.
4. 6" DIP VENT WITH SCREEN AND PASSIVE ODOR CONTROL DEVICE (IF REQUESTED)
5. 6-INCH D.I. BYPASS PIPE WITH D.I. 90° BEND & CAM AND GROOVE CONNECTION
6. NEMA 4X STAINLESS STEEL CONTROL PANEL ON ALUMINUM MOUNTING PLATE WITH ALUMINUM CHANNEL POSTS. PANEL SHALL BE MIN. 5' FROM ANY OPENING OR OBSTRUCTION
7. LEVEL DEVICE (PRESSURE TRANSDUCER)
8. REDUNDANT FLOAT BACK-UP
9. SUBMERSIBLE PUMP
10. CONCRETE FILLETS
11. FORCE MAIN, DUCTILE IRON, RESTRAINED JOINTS
12. ELECTROMAGNETIC FLOW METER (IF REQUESTED)
13. PRESSURE GAUGE
14. CHECK VALVE
15. RESILIENT WEDGE ISOLATION VALVE
16. SEAL OPENING WITH LINK SEAL (TYP. ALL PIPE PENETRATIONS)
17. LOWEST PIPE INVERT (HIGH ALARM ON)
18. PIPE SUPPORT, PER DETAIL (TYP 3 PER PIPE SECTION)
19. PIPE SUPPORT, SEE DETAIL
20. PENETRATION FOR VALVE OPERATION, REMOVABLE CAST IRON COVERS
21. TOP OF STRUCTURE, MIN. 4", MAX. 12" ABOVE FINISH GRADE
22. STAINLESS STEEL GUIDE RAIL
23. MONOLITHIC BASE
24. ANTI-FLOTATION EXTENSIONS (AS REQUIRED)
25. BACKFLOW PREVENTER – TIDEFLEX CHECK VALVE OR EQUAL
26. VENTED JUNCTION BOX
27. SEPARATE CONDUITS FOR EACH PUMP
28. CABLE HANGER
29. STAINLESS STEEL LIFTING CHAIN SIZED TO THE WEIGHT OF THE PUMP
30. FORCE MAIN TRANSITION FITTING FROM DUCTILE IRON TO ALTERNATE MATERIAL
31. PUMP CONDUIT TO JUNCTION BOX – PVC COATED RGS
32. 2" PVC DRAIN PIPE, MAINTAIN 1/4" PER FOOT INTO WET WELL
33. SLOPE FLOOR TO DRAIN 1/4" PER FOOT
34. INTERMEDIATE GUIDE RAIL SUPPORT
35. FIBERGLASS REINFORCED POLYPROPYLENE MANHOLE STEPS AT 16" ON CENTER
36. METER VAULT, MIN. 60" DIAMETER (IF REQUESTED)
37. PORTABLE GENERATOR CONNECTION
38. 7' HIGH VINYL-COATED CHAIN LINK FENCE, VINYL-COATED POST, PRIVACY SLATS, 16 FOOT VEHICLE ACCESS GATE AND 3 FOOT MAN GATE
39. EXPLOSION PROOF CONDUIT SEALS
40. FLEXIBLE COUPLING (TYP.)
41. EXTERNAL JOINT WRAP, MINIMUM 6" WIDTH (TYP.), INFI-SHIELD GATOR WRAP OR APPROVED EQUAL
42. 1-1/2" DIA. 10 FOOT HIGH STANCHION MOUNTED LED LIGHT FIXTURE
43. BYPASS PIPE 2-INCH DRAIN. STAINLESS STEEL SADDLE (2" TAP) WITH 2" BRONZE BALL VALVE, SCH 80 PVC PIPE DIRECTED TO SUMP (PIPE NOT SHOWN FOR CLARITY)
44. CONCRETE APRON
45. CONTROL JOINT (TYP.)
46. SIZE PER PUMP MANUFACTURER
47. 16' WIDE LOCKABLE GATE, 3' WIDE LOCKABLE MAN GATE LOCATION AS DIRECTED BY AQUA
48. 1-FOOT WIDE STONE AROUND LIFT STATION FENCE (PER DETAIL)
49. FLANGED COUPLING ADAPTER (TYP.)



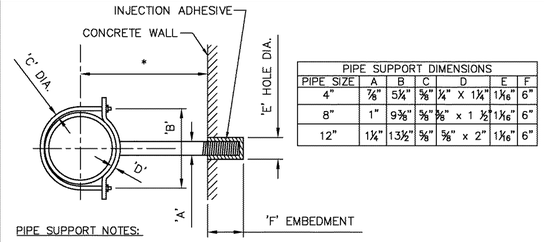
STONE DRIVE SECTION & STONE AROUND LIFT STATION
NOT TO SCALE



PIPE SLEEVE DETAIL FOR ALL WALL PENETRATIONS
NOT TO SCALE



PRESSURE GAUGE TAP DETAIL (TYP.)
NOT TO SCALE

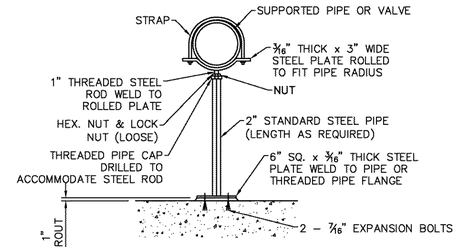


PIPE SUPPORT DIMENSIONS						
PIPE SIZE	A	B	C	D	E	F
4"	⅞"	5¼"	⅝"	⅛" X 1¼"	1⅛"	6"
8"	1"	9⅜"	⅝"	⅜" x 1 ½"	1⅛"	6"
12"	1¼"	13½"	⅝"	⅝" x 2"	1⅛"	6"

PIPE SUPPORT NOTES:

1. CONTRACTOR SHALL DETERMINE DIMENSION * PER PUMP MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. PIPE SUPPORTS SHALL BE CARBON STEEL, COATED WITH 14 MIL COAL TAR EPOXY.
3. INJECTION ADHESIVE SHALL BE HIT-HY 200 BY HILTI OR APPROVED EQUAL. INSTALL PER HILTI INSTALLATION INSTRUCTIONS FOR ROD INSTALLATION.
4. PIPE SUPPORT SHALL BE GRINNEL FIGURE 191 OR APPROVED EQUAL.

PIPE SUPPORT
NOT TO SCALE



NOTES:
1. PIPE SUPPORTS SHALL BE SPACED NOT MORE THAN 12'-0" ON CENTER.
2. PIPE TO BE SUPPORTED EACH SIDE OF VALVES, FLOW METERS, AND COUPLINGS.

ADJUSTABLE PIPE SUPPORT DETAIL
NOT TO SCALE

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

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1/4/2021
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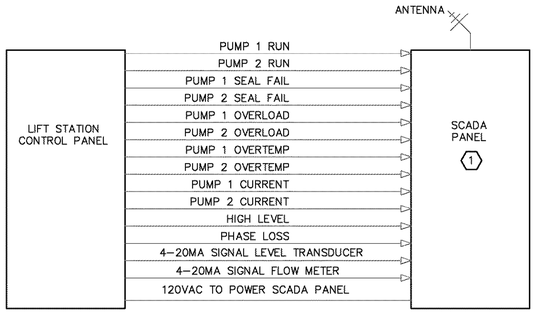
LIFT STATION DETAILS

4

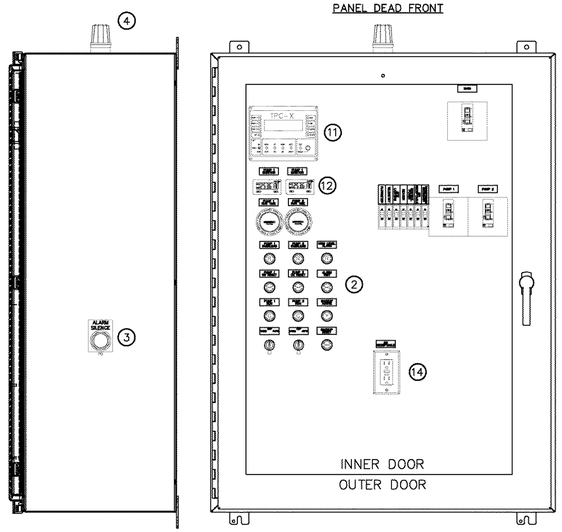
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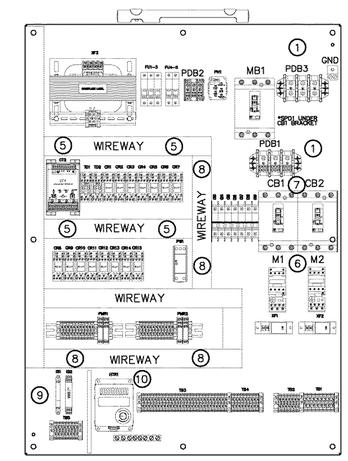
NEMA 4X CONTROL PANEL DEVICE LEGEND

ITEM#	DESCRIPTION
1	ILSCO (OR EQUAL) POWER DISTRIBUTION BLOCK.
2	PILOT DEVICES (TYPICAL FOR EACH PUMP): RUNNING LIGHT, FAIL LIGHT, SEAL FAIL LIGHT, HIGH MOTOR TEMP LIGHT, HOA SWITCH, AND ELAPSED TIME METER. PILOT DEVICES TO BE MOUNTED ON PANEL DEAD FRONT.
3	ALARM ACKNOWLEDGE PUSHBUTTON LOCATED ON SIDE OF PANEL.
4	NEMA 4 ALARM LIGHT.
5	ALTERNATING RELAYS AND CONTROL RELAYS AS REQUIRED.
6	SQUARE D (OR EQUAL) IEC STARTER SIZED PER PUMP FLA.
7	ISOLATION CIRCUIT BREAKERS WITH LOCKOUT/TAGOUT CAPABILITY. BREAKER ACCESSIBLE THROUGH DEAD FRONT.
8	MISCELLANEOUS COMPONENTS INCLUDING BUT NOT LIMITED TO PILOT RELAYS, TERMINAL BLOCKS, CIRCUIT BREAKERS, CONTROL TRANSFORMER, POWER SUPPLIES, ETHERNET SWITCH, PHASE LOSS RELAYS, ETC. TO PROVIDE FOR A COMPLETE AND FUNCTIONING CONTROL PANEL.
9	PROVIDE INTRINSICALLY SAFE BARRIERS FOR NEW FLOATS.
10	HEATER WITH INTEGRAL THERMOSTAT.
11	PUMP CONTROL MFR. TO COORDINATE WITH OWNER AND PROVIDE MONITORING POINTS AS REQUIRED FOR SCADA.
12	PROVIDE CURRENT TRANSDUCER (CT) WIRE TO DEAD FRONT PANEL METER AND TO SCADA SYSTEM. CURRENT DISPLAYS MOUNTED ON DEAD FRONT PANEL SHALL BE SCALABLE WITH INPUT SIGNAL TO MATCH CT. 4–20mA SIGNAL ONLY.
13	MOUNT LIGHT SWITCH FOR FLOOD LIGHT TO LIGHT POST.
14	PROVIDE AND MOUNT TO PANEL DEAD FRONT A 20A RATED CONVENIENCE OUTLET.

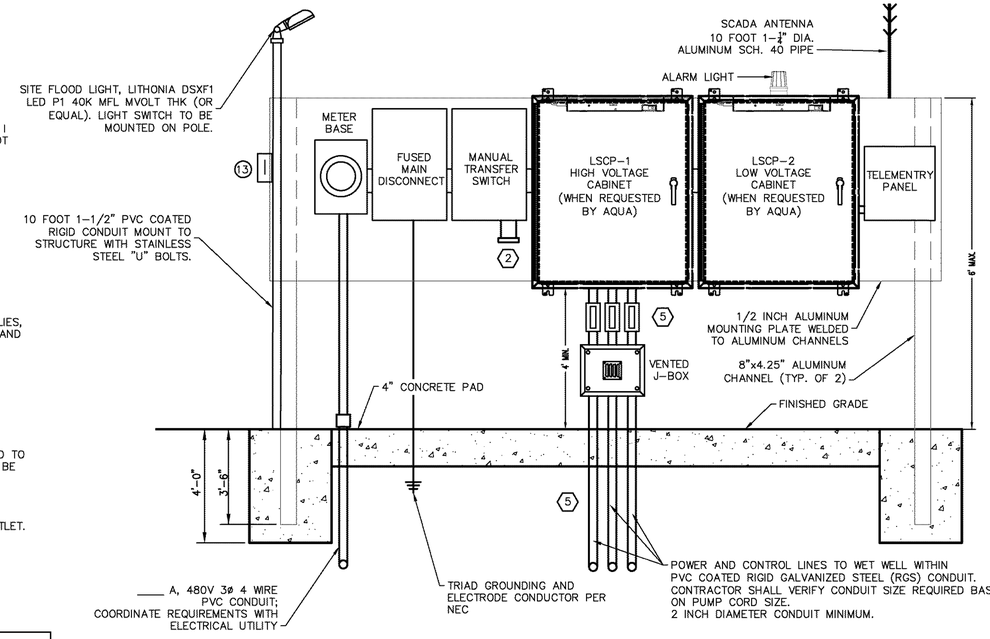


SCADA DETAIL
NOT TO SCALE





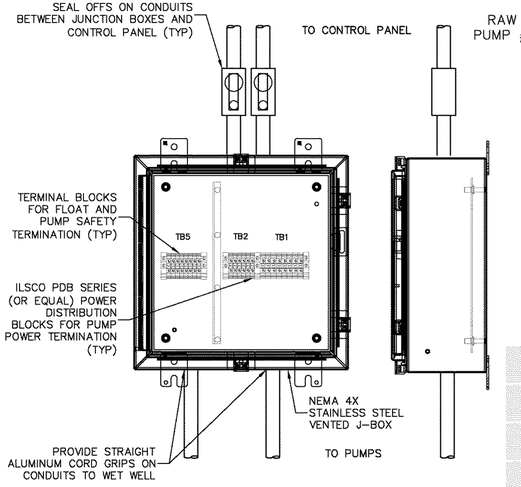
LIFT STATION CONTROL PANEL DETAIL
NOT TO SCALE



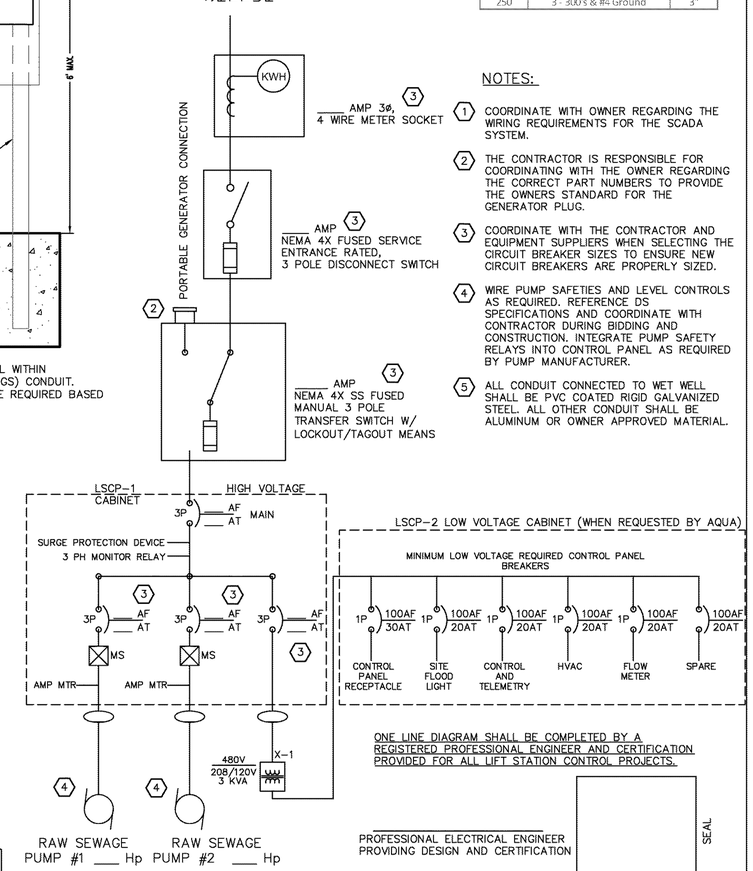
ELECTRICAL AND PUMP CONTROL MOUNTING DETAIL
NOT TO SCALE

NOTES:

1. SIZE NEMA 4X CONTROL PANEL AS REQUIRED.
2. CONTROL PANEL SHALL BE CONSTRUCTED TO UL STANDARDS IN A UL PANEL SHOP. CONTROL PANEL SHALL BE UL LISTED.
3. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE ELECTRIC UTILITY TO PROVIDE POWER SERVICE TO THE NEW LIFT STATION. PROVIDE CONDUIT, WIRE, METER BASE, ETC. TO PROVIDE POWER COMPLETE TO THE LIFT STATION.
4. CONTRACTOR TO PROVIDE METER BASE PER ELECTRIC UTILITY METER BASE REQUIREMENTS.
5. ALL COSTS ASSOCIATED WITH PROVIDING POWER TO THE LIFT STATION SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE; EXCEPT ANY CHARGES BY THE UTILITY COMPANY FOR THEIR WORK.
6. PROVIDE FLOAT CONTROL (4 FLOATS).
7. CONTROL PANEL SHALL BE CONSTRUCTED AND PROGRAMMED TO PROVIDE AUTOMATIC LEVEL CONTROL. PUMP SHALL CYCLE TO MAINTAIN LEVEL SETPOINT. PROVIDE AUTOMATIC ALTERNATION BETWEEN PRIMARY AND BACKUP TO ALTERNATE EACH TIME THEY RUN. HIGH LEVEL FLOAT SHALL BE HARDWIRED TO START BOTH PUMPS. LOW LEVEL CUTOUT FLOAT SHALL STOP BOTH PUMPS AFTER A HIGH LEVEL FLOAT HARDWIRED START VIA A LATCHING RELAY.
8. AN ARC FLASH STUDY SHALL BE COMPLETED AS PART OF THIS PROJECT AND ARC FLASH DECALS SHALL BE PLACED ON ALL ELECTRICAL CABINETS AS REQUIRED BY STUDY.



J–BOX DETAIL
NOT TO SCALE



ONE LINE REFERENCE DIAGRAM
NOT TO SCALE

Load Wiring Schedule		
	Copper Wire	
Type #:	Quantity and Wire Size	Conduit
20	3 #12's & #12 Ground	3/4"
30	3 #10's & #10 Ground	3/4"
50	3 #8's & #10 Ground	3/4"
60	3 #6's & #8 Ground	3/4"
80	3 #4's & #8 Ground	1"
100	3 #2's & #6 Ground	1.5"
125	3#1's & #6 Ground	1.5"
150	3 - 2/0 & #6 Ground	2"
200	3 - 4/0 & #4 Ground	2.5"
250	3 - 300's & #4 Ground	3"

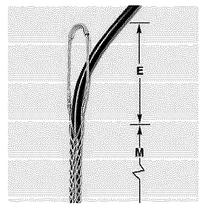
NOTES:

1. COORDINATE WITH OWNER REGARDING THE WIRING REQUIREMENTS FOR THE SCADA SYSTEM.
2. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE OWNER REGARDING THE CORRECT PART NUMBERS TO PROVIDE THE OWNERS STANDARD FOR THE GENERATOR PLUG.
3. COORDINATE WITH THE CONTRACTOR AND EQUIPMENT SUPPLIERS WHEN SELECTING THE CIRCUIT BREAKER SIZES TO ENSURE NEW CIRCUIT BREAKERS ARE PROPERLY SIZED.
4. WIRE PUMP SAFETIES AND LEVEL CONTROLS AS REQUIRED. REFERENCE DS SPECIFICATIONS AND COORDINATE WITH CONTRACTOR DURING BIDDING AND CONSTRUCTION. INTEGRATE PUMP SAFETY RELAYS INTO CONTROL PANEL AS REQUIRED BY PUMP MANUFACTURER.
5. ALL CONDUIT CONNECTED TO WET WELL SHALL BE PVC COATED RIGID GALVANIZED STEEL. ALL OTHER CONDUIT SHALL BE ALUMINUM OR OWNER APPROVED MATERIAL.

ONE LINE DIAGRAM SHALL BE COMPLETED BY A REGISTERED PROFESSIONAL ENGINEER AND CERTIFICATION PROVIDED FOR ALL LIFT STATION CONTROL PROJECTS.

PROFESSIONAL ELECTRICAL ENGINEER PROVIDING DESIGN AND CERTIFICATION

SEAL



Single Eye, Split Mesh, Lace Closing

Single Eye, Split Mesh, Lace Closing*

For permanent support when cable end is not available to be installed through grip.

Cable Diameter Range Inches (cm)	Approx. Breaking Strength Lbs. (N)	E Inches (cm)	M Inches (cm)	Catalog Number
.75"-.99" (1.90-2.51)	2,820 (12,543)	10" (25.40)	25" (63.50)	**02207010**
1.00"-1.24" (2.54-3.15)	4,280 (19,037)	12" (30.48)	28" (71.12)	**02207011**
1.25"-1.49" (3.17-3.78)	4,280 (19,037)	12" (30.48)	30" (76.20)	**02207012**
1.50"-1.99" (3.81-5.05)	4,280 (19,037)	12" (30.48)	34" (86.36)	**02207013**

Note: E-Eye length.
M-Mesh length at nominal diameter.
** Change catalog number from 022 to 024 for stainless steel. Consult factory for availability.*

STAINLESS STEEL CABLE SUPPORT DETAIL
NOT TO SCALE

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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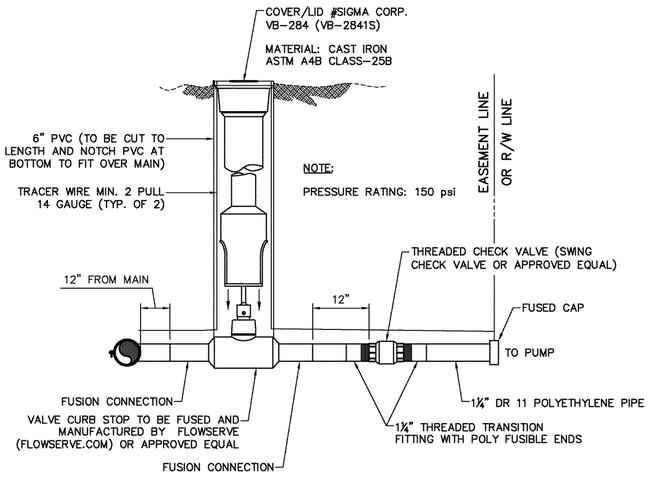
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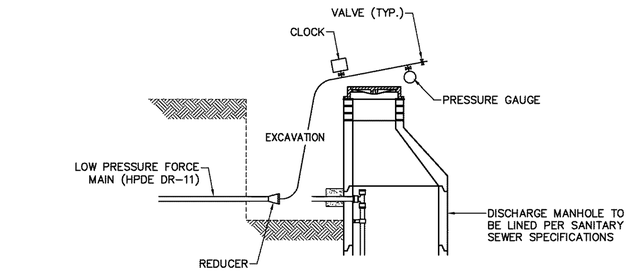
LIFT STATION ELECTRICAL DETAILS

4A

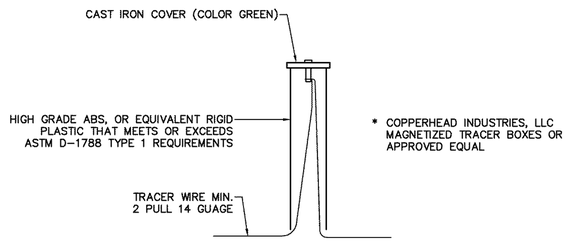
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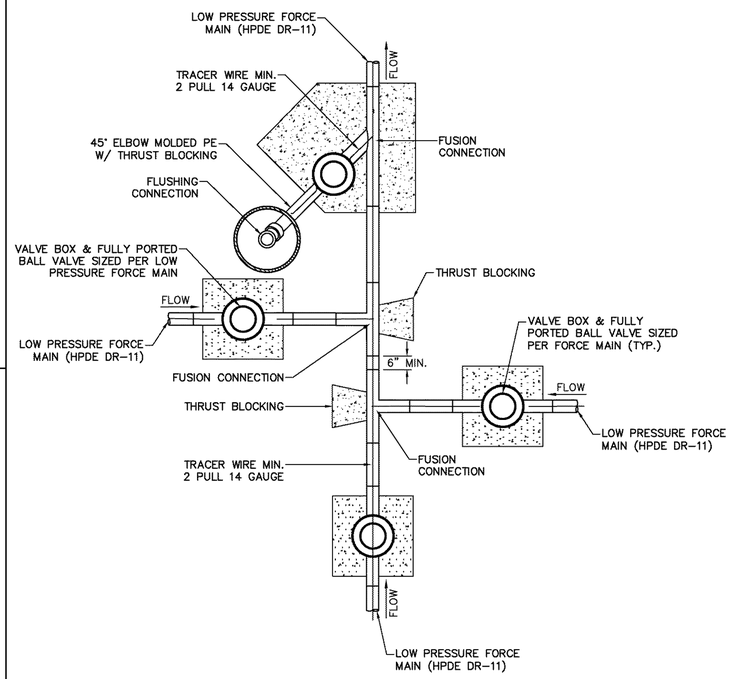
PLASTIC LATERAL ASSEMBLY
(1-1/4" DR 11 HDPE PIPE ARCH PATTERN)
NOT TO SCALE



TYPICAL TESTING OF LOW PRESSURE FORCE MAIN
NOT TO SCALE



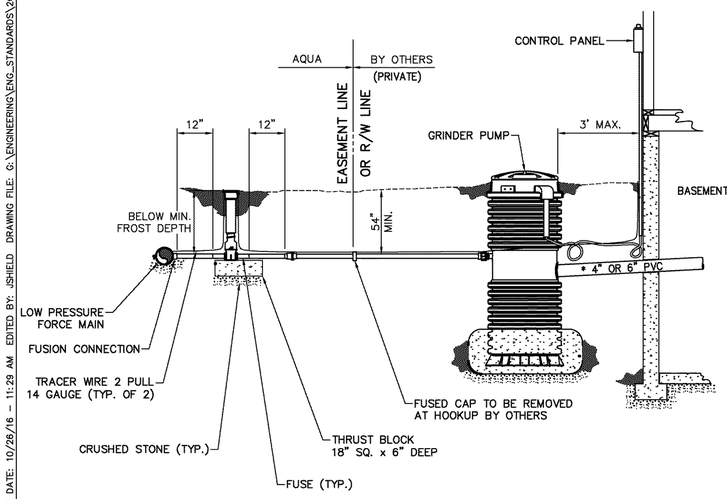
CATHODIC TEST STATION
(TRACER NODE)
NOT TO SCALE



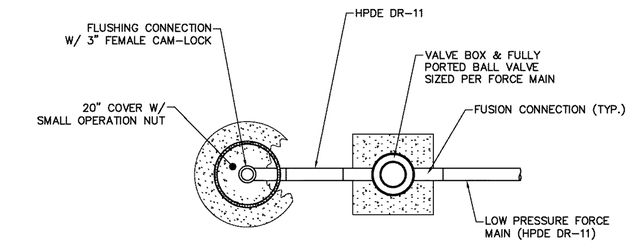
TYPICAL INTERSECTION DETAIL
NOT TO SCALE

NOTES:

1. ALL LATERALS TO BE DIRECTIONAL DRILLED ACROSS STREET.
2. ALL CONNECTIONS SHALL BE ELECTRO-FUSION OR THREADED TRANSITION FITTING. COMPRESSION FITTINGS ARE NOT ACCEPTABLE.
* IF GREATER THAN 3', CLEANOUT MUST BE IMPLEMENTED AND 6" PIPE MUST BE USED.



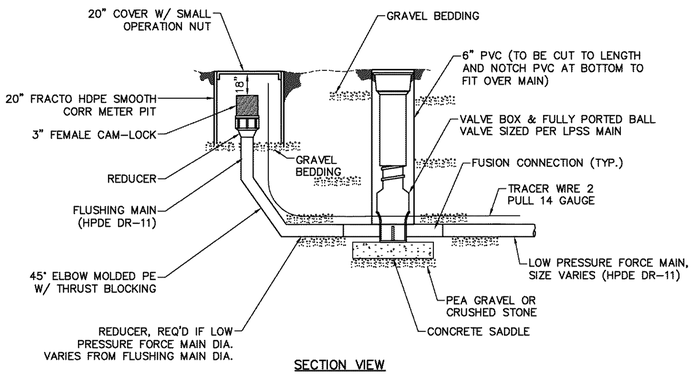
TYPICAL LATERAL INSTALLATION
NOT TO SCALE



PLAN VIEW

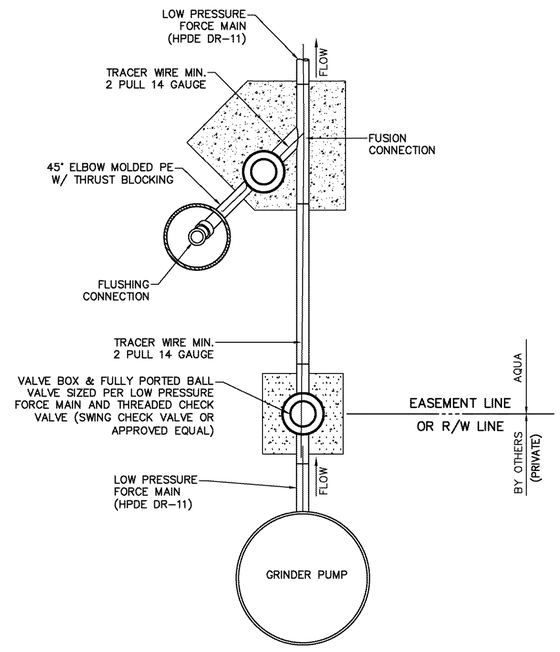
GRAVEL BEDDING TO BE PLACED AROUND VALVE AND OVER / UNDER MAIN

* A.R.I. MODEL #D-025 (2" THREADED)



SECTION VIEW

TYPICAL TERMINAL END WITH FLUSHING STATION DETAIL
NOT TO SCALE



TYPICAL GRINDER PUMP ON TERMINAL END OF MAIN DETAIL
NOT TO SCALE

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

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LOW PRESSURE SEWER SYSTEM DETAILS

5

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AQUA INDIANA STATE STANDARDS
SANITARY SEWER CONSTRUCTION

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FOREWORD

THE "AQUA INDIANA STATE STANDARDS" FOR AQUA INDIANA AND ITS SUBSIDIARIES (THE UTILITY) HAVE BEEN PREPARED TO SET FORTH AQUA INDIANA'S MINIMUM CRITERIA FOR CONSTRUCTION WITHIN THE UTILITY'S LIMITS.

ALL CONSTRUCTION PROJECTS WHICH ARE CONNECTED TO THE UTILITY SYSTEM SHALL CONFORM TO THESE STANDARDS. CONSTRUCTION DRAWINGS AND SPECIFICATIONS MUST BE APPROVED BY THE UTILITY AND A WRITTEN PERMIT OBTAINED FOR SEWER EXTENSIONS IN ACCORDANCE WITH EXISTING ORDINANCES BEFORE CONSTRUCTION BEGINS. IN ADDITION, SANITARY SEWER PROJECTS MUST BE SUBMITTED TO THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM) FOR APPROVAL AND ISSUANCE OF A CONSTRUCTION PERMIT. DEVELOPERS MAY NOT SUBMIT PROJECTS TO IDEM UNTIL THE UTILITY ISSUES A WASTELOAD ALLOCATION AND APPROVAL OF PLANS.

CONSTRUCTION OBSERVATION WILL BE PERFORMED BY THE UTILITY. A MINIMUM OF 48 HOURS' NOTICE SHALL BE GIVEN PRIOR TO STARTING CONSTRUCTION.

THESE STANDARDS WERE PREPARED WITH THE INTENT OF OBTAINING THE HIGHEST QUALITY OF CONSTRUCTION POSSIBLE, CONSISTENT WITH ACCEPTED INDUSTRY PRACTICES AND SPECIFICATIONS. AS NEW MATERIALS BECOME AVAILABLE AND ACCEPTABLE, THE STANDARDS MAY BE REVISED AND UPDATED.

CRITICAL DESIGN CRITERIA FOR SANITARY SEWER CONSTRUCTION:

1. ALL SANITARY SEWERS SHALL COMPLY WITH THE LATEST EDITION OF THE "GLUMRB (GREAT LAKES UPPER MISSISSIPPI RIVER BOARD) RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES".
2. STATE UTILITY ENGINEER WILL MAKE THE DETERMINATION AS TO THE NEED FOR IMPROVEMENTS TO DOWNSTREAM SANITARY SEWER FACILITIES. EARLY COORDINATION IS RECOMMENDED TO ELIMINATE DELAYS DURING DESIGN.
3. STATE UTILITY ENGINEER WILL MAKE FINAL DETERMINATIONS AS TO THE ABILITY TO REASONABLY COMPLY WITH THESE DESIGN SPECIFICATIONS.
4. THESE DESIGN SPECIFICATIONS ARE INTENDED TO DEFINE THE DESIGN REQUIREMENTS OF SANITARY SEWER FACILITIES WHICH ARE CONSTRUCTED AND OPERATED UNDER TYPICAL CONDITIONS IN AQUA INDIANA SERVICE AREAS. DEPENDING ON FIELD CONDITIONS AND THE COMPOSITION AND CHARACTERISTICS OF THE SANITARY SEWER FLOW, DIFFERENT OR UNUSUAL CONDITIONS MAY OCCUR WHICH CANNOT BE ANTICIPATED IN A DOCUMENT OF THIS NATURE. CONSEQUENTLY, THE STATE UTILITY ENGINEER MAY IMPOSE ADDITIONAL OR SPECIAL DESIGN REQUIREMENTS UNDER SUCH CIRCUMSTANCES.
5. AQUA INDIANA WILL NOT ACCEPT GRAVITY SEWERS DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN SECTION 33.41 (RECOMMENDED MINIMUM SLOPES) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES "TEN STATES STANDARDS" (MOST RECENT EDITION) AND/OR 327 IAC ARTICLE 3, WHICHEVER IS MORE RESTRICTIVE. IT IS STRONGLY RECOMMENDED THAT GRAVITY SEWERS BE DESIGNED AT SLOPES GREATER THAN THE MINIMUM REGULATORY REQUIREMENTS.
6. ALL NEW COMMERCIAL OR INDUSTRIAL ENTITIES, WHICH EITHER GENERATE AND/OR WASTE OIL, GREASE OR THE BY-PRODUCTS THERETO, SHALL CONSTRUCT A 1,000-GALLON (MINIMUM) GREASE TRAP. THE DESIGN ENGINEER SHALL SUBMIT DETAILED CALCULATIONS FOR SIZE JUSTIFICATION OF SAID TRAP TO AQUA. CALCULATIONS SHALL BE ACCOMPANIED WITH REFERENCES, SPECIFICALLY DENOTING ORIGIN OF SIZING/CALCULATION METHOD.
7. TOILETS, URINALS, SINKS, SHOWERS, AND OTHER SIMILAR FIXTURES SHALL NOT WASTE THROUGH THE GREASE INTERCEPTOR. ALL OTHER WASTE SHALL ENTER THROUGH THE GREASE TRAP INTERCEPTOR, THROUGH THE INLET PIPE ONLY.
8. THE GREASE INTERCEPTOR AND GREASE TRAP SHALL BE DESIGNED SUCH THAT IT IS EASILY ACCESSIBLE, FOR INSPECTION/SAMPLING AND CLEANING, AT ALL TIMES. THE GREASE TRAP SHALL HAVE A MINIMUM OF TWO (2) COMPARTMENTS, WITH FITTINGS, DESIGNED FOR GREASE INTERCEPTION.
9. THE OIL/GREASE TRAP SHALL BE LOCATED OUTSIDE THE BUILDING AND AT A DISTANCE FAR ENOUGH TO ALLOW SOLUBLE GREASE/OIL TO BECOME INSOLUBLE.
10. NO GRAVITY SEWER MAIN CONVEYING RAW WASTEWATER SHALL BE LESS THAN 8 INCHES IN DIAMETER.
11. ALL SEWERS SHALL BE DESIGNED AND CONSTRUCTED TO GIVE MEAN VELOCITY, WHEN FLOWING FULL, OF NOT LESS THAN 2.0 FEET PER SECOND, BASED ON MANNING FORMULA USING AN "N" VALUE OF 0.013.
12. LATERALS SHALL BE A MINIMUM OF 6-INCHES IN DIAMETER WITH A SLOPE OF 1.00%.
13. SERVICE LATERALS SHALL BE SDR-26 PIPE FROM THE SEWER MAIN TO THE BUILDING. ONE LATERAL SHALL BE INSTALLED PER BUILDING. ALL LATERALS SHALL BE INSPECTED BY AN AQUA REPRESENTATIVE PRIOR TO BACKFILLING.
14. ALL LATERALS AND TEE-WYE FITTINGS SHALL BE PVC SDR-26. SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION. LATERAL CONNECTIONS SHALL ONLY OCCUR AT TEE-WYES.
15. A MINIMUM OF ONE CLEAN-OUT SHALL BE INSTALLED FOR EACH LATERAL. WHERE THE LENGTH OF A LATERAL EXCEEDS 100 FEET, THEN ONE CLEAN-OUT SHALL BE INSTALLED FOR EVERY 100 FEET OF LATERAL LENGTH. IN ANY EVENT A CLEAN-OUT SHALL BE LOCATED NO FARTHER THAN 4 FEET FROM THE BUILDING.
16. THE LOWEST INTERNAL PLUMBING ELEVATION TO RECEIVE GRAVITY SANITARY SERVICE MUST BE ONE (1) FOOT ABOVE THE TOP OF MANHOLE CASTING ELEVATION OF EITHER THE FIRST UPSTREAM OR DOWNSTREAM MANHOLE ON THE PUBLIC SEWER TO WHICH CONNECTION IS TO BE MADE. THOSE PORTIONS OF THE BUILDING NOT MEETING THE STATED GRAVITY SANITARY SERVICE REQUIREMENT SHALL BE PROVIDED AND MAINTAINED BY THE PROPERTY OWNER WITH A GRINDER PUMP SYSTEM, OR AN AQUA APPROVED EQUAL, DISCHARGING TO THE GRAVITY BUILDING CONNECTION OUTSIDE OF THE PUBLIC RIGHT-OF-WAY.
17. SEWER CONNECTION PERMIT FROM AQUA REQUIRES A LEGIBLE DIAGRAM, NAME OF PROPERTY OWNER, ADDRESS, TELEPHONE NUMBERS OF BOTH PROPERTY OWNER AND CONTRACTOR, DEPTH AND POSITION OF LATERAL BETWEEN MAINLINE SEWER TO THE BUILDING, LOCATION OF CONNECTION POINT REFERENCED TO ANY PERMANENT OBJECT, LENGTH AND SIZE OF PIPE TO BE INSTALLED, PIPE MATERIAL, SLOPE OF PIPE, BEDDING TYPE, PIPE CONTRACTOR, AND METHOD OF CONNECTION.
18. CONTRACTOR SHALL, WHEN CURBS ARE AVAILABLE, ENGRAVE A 3-LNCH HIGH BY 1/8-LNCH DEEP "S" ON THE CURB DIRECTLY ABOVE EACH SERVICE LATERAL. WHERE CURBS ARE NOT AVAILABLE, CONTRACTOR SHALL NOTCH THE SIDEWALK DIRECTLY ABOVE EACH SERVICE LATERAL.
19. NO DIRECT BASEMENT CONNECTIONS ARE PERMITTED.
20. NO ROOF DRAIN CONNECTIONS ARE PERMITTED.
21. SANITARY SEWERS SHALL NOT BE LOCATED IN REAR YARDS OR OTHER INACCESSIBLE AREAS UNLESS APPROVED BY AQUA.
22. ALL SANITARY SEWER FACILITIES AND LATERALS SHALL BE SEPARATED FROM EXISTING OR PROPOSED WATERBODIES BY A MINIMUM TWENTY (20) FEET HORIZONTALLY AS MEASURED FROM THE OUTSIDE EDGE OF THE SANITARY SEWER FACILITY TO THE TOP OF BANK. SANITARY SEWERS, FORCE MAINS, AND LATERALS CROSSING EXISTING OR PROPOSED LAKES, PONDS, AND/OR RETENTION OR DETENTION AREAS (EITHER WET OR DRY) ARE PROHIBITED.
23. CASTINGS SHALL BE SET AT TWO TENTHS (0.2) FEET ABOVE FINISH GRADE TO INSURE DRAINAGE AWAY FROM MANHOLE. CASTINGS WHICH ARE SURROUNDED BY ASPHALT, STONE DRIVES OR CONCRETE SHALL BE CONSTRUCTED WITHIN A TOLERANCE OF ±0.1 FEET OF THE DESIGNED ELEVATION. ALL OTHER CASTINGS SHALL BE CONSTRUCTED WITHIN A TOLERANCE OF ±0.2 FEET OF THE DESIGNED ELEVATION. ELEVATIONS WILL BE CHECKED WITH THE AS-BUILT DRAWINGS. UNDER NO CIRCUMSTANCE SHALL A MANHOLE CASTING BE BURIED.
24. THERE SHALL BE A MINIMUM OF 0.1 FEET OF FALL BETWEEN THE UPSTREAM INVERT(S) AND THE DOWNSTREAM INVERT IN A MANHOLE STRUCTURE FOR PIPES OF THE SAME DIAMETER. FOR CHANGE IN DIRECTION 45 DEGREES TO 75 DEGREES, A MINIMUM 0.20 FEET DROP SHALL BE MAINTAINED. FOR CHANGE IN DIRECTION 75 DEGREES TO 90 DEGREES, A MINIMUM 0.30 FEET DROP SHALL BE MAINTAINED. CHANGES IN DIRECTION OVER 90 DEGREES ARE NOT PERMITTED. FOR PIPES OF DIFFERING DIAMETERS, THE CROWN OF THE UPSTREAM PIPE SHALL MATCH THE CROWN OF THE DOWNSTREAM PIPE. AN OUTSIDE DROP MANHOLE IS REQUIRED FOR UPSTREAM INVERTS WHICH ARE TWO FEET HIGHER THAN THE DOWNSTREAM INVERT.

PART 1 - GENERALDEFINITIONS

BEDDING: FILL PLACED UNDER, BESIDE, AND DIRECTLY OVER PIPE, PRIOR TO SUBSEQUENT BACKFILL OPERATIONS.

CONTRACTOR: COMPANY OR INDIVIDUAL AUTHORIZED BY THE UTILITY TO PERFORM WORK AS CALLED FOR BY ISSUANCE OF A SEWER CONSTRUCTION PERMIT.

DEVELOPER: ANY PUBLIC AGENCY, PRIVATE COMPANY, OR INDIVIDUAL WHO PROPOSES THE DEVELOPMENT OF PROPERTY WHICH REQUIRES CONSTRUCTION OF SANITARY SEWERS OR LATERALS.

EMBEDMENT: EARTH OR OTHER SPECIAL MATERIAL USED TO REPLACE MATERIAL REMOVED FROM TRENCHES DURING CONSTRUCTION FROM THE SEWER SUBGRADE.

MAIN SEWER: REFERS TO ANY EXISTING OR PROPOSED SEWER DEDICATED TO PUBLIC USE WITHIN THE PUBLIC RIGHT-OF-WAY OR EASEMENT.

LATERAL: REFERS TO ANY EXISTING OR PROPOSED PIPE WHICH CONNECTS FROM THE BUILDING PLUMBING TO THE MAIN SEWER.

GRINDER PUMP: REFERS TO A PUMP USED TO GRIND WASTEWATER UP AND PUMP IT TO THE NEAREST GRAVITY SEWER.

1.2 ABBREVIATIONS

DI: DUCTILE IRON PIPE

IDEM: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PVC: POLYVINYL CHLORIDE PLASTIC

SDR: STANDARD DIMENSION RATIO

HDPE: HIGH DENSITY POLYETHYLENE

CCTV: CLOSED CIRCUIT TELEVISION

IAC: INDIANA ADMINISTRATIVE CODE

1.3 DELIVERY, STORAGE, AND HANDLING

STORE PLASTIC PIPING PROTECTED FROM DIRECT SUNLIGHT AND SUPPORT TO PREVENT SAGGING AND BENDING. PROTECT STORED PIPING FROM MOISTURE AND DIRT BY ELEVATING ABOVE GRADE. PROTECT FLANGES, FITTINGS, AND SPECIALTIES FROM MOISTURE AND DIRT. HANDLE MANHOLES ACCORDING TO MANUFACTURER'S WRITTEN RIGGING INSTRUCTIONS.

1.4 REFERENCE STANDARDS

THE PUBLICATIONS LISTED BELOW FORM A PART OF THIS SPECIFICATION TO THE EXTENT REFERENCED. THE PUBLICATIONS ARE REFERENCED IN THE TEXT BY THE BASIC DESIGNATION ONLY. MOST RECENT STANDARDS APPLY.

A. ASTM INTERNATIONAL:
   1. ASTM C443 - STANDARD SPECIFICATION FOR JOINTS FOR CONCRETE PIPE AND MANHOLES, USING RUBBER GASKETS
   2. ASTM D1785 - STANDARD SPECIFICATION FOR POLY(VINYL CHLORIDE) (PVC) PLASTIC PIPE, SCHEDULES 40, 80, AND 120.
   3. ASTM D2564 - STANDARD SPECIFICATION FOR SOLVENT CEMENTS FOR POLY(VINYL CHLORIDE) (PVC) PLASTIC PIPING SYSTEMS.
   4. ASTM D2729 - STANDARD SPECIFICATION FOR POLY(VINYL CHLORIDE) (PVC) SEWER PIPE AND FITTINGS.
   5. ASTM D2855 - STANDARD PRACTICE FOR MAKING SOLVENT-CEMENTED JOINTS WITH POLY(VINYL CHLORIDE) (PVC) PIPE AND FITTINGS.
   6. ASTM D3034 - STANDARD SPECIFICATION FOR TYPE PSM POLY(VINYL CHLORIDE) (PVC) SEWER PIPE AND FITTINGS.
   7. ASTM D6938 - STANDARD TEST METHOD FOR IN-PLACE DENSITY AND WATER CONTENT OF SOIL AND SOIL-AGGREGATE BY NUCLEAR METHODS (SHALLOW DEPTH).

B. ASTM F477 - STANDARD SPECIFICATION FOR ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE.

C. AMERICAN WATER WORKS ASSOCIATION (AWWA):
   1. AWWA C111 - RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS.
   2. AWWA C150 - THICKNESS DESIGN OF DUCTILE-IRON PIPE.
   3. AWWA C151 - DUCTILE-IRON PIPE, CENTRIFUGALLY CAST.

1.5 COORDINATION

A. COORDINATE CONNECTION TO SANITARY SEWER MAIN WITH THE UTILITY. A UTILITY REPRESENTATIVE MUST BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION STARTUP.

1.6 SANITARY SEWER SERVICE AREA STUDY

A. THE APPLICANT SHALL PREPARE A SERVICE AREA STUDY FOR ALL PROPOSED SANITARY SEWER FACILITIES. THE INTENT IS TO MAXIMIZE THE SERVICE AREA TO THE GREATEST EXTENT PRACTICAL. AQUA INDIANA WILL DETERMINE IF THE PROJECTED SERVICE AREA HAS BEEN MAXIMIZED. THE SERVICE AREA STUDY SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING:
   a. SERVICE AREA MAP
   b. PROJECT BOUNDARIES
   c. PROJECTED SERVICE AREA BOUNDARIES FOR COLLECTION SYSTEM
   d. ALL RELEVANT TOPOGRAPHIC INFORMATION WITH ELEVATION CONTOUR LINES
   e. DESIGN FLOW FOR PROJECTED SERVICE AREA BOUNDARY
   f. EXISTING SANITARY SEWER FACILITIES WITH INVERT AND TOP OF CASTING ELEVATIONS. AS-BUILT INFORMATION MAY BE USED
   g. ANY OTHER INFORMATION DEEMED NECESSARY BY AQUA INDIANA

B. SANITARY SEWER FACILITIES MUST BE DESIGNED TO SERVE THE ANTICIPATED FLOWS FROM THE ENTIRE UPSTREAM SERVICE AREA. DESIGNER SHALL CONTACT STATE UTILITY ENGINEER TO DETERMINE THE APPLICABILITY OF OVER-SIZING COSTS FOR EACH PROJECT.

1.7 EASEMENTS

A. MINIMUM EASEMENT WIDTH IS 20 FEET WITH THE SEWER CENTERED IN THE EASEMENT. THE EASEMENT SHALL BE DEDICATED TO THE UTILITY.

DEPTH OF SEWER	EASEMENT WIDTH (FEET)
UP TO 15 FEET	20
15 – 20 FEET	25
20 – 25 FEET	30
25 – 35 FEET	40
OVER 35 FEET	50

B. A MINIMUM OF TWENTY (20) FEET OF HORIZONTAL SEPARATION (AS MEASURED HORIZONTALLY FROM THE SEWER SPRING LINE) MUST BE MAINTAINED BETWEEN GRAVITY SEWERS AND THE TOP OF BANK OF ALL WATER WAYS, BODIES OF WATER AND DRY DETENTION AREAS.

C. WHEN CROSSING A WATER WAY, THE SANITARY SEWER FACILITIES SHOULD BE DESIGNED TO CROSS AS CLOSE TO NINETY (90) DEGREES AS POSSIBLE. THE UTILITY WILL NOT PERMIT THE CROSSING OF BODIES OF WATER

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

1/4/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

PLOT SCALE: 1:2.5849 - EDIT DATE: 10/26/16 - 8:11 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20180196 4\UI.DS.01(R4).DWG

INCLUDING, LAKES AND RETENTION/DETENTION PONDS OR DRY DETENTION AREAS.

1.8 CLOSEOUT SUBMITTALS

A. THE FOLLOWING DOCUMENTS ARE REQUIRED FOR UTILITY PROJECT ACCEPTANCE AND CLOSEOUT:

1. RESULTS OF ALL TESTING (PDF FORMAT)
2. CCTV OF ALL SEWER LINES TO BE DEDICATED (VIDEO FORMAT)
3. AS-BUILTS (2) TWO 24X36" FULL SIZE COPIES – PAPER (CERTIFIED)
4. AS-BUILTS – PDF FORMAT (CERTIFIED)
5. AS-BUILTS – ELECTRONIC CAD FORMAT (IN STATE PLANE AND ON NAVD 88)
6. RECORDED PLAT – PDF FORMAT
7. CONSTRUCTION PLANS – PDF FORMAT
8. ENGINEER OF RECORD CERTIFICATION – PDF FORMAT
9. CERTIFICATE OF SEWER MAIN COST (DESIGN ENGINEER CERTIFIED) – PDF FORMAT
10. 2 YEAR MAINTENANCE BOND (10%) – PAPER AND PDF FORMAT
11. TRANSFER OF OWNERSHIP – SEWER FACILITIES – PAPER (NOTARIZED)

PART 2 - PRODUCTS2.1EXCAVATION

A. DESCRIPTION

1. THE CONTRACTOR SHALL CONSTRUCT ALL EARTH EXCAVATIONS TO THE WIDTHS AND DEPTHS DETAILED IN THE DRAWINGS. EXCAVATION SHALL INCLUDE ALL KINDS OF MATERIALS, WET AND/OR DRY, EXCAVATED, OR WHICH ARE TO BE EXCAVATED, INCLUDING ROCK, SHALE, HARDPAN, MUCK, ETC.
2. EXCAVATION INCLUDES ALL EXCAVATION, SURFACE REMOVAL, CLEARING, DISPOSAL OF SURPLUS MATERIAL, DEWATERING, BORING AND JACKING, AND ALL OTHER WORK INCIDENTAL TO THE CONSTRUCTION OF TRENCHES OR TRENCHLESS MEANS FOR PIPE INSTALLATION. EXCAVATION ALSO INCLUDES THE SAME ACTIVITIES RELATED TO THE INSTALLATION OF MANHOLES OR OTHER REQUIRED STRUCTURES.
3. THE DEVELOPER AND HIS OR HER CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING THE PROTECTION OF ALL EXISTING IMPROVEMENTS, BOTH PUBLIC AND PRIVATE. THE UTILITY SHALL BE HELD HARMLESS FROM ANY AND ALL DAMAGES TO SAID EXISTING IMPROVEMENTS DURING THE CONSTRUCTION OF THE IMPROVEMENTS.
4. COMPLIANCE WITH THESE SPECIFICATIONS DOES NOT ELIMINATE THE NEED TO COMPLY WITH OTHER APPLICABLE CITY, COUNTY, STATE AND FEDERAL ORDINANCES, REGULATIONS, AND CONSTRUCTION REQUIREMENTS. THIS INCLUDES BUT IS NOT LIMITED TO CODES AND STANDARDS ISSUED BY IDEM, INDOT, OR OTHER GOVERNMENTAL AGENCIES.
5. THE PROVISIONS OF THIS DOCUMENT SHALL BE DEEMED AS ADDITIONAL REQUIREMENTS TO MINIMUM STANDARDS REQUIRED BY OTHER APPLICABLE ORDINANCES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.

2.2 EMBEDMENT AND BACKFILL

A. DESCRIPTION

1. ALL TRENCHES OR EXCAVATIONS SHALL BE BACKFILLED TO THE ORIGINAL SURFACE OF THE GROUND OR SUCH OTHER GRADES AS SHOWN ON THE DRAWINGS. IN GENERAL, BACKFILLING OPERATIONS SHALL BE CARRIED ALONG AS SPEEDILY AS POSSIBLE AND AS SOON AS THE PIPE HAS BEEN LAID AND BEDDING HAS BEEN PLACED.

B. DEFINITIONS AND GENERAL CONSIDERATIONS

1. PIPE BEDDING SHALL BE CONSIDERED THE AREA USED FOR SUPPORT DIRECTLY UNDER THE PIPE FOR THE FULL WIDTH OF THE TRENCH. THE HAUNCH IS THE AREA FROM THE TOP OF THE BEDDING TO THE SPRINGLINE (HORIZONTAL CENTERLINE OF THE PIPE) FOR THE FULL WIDTH OF THE TRENCH. INITIAL BACKFILL IS THE AREA FROM THE SPRINGLINE TO TWELVE (12") INCHES ABOVE THE CROWN (TOP) OF THE PIPE. PIPE EMBEDMENT IS THE TOTAL AREA THAT INCLUDES THE BEDDING, HAUNCH AND INITIAL BACKFILL. THE FINAL BACKFILL IS ALL OF THE AREA ABOVE THE TOP OF THE INITIAL BACKFILL ELEVATION.
2. SPECIAL FOUNDATION MATERIAL MAY BE REQUIRED UNDER THE PIPE BEDDING FOR AREAS OF UNSTABLE SOIL MATERIAL. IN CIRCUMSTANCES WHERE UNSTABLE SOIL MATERIAL IS ENCOUNTERED, THE AREA SHALL BE EXCAVATED AND REPLACED WITH SUITABLE CRUSHED STONE TO FORM A SOUND FOUNDATION. THE PIPE BEDDING CAN THEN BE PLACED UPON THE FOUNDATION MATERIAL.
3. THE CONTRACTOR SHALL NOT PLACE PIPE EMBEDMENT MATERIALS BY METHODS THAT WILL DAMAGE OR DISTURB THE PIPE OR OTHER UTILITIES. CARE SHALL BE TAKEN THAT COMPACTION EQUIPMENT DOES NOT COME INTO CONTACT WITH THE PIPE. PRIOR TO PERFORMING COMPACTION OPERATION OVER THE PIPE, THE CONTRACTOR MUST ENSURE THAT SUFFICIENT BACKFILL IS INSTALLED OVER THE PIPE TO PREVENT DAMAGE OR EXCESSIVE DEFLECTION.

C. BEDDING AND BACKFILL OF TRENCH EXCAVATIONS FOR PIPES AND CONDUITS

1. BEDDING AND BACKFILL MATERIALS FOR PIPE INSTALLATION AND TRENCH BACKFILL SHALL CONFORM TO THE TYPES DETAILED IN PART 3 OF THIS SPECIFICATION FOR THE SPECIFIC PIPE TYPE INSTALLED.

D. STRUCTURAL BACKFILL

1. BACKFILL MATERIALS FOR BACKFILL OF STRUCTURES OTHER THAN PIPES AND CONDUITS SHALL BE ACCORDING THE STANDARD DETAILS.

2.3 GRAVITY SANITARY SEWER PIPE

A. DESCRIPTION

1. THE CONTRACTOR SHALL FURNISH AND LAY SEWER PIPE, AND ALL ACCESSORIES, TO THE LINES AND GRADES SHOWN ON THE DRAWINGS. SEWER PIPE SHALL BE CONSTRUCTED OF THE PIPE MATERIALS AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
2. RELATED WORK DESCRIBED ELSEWHERE:
   a. EXCAVATION
   b. EMBEDMENT AND BACKFILL

B. QUALITY ASSURANCE

1. CODES AND STANDARDS
   a. EACH LENGTH OF PIPE SHALL BE MARKED PER THE REQUIREMENTS OF THE RESPECTIVE ASTM STANDARD.
   b. ALL CODES AND STANDARDS SHALL BE SET FORTH IN THE LATEST ASTM STANDARD.
2. UPON REQUEST BY THE UTILITY, THE CONTRACTOR SHALL FURNISH COPIES OF ALL MATERIAL TESTS REQUIRED BY THE APPLICABLE ASTM STANDARD.
3. NO PUBLIC GRAVITY SEWER WILL BE LESS THAN EIGHT (8) INCHES IN DIAMETER.
4. THE UTILITY WILL NOT ACCEPT GRAVITY SEWERS DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN SECTION 33.41 (RECOMMENDED MINIMUM SLOPES) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES "TEN STATES STANDARDS" (MOST RECENT EDITION) AND/OR 327 IAC ARTICLE 3, WHICHEVER IS MORE RESTRICTIVE. IT IS STRONGLY RECOMMENDED THAT GRAVITY SEWERS BE DESIGNED AT SLOPES GREATER THAN THE MINIMUM REGULATORY REQUIREMENTS.
5. IF A DROP MANHOLE CAN BE CONSTRUCTED TO AVOID SLOPES GREATER THAN 5.00%, THEN AQUA INDIANA GENERALLY WILL REQUIRE THE DROP MANHOLE TO BE CONSTRUCTED.
6. MAXIMUM ALLOWED INFILTRATION IN NEW GRAVITY SANITARY SEWERS SHALL BE 100 GALLONS PER 24 HOUR PERIOD PER INCH-DIAMETER-MILE.

C. POLYVINYL CHLORIDE (PVC) PIPE, SDR-35, SDR-26, OR SDR-21

1. MATERIAL
   a. POLYVINYL CHLORIDE (PVC) FOR GRAVITY SANITARY SEWER PIPE SHALL BE THE INTEGRAL WALL BELL AND SPIGOT TYPE WITH ELASTOMERIC SEAL JOINTS AND SMOOTH INNER WALLS MEETING OR EXCEEDING ALL OF THE REQUIREMENTS SET FORTH IN ASTM D-3034 FOR PIPE DIAMETERS 15-INCHES OR LESS.
   b. FOR DIAMETERS 15-INCHES OR LESS, THE PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454 OR 12364; WITH ALL PIPE HAVING A MINIMUM TENSILE STRENGTH OF 34.50 MPA AS DEFINED IN ASTM D-1784.
   c. PVC SANITARY SEWER PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR 35 AND 115 PSI FOR SDR 26 FOR EACH DIAMETER, WHEN MEASURED AT 5% VERTICAL RING DEFLECTION AND TESTED IN ACCORDANCE WITH ASTM D-2412.
   d. FOR PIPE INSTALLATION WHERE THE SEWER IS CLOSER THAN 51 FEET TO A RESIDENTIAL WATER WELL, THE SEWER SHALL BE CONSTRUCTED FROM SDR-21 IN ACCORDANCE WITH ASTM D-2241, WITH A MINIMUM CELL CLASS OF 12454.
   e. ULTIMATE DEPTH (FROM INVERT TO GRADE) GUIDANCE:

DEPTH OF SEWER	PIPE TYPE
UP TO 15 FEET	PVC: ASTM D3034 (SDR 35). ASTM F679 (T-1, SDR 35, PS 46)
UP TO 25 FEET	PVC: ASTM D3034 (SDR 26), ASTM D2241 (SDR 21, PS 225 OR GREATER), AWWA C-900 (DR 18, PS 364 OR GREATER), OR AWWA C-905 (DR 25 OR DR 18, PS 115 OR GREATER)
UP TO 30 FEET	AWWA C-900 (DR 18, PS 364 OR GREATER) OR AWWA C-905 (DR 25 OR DR 18, PS 115 OR GREATER)
OVER 30 FEET	CONTACT STATE UTILITY ENGINEER

2. JOINTS
   a. FLEXIBLE GASKET 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. THE ASSEMBLY OF JOINTS SHALL BE IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS AND ASTM D-3212 FOR PIPE CONFORMING TO ASTM D-3034 OR JOINTS SHALL MEET THE REQUIREMENTS OF ASTM D-3139 FOR PIPE CONFORMING TO ASTM D-2241. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO THE REQUIREMENTS OF ASTM F-477.
   b. NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.
   c. ALL FIELD-CUTTING OF PIPE SHALL BE DONE IN A NEAT MANNER AS PER MANUFACTURER'S RECOMMENDATIONS 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 THE PIPE WALL THICKNESS. FIELD CUT PIPE WILL ONLY BE ALLOWED TO BE INSTALLED AT MANHOLES, AT PREFABRICATED TEES AND WYES, AND AT THE CONNECTION OF NEW SANITARY SEWER TO EXISTING SANITARY SEWER.
3. FITTINGS
   a. ALL PIPE FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE LATEST ASTM D-3034 AND ASTM F-679 STANDARDS AND SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR 35 AND 115 PSI FOR SDR 26 IN ALL DIRECTIONS. THE MINIMUM CELL CLASSIFICATION SHALL BE 12454 OR 12364 PER THE LATEST ASTM D-1784 STANDARD. ALL FITTINGS SHALL BE "HEAVY WALL" AND PROVIDED GASKETS MEETING OR EXCEEDING THE STANDARDS FOR THE PIPE.
   b. ALL SEWER MAIN LATERAL CONNECTIONS SHALL BE PRE-FABRICATED WYE FITTINGS. ALL PIPE FITTINGS SHALL BE INJECTION MOLDED UNLESS PRIOR AUTHORIZATION IS GRANTED BY THE UTILITY.
   c. SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION. FOR INSTALLATION OF A NEW LATERAL ON EXISTING SEWERS, CONNECTION WITH A SADDLE MAY BE CONSIDERED ON PIPE 10-INCHES IN DIAMETER AND LARGER.
4. DESIGN
   a. THE MINIMUM WALL THICKNESS FOR PVC SEWER PIPE AND LATERAL SEWER PIPE 15- INCHES OR LESS IN DIAMETER SHALL CONFORM TO SDR-35, SDR-26, OR SDR-21 AS SPECIFIED IN ASTM D-3034 OR ASTM D-2241.
5. MARKINGS
   a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION (E.G. "PVC-SDR-26"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION AND FITTING IN ACCORDANCE WITH THE ASTM D-3034.
6. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

D. POLYVINYL CHLORIDE (PVC) PIPE, C-900/C-905

1. PIPE
   a. PVC GRAVITY SEWER MAIN PIPE SHALL CONFORM TO ASTM SPECIFICATION D-2241, STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PLASTIC PIPE (SDR PR). THE MATERIAL USED SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CLASS 12454. THE MINIMUM PRESSURE CLASS FOR A STREAM CROSSING SHALL BE CLASS 200.
   b. THE PIPE FITTINGS SHALL BE PRESSURE RATED IN ACCORDANCE WITH RECOMMENDATIONS OF THE PLASTIC PIPE INSTITUTE.
   c. PVC GRAVITY SEWER MAIN SHALL BE IN COMPLIANCE WITH AWWA C-900 FOR 4" THROUGH 12" AND AWWA C-905 FOR 14" AND GREATER. THE MINIMUM DIMENSION RATIO SHALL BE DR18 WITH A PRESSURE RATING OF 235 PSI.
   d. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C-900, WHICH SHALL INCLUDE THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL. IN ADDITION, THE PLAIN END OF EACH PIPE LENGTH SHALL HAVE TWO (2) RINGS, ONE INCH (1") APART, PAINTED AROUND THE PIPE AT THE PROPER LOCATION TO ALLOW FIELD CHECKING OF THE CORRECT SETTING DEPTH OF THE PIPE IN THE BELL OR COUPLING.
2. JOINTS
   a. JOINTS SHALL BE BELL END OR COUPLING PUSH-ON TYPE.
   b. THE PUSH-ON JOINT AND JOINT COMPOUNDS SHALL MEET THE REQUIREMENTS FOR ASTM SPECIFICATION D-3139, JOINT FOR THE PLASTIC PIPE, USING FLEXIBLE ELASTOMERIC SEALS. THE JOINT SHALL BE DESIGNED SO AS TO PROVIDE FOR THE THERMAL EXPANSION AND CONTRACTION EXPERIENCED WITH A TOTAL TEMPERATURE CHANGE OF SEVENTY-FIVE (75) DEGREES F IN EACH JOINT OF PIPE. DETAILS OF THE JOINT DESIGN AND ASSEMBLY SHALL BE IN ACCORDANCE WITH JOINT MANUFACTURER'S STANDARD PRACTICE.
   c. THE LUBRICANT SHALL HAVE NO DETERIORATING EFFECTS ON THE GASKET OR THE PIPE. THE LUBRICANT CONTAINERS SHALL BE LABELED WITH MANUFACTURER'S NAME.
   d. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO ASTM F-477. GASKETS SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI STANDARD A- 21.11.
3. FITTINGS
   a. FITTINGS SHALL BE MANUFACTURED IN ONE PIECE OF INJECTION MOLDED PVC COMPOUND MEETING THE REQUIREMENTS OF ASTM D1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE @ 73 DEGREES F IN ACCORDANCE WITH ASTM D1599.
   b. ALL SEWER MAIN LATERAL CONNECTIONS SHALL BE PRE-FABRICATED WYE FITTINGS TO FIT C900 PIPE. ALL PIPE FITTINGS SHALL BE INJECTION MOLDED UNLESS PRIOR AUTHORIZATION IS GRANTED BY THE UTILITY.
4. MARKINGS
   a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION (E.G. "PVC-C900"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION AND FITTING IN ACCORDANCE WITH THE ASTM D-3034.
5. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

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AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

1/4/2021
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SANITARY SEWER SPECIFICATIONS

E. NON-PRESSURE TYPE TRANSITION COUPLINGS

1. COMPLY WITH ASTM C1173, ELASTOMERIC, SLEEVE TYPE, REDUCING OR TRANSITION COUPLING, FOR JOINING UNDERGROUND NONPRESSURE PIPING. INCLUDE ENDS TO MATCH SAME SIZES OF MAIN LINE PIPING AND INSTALL CORROSION-RESISTANT METAL TENSION BANDS AND TIGHTENING MECHANISM ON EACH END.
2. SLEEVE MATERIALS:
   a. FOR PLASTIC PIPES: ASTM F477, ELASTOMERIC SEAL.
   b. FOR DISSIMILAR PIPES: PVC OR OTHER MATERIAL COMPATIBLE WITH PIPE MATERIALS BEING JOINED.
3. NON-SHEAR, FLEXIBLE COUPLINGS:
   a. COUPLINGS SHALL BE ELASTOMERIC SLEEVE WITH STAINLESS STEEL SHEAR RING AND CORROSION-RESISTANT-METAL TENSION BAND AND TIGHTENING MECHANISM ON EACH END.

F. LATERALS

1. LATERALS SHALL BE 6-INCH PVC SDR 26 LAID AT A MINIMUM OF 1.00% SLOPE FROM THE SEWER MAIN TO THE RIGHT OF WAY LINE (OR EASEMENT LINE).
   a. EACH PROPERTY HAVING A SEPARATE PROPERTY OWNER SHALL HAVE ITS OWN LATERAL FROM THE BUILDING TO THE MAINLINE SEWER.
2. EXCEPT AS PROVIDED IN A WRITTEN APPROVAL ISSUED BY THE UTILITY, NO PERSON SHALL CONNECT A LATERAL TO A SANITARY OR COMBINED SEWER WHEN THE LATERAL HAS ANY OF THE FOLLOWING SOURCES OF CLEAR WATER:
   a. FOUNDATION/FOOTING DRAINS;
   b. SUMP PUMPS WITH OR WITHOUT FOUNDATION DRAINS CONNECTED;
   c. ROOF DRAINS;
   d. HEAT PUMP DISCHARGE;
   e. COOLING WATER; OR
   f. ANY OTHER SOURCES OF CLEAR WATER, SUCH AS, BUT NOT LIMITED TO, YARD AND / OR DRIVEWAY DRAINS.
3. BASEMENTS
   a. THE UTILITY DOES NOT ALLOW ANY DIRECT BASEMENT CONNECTIONS TO A GRAVITY LATERAL.
   b. ALL BUILDINGS CONSTRUCTED WITH A BASEMENT (BELOW GROUND LEVEL) SHALL USE A SUMP PIT AND SEWAGE EJECTOR PUMP ARRANGEMENT TO LIFT THE SEWAGE ABOVE THE OUTSIDE GRADE RELATIVE TO THE DIRECTION AND LOCATION OF THE SANITARY SEWER MAIN (OVERHEAD SEWER). ALL PIPING SHALL BE ARRANGED AS TO PRECLUDE THE PUMP FROM PUMPING SEWAGE TO AN UPPER LEVEL WHEN THE PUMP IS PUMPING AGAINST A HEAD (BLOCKED SEWER MAIN OR LATERAL).
   c. A CHECK VALVE SUITABLE FOR THE PIPE MATERIAL BEING USED SHALL BE INSTALLED HORIZONTALLY IN THE DOWNSTREAM PIPING OF THE EJECTOR PUMP PRIOR TO DISCHARGE INTO THE HOUSE GRAVITY LATERAL. THE CHECK VALVE SHALL BE ABLE TO WITHSTAND NORMAL PUMPING PRESSURE AND WATER HAMMER. THE CHECK VALVE SHALL BE ACCESSIBLE FOR NORMAL MAINTENANCE. A BALL-TYPE SHUT-OFF VALVE SHALL BE INSTALLED ON BOTH DOWNSTREAM AND UPSTREAM SIDE OF THE CHECK VALVE FOR EASE OF MAINTENANCE.
4. THE UTILITY PREFERS NOT TO INSTALL LATERALS ON SEWERS WITH AN ULTIMATE DEPTH OF TWENTY (20) FEET OR GREATER AND/OR TO SEWERS EIGHTEEN (18) INCHES OR LARGER. THEREFORE, DESIGN ENGINEER SHALL CONTACT STATE UTILITY ENGINEER TO DISCUSS ALTERNATIVES. FOR EXAMPLE, A PARALLEL SHALLOW SEWER, SPECIAL LATERAL CONSTRUCTION, ETC.
5. GENERALLY, THE UTILITY DOES NOT ALLOW LATERAL CONNECTIONS TO A SEWER BEYOND THOSE INSTALLED DURING ORIGINAL CONSTRUCTION. LATERALS MUST CONNECT TO THE SANITARY SEWER ONLY AT MANUFACTURED FITTINGS (EXCEPT AS OTHERWISE PERMITTED BY THESE DESIGN SPECIFICATIONS). NO "SADDLE" CONNECTIONS TO THE SANITARY SEWER WILL BE ALLOWED. THEREFORE, CONSIDERATION OF FUTURE CONNECTIONS MUST BE ADDRESSED IN THE DESIGN PROCESS. IF IT IS DETERMINED BY STATE UTILITY ENGINEER THAT AN EXCEPTION SHOULD BE GRANTED THEN THE FOLLOWING CONSIDERATIONS WILL APPLY:
   a. BY-PASS PUMPING MAY BE REQUIRED TO MAINTAIN CONTINUAL SERVICE TO ALL UPSTREAM USERS.
   b. DISCONNECT THE EXISTING SEWER AT AN EXISTING JOINT.
   c. CONTRACTOR TO MAINTAIN EXISTING LINE AND GRADE FOR RECONSTRUCTED SEWER.
   d. INSTALL DUCTILE IRON COUPLING WITH TRANSITION GASKET FOR THE WYE/EXISTING SEWER CONNECTION.
   e. THE ADDITIONAL WYE AND COUPLING MUST BE CONCRETE ENCASED.
6. ALL LATERALS MUST BE A MINIMUM OF SIX (6) INCHES IN DIAMETER AND SIZED BASED ON THE ANTICIPATED FLOWS. FOR EXAMPLE, A LATERAL SERVICING A POOL HOUSE MAY NEED TO BE LARGER BASED ON THE PEAK FILTER BACKWASH FLOW.
7. LATERAL LENGTH
   a. UNLESS APPROVED BY STATE UTILITY ENGINEER IN WRITING, NO MORE THAN ONE HUNDRED (100) FEET OF A LATERAL SHALL EXIST WITHIN A PUBLIC RIGHT-OF-WAY OR BEYOND THE BOUNDARY OF THE LOT OR PARCEL FOR WHICH THE LATERAL IS DESIGNED TO SERVICE.
   b. UNLESS APPROVED BY STATE UTILITY ENGINEER IN WRITING, NO LATERAL SHALL BE GREATER THAN TWO HUNDRED (200) FEET IN LENGTH.
8. SLOPE
   a. SLOPE REQUIREMENTS MUST CONFORM TO THE LATEST EDITION OF THE STATE OF INDIANA (UNIFORM PLUMBING CODE), LOCAL CODES AND TO THESE DESIGN SPECIFICATIONS, WHICHEVER IS MORE STRINGENT.
   b. LATERALS MUST BE INSTALLED AT A MINIMUM OF 1.00% AND WHERE POSSIBLE, NOT EXCEED 6.00%. STATE UTILITY ENGINEER, DEPENDING ON SITE CONDITIONS, MAY WAIVE THE SLOPE REQUIREMENTS.
9. NO MORE THAN ONE (1) BUILDING OR RESIDENCE WILL BE PERMITTED TO CONNECT INTO A LATERAL UNLESS THE PRIOR WRITTEN APPROVAL OF STATE UTILITY ENGINEER IS OBTAINED. EXCEPT FOR EXISTING HOMES SERVED BY LATERALS INSTALLED WITH NEW CONSTRUCTION TWO EXISTING HOMES MAY BE SERVED BY A SINGLE LATERAL.
10. LATERALS CANNOT CONNECT DIRECTLY INTO A MANHOLE, EXCEPT AS FOLLOWS:
    a. APPROVED BY STATE UTILITY ENGINEER IN WRITING.
    b. ON DEEP LINES (GREATER THAN TWELVE (12) FEET) OR INTERCEPTORS GREATER THAN TEN (10) INCHES IN DIAMETER.
    c. ON BUILDINGS IN WHICH AQUA INDIANA MAY WISH TO FLOW MONITOR OR SAMPLE FLOW CHARACTERISTICS.
    d. ON BUILDINGS IN WHICH ADDITIONAL ACCESS TO THE LATERAL WOULD BE HELPFUL. FOR EXAMPLE, SCHOOLS.
11. LATERALS MUST CONNECT TO THE MAIN LINE SEWER AT AN ANGLE (AS MEASURED FROM THE DIRECTION OF FLOW) THAT IS GREATER THAN NINETY (90) DEGREES.
12. WHERE POSSIBLE, WYES AND LATERALS SHOULD BE LOCATED TO AVOID THE FOLLOWING SITUATIONS:
    a. INSTALLATION ON INTERCEPTORS GREATER THAN TEN (10) INCHES.
    b. INSTALLATION ON SEWERS WHICH ARE CONCRETE ENCASED/CAPPED.
    c. INSTALLATION BELOW PAVEMENT OR CONCRETE, INCLUDING STREETS, DRIVEWAYS, PARKING LOTS, ETC.
    d. INSTALLATION BELOW STORM SEWERS OR WATER WAYS.
    e. INSTALLATION BELOW OTHER UTILITIES.
    f. INSTALLATION BELOW MOUNDING, RETAINING/LANDSCAPING/ENTRANCE WALLS AND LANDSCAPING.
    g. INSTALLED WITH LESS THAN TEN (10) FEET OF HORIZONTAL SEPARATION FROM UTILITIES, STREETS, STORM SEWERS, WATER WAYS, BUILDINGS, ETC.
13. WHEN A LATERAL CROSSES A PARCEL OTHER THAN THE PROPERTY IT IS INTENDED TO SERVICE, IT MUST BE CONSTRUCTED WITHIN A SANITARY SEWER EASEMENT OR UTILITY EASEMENT. THE LATERAL MUST MAINTAIN A MINIMUM HORIZONTAL SEPARATION OF TEN (10) FEET MEASURED FROM THE SPRING LINE OF THE PIPE TO THE EDGE OF THE EASEMENT. ADDITIONAL SEPARATION MAY BE REQUIRED BASED UPON ULTIMATE DEPTH OF THE LATERAL AND/OR SOIL/GROUNDWATER CONDITIONS.
14. DURING CONSTRUCTION OF THE MAIN LINE SEWER, LATERALS MUST TERMINATE WITHIN A SANITARY SEWER OR UTILITY EASEMENT AND BE SEALED WITH A MANUFACTURED CAP/PLUG MADE SPECIFICALLY FOR THE PURPOSED OF SEALING/CAPPING THE END OF THE SANITARY SEWER TO ENSURE 100% WATER TIGHTNESS. THE TERMINATION POINT MUST BE A MINIMUM OF FIVE (5) FEET FROM THE BUILDING LINE.
15. ALL PVC FITTINGS MUST BE ASTM D-3034 SDR-26 HEAVY WALL MINIMUM. BELL TO SPIGOT FITTINGS MAY ONLY BE APPROVED BY THE STATE UTILITY ENGINEER.
16. FROM THE BUILDING TO THE MAIN LINE SEWER, IT IS RECOMMENDED THAT A CLEAN-OUT BE INSTALLED AFTER EVERY THREE (3) FITTINGS OF 22.5 DEGREES OR MORE, BUT IN NO CASE EXCEEDING FIVE (5) FITTINGS BETWEEN CLEAN-OUTS.
17. WHEN SERVICE IS FROM THE REAR A CLEAN-OUT MUST BE INSTALLED EITHER ON THE SIDE OR FRONT OF THE BUILDING SO THAT A CLEAN-OUT IS ALWAYS ACCESSIBLE, NOT FENCED IN.
18. TYPE 1 CLEAN-OUTS MUST BE INSTALLED IN GRASS OR LANDSCAPE AREAS LOCATED WITHIN THREE (3) FEET OF THE BUILDING'S EXTERIOR WALL. ALL OTHER INSTALLATIONS MUST BE TYPE 2 OR TYPE 3.
19. ALL CLEAN-OUTS MUST BE THE SAME DIAMETER AS THE HORIZONTAL LATERAL INTO WHICH THE CLEAN-OUT IS CONNECTED BEING A MINIMUM OF SIX (6) INCHES.

G. CLEANOUTS

1. PVC CLEANOUTS:
   a. PVC BODY WITH PVC THREADED PLUG: CLEANOUT SHALL BE AS PER ASTM D3034. PVC SEWER PIPE FITTING AND RISER TO CLEANOUT.
   b. CLEANOUT SHALL BE INSTALLED AT A MINIMUM OF 3 FEET FROM THE OUTSIDE OF BUILDING WALL AND EVERY 100 FEET OF LATERAL UNTIL CONNECTION AT THE MAINLINE SEWER.
   c. CLEANOUT RISER: SEWER PIPE FITTING ON MAIN LINE SEWER AND RISER SHALL MATCH MAIN LINE PIPING.
   d. CLEANOUT SHUT-OFF VALVE: A CLEANOUT VALVE SHALL BE PROVIDED, SEWUR VALVE OR APPROVED EQUAL.

2.4 PRESSURE PIPE

A. DESCRIPTION

1. THE CONTRACTOR SHALL FURNISH AND LAY, AS REQUIRED, SANITARY PRESSURE PIPE, TOGETHER WITH ALL FITTINGS, THRUST BLOCKING OR OTHER INCIDENTALS AS SHOWN ON THE APPROVED PLANS OR SPECIFIED AND, NECESSARY TO COMPLETE THE WORK. SANITARY PRESSURE PIPE SHALL BE CONSTRUCTED OF THE PIPE MATERIALS AS SPECIFIED HEREIN.
2. ALL SANITARY PRESSURE PIPES TO BE FURNISHED UNDER THIS CONTRACT SHALL CONFORM TO SPECIFICATIONS OF THIS SECTION.
3. PRESSURE PIPE MAY BE INSTALLED BY THE HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD.
4. RELATED WORK DESCRIBED ELSEWHERE:
   a. EXCAVATION
   b. EMBEDMENT AND BACKFILL
5. FLOW FROM PRESSURE PIPES SHALL BE DIRECTED TOWARDS THE OUTLET PIPE WITHIN THE DISCHARGE MANHOLE. MODIFICATIONS TO THE BENCH MAY BE NECESSARY.
6. NO PUBLIC FORCE MAIN WILL BE LESS THAN FOUR (4) INCHES IN DIAMETER, EXCEPT IN A LOW PRESSURE TYPE GRINDER PUMP COLLECTION SYSTEM APPROVED BY THE UTILITY.
7. VELOCITIES IN FORCE MAINS OF LESS THAN TWO (2) FEET PER SECOND WILL NOT BE ACCEPTED.
8. FORCE MAINS MUST BE DESIGNED AT A CONSTANT POSITIVE SLOPE FROM LOW POINTS AND CLEAN-OUTS TO AIR/VACUUM RELIEF VALVES.

B. QUALITY ASSURANCE

1. CODES AND STANDARDS
   a. EACH LENGTH OF PIPE SHALL BE MARKED PER THE REQUIREMENTS OF THE RESPECTIVE ASTM STANDARD.
   b. ALL CODES AND STANDARDS SHALL BE SET FORTH IN THE LATEST ASTM STANDARD.
   c. UPON REQUEST BY THE ENGINEER, THE CONTRACTOR SHALL FURNISH COPIES OF ALL MATERIAL TESTS REQUIRED BY THE APPLICABLE ASTM STANDARD.

C. DUCTILE IRON PIPE

1. MATERIAL
   a. DUCTILE IRON PIPE SHALL BE CENTRIFUGALLY CAST AND SHALL CONFORM TO ANSI SPECIFICATIONS A-21 AND AWWA C-151, LATEST REVISION. DUCTILE IRON PIPE SHALL BE PRESSURE CLASS 350, 300 OR 250.
2. COATINGS AND LININGS
   a. PIPE SHALL BE SULFATE RESISTING CEMENT LINED IN ACCORDANCE WITH AWWA C-104. THE PIPE OUTSIDE SHALL BE SEAL COATED WITH AN APPROVED BITUMINOUS SEAL COAT IN ACCORDANCE WITH AWWA SPECIFICATION C-151 (ANSI A21).
   b. THE PIPE SHALL ALSO HAVE EITHER OF THE FOLLOWING INTERIOR COATINGS:
      1) POLYURETHANE IN ACCORDANCE WITH ASTM D16 TYPE V (1000 MICRONS MINIMUM THICKNESS)
      2) EPOXY (40 MILS MINIMUM THICKNESS)
      3) POLYETHYLENE (1500 MICRONS MINIMUM THICKNESS)
3. FITTINGS
   a. FITTINGS SHALL BE STANDARDIZED FOR THE TYPE OF PIPE AND JOINT SPECIFIED AND SHALL COMPLY WITH AWWA C-110 (ANSI A-21) OR AWWA C-153 (ANSI A-21).
4. JOINTS
   a. MECHANICAL JOINTS OR SLIP JOINTS SHALL BE PROVIDED
   b. MECHANICAL JOINTS AND ACCESSORIES SHALL CONFORM TO AWWA STANDARD C-111, ANSI A-21. THE BOLTS AND NUTS SHALL BE CORROSION RESISTANT HIGH STRENGTH ALLOY STEEL.
   c. THE O-RING GASKETS SEALING THE SLIP JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURER OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER; AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS LIKELY TO BE IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO THE REQUIREMENTS OF AWWA C-111 (ANSI A-21.11).
   d. WHERE INDICATED ON PLANS, RESTRAINED JOINT PIPE SHALL BE PROVIDED. RESTRAINED JOINTS SHALL BE DESIGNED IN ACCORDANCE WITH AWWA C-111 AND SHALL PERMIT HORIZONTAL AND/OR VERTICAL DEFLECTION AFTER ASSEMBLY, YET ADEQUATELY RESTRAIN THE JOINT AT THE FULL DESIGN PRESSURE.
5. DUCTILE IRON ENCASEMENT
   a. POLYETHYLENE ENCASEMENT SHALL BE REQUIRED FOR ALL DUCTILE IRON PIPE AND SHALL BE INSTALLED IN ACCORDANCE WITH ANSI/AWWA C105/A21.5.
6. MARKINGS
   a. THE CLASS DESIGNATIONS FOR THE VARIOUS CLASSES OF PIPE AND FITTINGS, MANUFACTURER'S NAME AND THE YEAR OF MANUFACTURE SHALL BE CAST ONTO FITTINGS IN RAISED NUMERALS, AND CAST OR STAMPED ON THE OUTSIDE OF EACH JOINT OF PIPE.
7. LOCATING TRACING WIRE
   a. ALL DUCTILE IRON PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.
   b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.
   c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.
8. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

D. POLYVINYL CHLORIDE PIPE (PVC)

1. PIPE
   a. PVC FORCE MAIN SHALL CONFORM TO ASTM D2241, AWWA C900 OR AWWA C905.
   b. PVC FORCE MAIN PIPE MATERIAL SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID

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SANITARY SEWER SPECIFICATIONS

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POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CELL CLASS 12454 (PVC 1120).

c. FOR ASTM D2241, THE MATERIAL SHALL CONFORM TO ASTM D1784, CELL CLASS 12454 AND HYDROSTATIC DESIGN STRESS OF 2000 PSI. THE MINIMUM PRESSURE CLASS/SDR RATING SHALL BE CLASS 200/SDR 21.

d. FOR AWWA C900, THE MATERIAL SHALL HAVE A DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING SHALL BE CLASS 200/DR 14.

e. FOR AWWA C905, THE MATERIAL SHALL HAVE A HYDROSTATIC DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING ACCEPTABLE SHALL BE CLASS 200/DR 21.

f. PVC FORCE MAIN SHALL BE IN COMPLIANCE WITH AWWA C-900 FOR 4" THROUGH 12" AND AWWA C-905 FOR 14" AND GREATER.

g. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C-900, WHICH SHALL INCLUDE THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL. IN ADDITION, THE PLAIN END OF EACH PIPE LENGTH SHALL HAVE TWO (2) RINGS, ONE INCH (1") APART, PAINTED AROUND THE PIPE AT THE PROPER LOCATION TO ALLOW FIELD CHECKING OF THE CORRECT SETTING DEPTH OF THE PIPE IN THE BELL OR COUPLING.

2. JOINTS

a. JOINTS SHALL BE BELL END OR COUPLING PUSH-ON TYPE WITH JOINT RESTRAINTS AS NEEDED. JOINT RESTRAINTS SHALL BE MEGALUG STYLE MECHANICAL JOINTS FOR PVC PIPE AS MANUFACTURED BY EBAA IRON OR APPROVED EQUAL.

b. THE PUSH-ON JOINT AND JOINT COMPOUNDS SHALL MEET THE REQUIREMENTS FOR ASTM SPECIFICATION D-3139, JOINT FOR THE PLASTIC PIPE, USING FLEXIBLE ELASTOMERIC SEALS. THE JOINT SHALL BE DESIGNED SO AS TO PROVIDE FOR THE THERMAL EXPANSION AND CONTRACTION EXPERIENCED WITH A TOTAL TEMPERATURE CHANGE OF SEVENTY-FIVE (75) DEGREES F IN EACH JOINT OF PIPE. DETAILS OF THE JOINT DESIGN AND ASSEMBLY SHALL BE IN ACCORDANCE WITH JOINT MANUFACTURER'S STANDARD PRACTICE.

c. THE LUBRICANT SHALL HAVE NO DETERIORATING EFFECTS ON THE GASKET OR THE PIPE. THE LUBRICANT CONTAINERS SHALL BE LABELED WITH MANUFACTURER'S NAME.

d. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO ASTM F-477. GASKETS SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI STANDARD A- 21.11.

3. FITTINGS

a. FITTINGS SHALL BE MANUFACTURED IN ONE PIECE OF INJECTION MOLDED PVC COMPOUND MEETING THE REQUIREMENTS OF ASTM D1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE @ 73 DEGREES F IN ACCORDANCE WITH ASTM D1599.

b. FOR RESTRAINED JOINTS, FITTINGS SHALL BE RESTRAINED JOINT DUCTILE IRON FITTINGS CONFORMING TO AWWA C110 AND AWWA C111.

4. LOCATING TRACING WIRE

a. ALL PVC PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.

b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.

c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.

5. MARKINGS

a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION ("PVC-C900"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION IN ACCORDANCE WITH THE ASTM D-3034.

b. WHERE C900/905 IS USED FOR SEWER FORCE MAIN, IT SHALL BE GREEN IN COLOR TO DESIGNATE IT IS SEWER. ALTERNATELY, A PLASTIC TAPE "SEWER" COMPLYING WITH 327 IAC MAY BE INSTALLED.

6. CERTIFICATION

a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

E. HIGH DENSITY POLYETHYLENE PIPE (HDPE)

1. RESIN AND MATERIAL REQUIREMENTS

a. ALL MATERIAL SHALL BE MANUFACTURED FROM A PE 4710 RESIN LISTED WITH THE PLASTIC PIPE INSTITUTE (PPI) AS TR-4. THE RESIN MATERIAL SHALL MEET THE SPECIFICATIONS OF ASTM D 3350 WITH A MINIMUM CELL CLASSIFICATION OF 445474C. HDPE PIPE AND FITTINGS SHALL CONTAIN NO RECYCLED COMPOUNDS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. HDPE PRODUCTS SHALL BE HOMOGENEOUS THROUGHOUT AND FREE OF VISIBLE CRACKS, HOLES, FOREIGN INCLUSIONS, VOIDS, OR OTHER INJURIOUS DEFECTS.

2. PIPE

a. PIPE SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. THE POLYETHYLENE COMPOUND SHALL BE SUITABLY PROTECTED AGAINST DEGRADATION BY ULTRAVIOLET LIGHT BY MEANS OF CARBON BLACK OF NOT LESS THAN 2 PERCENT. THE MANUFACTURE OF THE HDPE RESIN SHALL CERTIFY THE CELL CLASSIFICATION INDICATED.

b. PIPE SIZES 3" AND LARGE SHALL HAVE A MANUFACTURING STANDARD OF ASTM F 714, WHILE PIPE SMALLER THAN 3" SHALL BE MANUFACTURED TO THE DIMENSIONAL REQUIREMENTS LISTED IN ASTM D 3035. DIMENSION RATIO (DR) AND OUTSIDE DIAMETER (IPS/DIPS) SHALL BE AS SPECIFIED ON PLANS.

c. PIPE SHALL MEET AWWA C901 (1/2" TO 3") OR AWWA C906 (4" TO 63"), AND SHALL BE LISTED AS MEETING NSF-61.

d. THE COLOR CODING SHALL BE PERMANENTLY CO-EXTRUDED STRIPES ON THE PIPE OUTSIDE SURFACE AS PART OF THE PIPE'S MANUFACTURING PROCESS. COLOR CODING SHALL BE AS FOLLOWS: SEWER – GREEN

3. JOINTS

a. HDPE PIPE SHALL BE JOINED INTO CONTINUOUS LENGTHS ON THE JOB SITE ABOVE GROUND. THE JOINING METHOD SHALL BE THE BUTT FUSION METHOD AND SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS. ELECTROFUSION SHALL NOT BE USED EXCEPT AS NEEDED TO CONNECT ADJACENT DIRECTIONALLY DRILLED SECTIONS WHICH ARE TO BE CONNECTED IN THE TRENCH BOTTOM. MECHANICAL JOINT ADAPTERS ARE REQUIRED TO MECHANICALLY CONNECT THE HDPE PIPE TO THE MAIN LINE. JOINT RESTRAINT TO PREVENT AXIAL SEPARATION SHALL BE INCORPORATED INTO THE DESIGN OF THE SLEEVE OR COUPLING USED TO CONNECT HDPE PIPE PLAIN ENDS. INTERNAL PIPE WALL STIFFENERS MUST BE USED WHEN RESTRAINING HDPE. THE RESTRAINED COUPLING SYSTEM SHALL BE SERIES 4800 MANUFACTURED BY EBAA IRON, INC. OR AN APPROVED EQUAL.

4. FITTINGS

a. BUTT FUSION FITTINGS- FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS OR ACCEPTED BY OWNER/ENGINEER. ALL FITTINGS SHALL MEET THE REQUIREMENTS OF AWWA C901 OR C906.

1) MOLDED FITTINGS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM D 3261.

2) ALL FABRICATED ELBOWS, TEES, REDUCING TEES AND END CAPS SHALL BE PRODUCED AND MEET THE REQUIREMENTS OF ASTM F 2206, AS MANUFACTURED BY ISCO INDUSTRIES, INC OR OTHER APPROVED MANUFACTURER HOLDING AN ISO 9001 QUALITY SYSTEM CERTIFICATE. EACH FITTING WILL BE MARKED PER ASTM F 2206 SECTION 10 INCLUDING THE NOMINAL SIZE AND FITTING EDR, WHICH WILL MEET OR EXCEED THE PIPE DR IDENTIFIED FOR THE PROJECT. FABRICATED FITTINGS SHALL BE MANUFACTURED USING A MCELROY DATA LOGGER TO RECORD FUSION PRESSURE AND TEMPERATURE, AND SHALL BE STAMPED WITH UNIQUE JOINT NUMBER THAT CORRESPONDS TO THE JOINT REPORT. A GRAPHIC REPRESENTATION OF THE TEMPERATURE AND PRESSURE DATA FOR ALL FUSION JOINTS MADE PRODUCING FITTINGS SHALL BE MAINTAINED FOR A MINIMUM OF 5 YEARS AS PART OF THE QUALITY CONTROL AND WILL BE AVAILABLE UPON REQUEST OF OWNER. TEST RESULTS TO VALIDATE ASTM F 2206 SECTION 7.3 AND 9 SHALL BE PROVIDED TO OWNER OR OWNER'S REPRESENTATIVE UPON REQUEST.

3) SOCKET FITTINGS SHALL MEET ASTM D 2683.

b. ELECTROFUSION FITTINGS - FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE 4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. ELECTROFUSION FITTINGS SHALL HAVE A MANUFACTURING STANDARD OF ASTM F1055. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS. FOR POTABLE WATER SYSTEMS, ALL ELECTROFUSION FITTINGS SHALL HAVE AWWA APPROVAL.

c. BOLTED CONNECTIONS- FLANGES AND MJ ADAPTERS SHALL BE FUSED ONTO THE PIPE AND HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE UNLESS OTHERWISE SPECIFIED ON THE PLANS.

1) METALLIC BACK-UP RINGS (VAN-STONE STYLE LAP JOINT FLANGES), SHALL HAVE A RADIUS ON THE INSIDE DIAMETER OF THE BORE SO AS TO BE COMPATIBLE WITH HDPE FLANGES. BACK UP RINGS SHALL HAVE BOLT PATTERN THAT WILL MATE WITH AWWA C207 CLASS D (GENERICALLY KNOWN AS 150 POUND PATTERNS).

2) WHERE SHOWN ON THE DRAWINGS, 4" AND LARGER TRANSITIONS TO MECHANICAL JOINT FITTINGS AND VALVES SHALL BE ACCOMPLISHED USING A MJ ADAPTER WITH KIT. THE D.I./HDPE MECHANICAL JOINT ADAPTOR SHALL CONSIST OF AN HDPE MECHANICAL JOINT TRANSITION FITTING, RUBBER GASKET, A MECHANICAL JOINT BACKUP DRIVE RING, AND CORTEN MECHANICAL JOINT TEE BOLTS.

d. MECHANICAL FITTINGS: THE USE OF MECHANICAL COUPLING AND SADDLES SHALL BE APPROVED BY THE OWNER OR ENGINEER PRIOR TO INSTALLATION. MECHANICAL FITTINGS SHALL BE DESIGNED FOR USE AND COMPATIBLE WITH HDPE PIPE, INCLUDING SS STIFFENERS WHEN REQUIRED BY MANUFACTURER. MECHANICAL FITTINGS SHALL HAVE A PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE.S.

5. MARKINGS

a. DURING THE EXTRUSION PRODUCTION, THE HDPE PIPE SHALL BE CONTINUOUSLY MARKED PER ASTM AND AWWA WITH DURABLE PRINTING WITH, AT A MINIMUM, THE FOLLOWING: NOMINAL PIPE SIZE, DIMENSION RATIO, PRESSURE RATING, TRADE NAME, MATERIAL CLASSIFICATION, CERTIFICATION BASES, AND DATE.

6. LOCATING TRACING WIRE

a. ALL HDPE PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.

b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.

c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.

7. CERTIFICATION

a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

F. PRESSURE TYPE PIPE COUPLINGS:

1. TUBULAR-SLEEVE COUPLINGS:

2. COUPLINGS SHALL MEET AWWA C219, WITH CENTER SLEEVE, GASKETS, END RINGS, AND BOLT FASTENERS.

3. METAL, BOLTED, SLEEVE-TYPE, REDUCING OR TRANSITION COUPLINGS FOR JOINING UNDERGROUND PRESSURE PIPING:

4. COUPLINGS SHALL MEET A 200-PSI MINIMUM PRESSURE RATING AND ENDS OF SAME SIZES OF THE MAIN LINE PIPING.

5. CENTER-SLEEVE MATERIAL:

6. SLEEVE SHALL BE STAINLESS STEEL.

7. GASKET MATERIAL: GASKETS SHALL BE NATURAL OR SYNTHETIC RUBBER RESISTANT TO SEWAGE.

8. METAL COMPONENT FINISH: FINISH SHALL BE A CORROSION-RESISTANT MATERIAL OR COATING.

2.5 RESILIENT WEDGE GATE VALVES

A. VALVES SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C515 COVERING RESILIENT SEATED GATE VALVES FOR WATER SUPPLY SERVICE.

B. THE VALVES SHALL HAVE A DUCTILE IRON BODY, BONNET, AND O-RING PLATE. THE WEDGE SHALL BE TOTALLY ENCAPSULATED WITH RUBBER.

C. THE SEALING RUBBER SHALL BE PERMANENTLY BONDED TO THE WEDGE PER ASTM D-429.

D. VALVES SHALL BE SUPPLIED WITH O-RING SEALS AT ALL PRESSURE RETAINING JOINTS. NO FLAT GASKETS SHALL BE ALLOWED.

E. THE VALVES SHALL BE NON-RISING STEM OPENING BY TURNING LEFT AND PROVIDED WITH 2" SQUARE OPERATING NUT OR A HANDWHEEL WITH THE WORD "OPEN" AND AN ARROW TO INDICATE THE DIRECTION TO OPEN.

F. STEMS SHALL BE CAST COPPER ALLOY WITH INTEGRAL COLLARS IN FULL COMPLIANCE WITH AWWA. ALL STEMS SHALL OPERATE WITH COPPER ALLOY STEM NUTS INDEPENDENT OF WEDGE AND OF STEM (IN NRS VALVES).

G. ALL STEMS SHALL HAVE TWO O-RINGS LOCATED ABOVE THE THRUST COLLAR AND ONE O-RING BELOW. STEM O-RINGS SHALL BE REPLACEABLE WITH VALVE FULLY OPENED AND SUBJECTED TO FULL PRESSURE.

H. THE STEMS ON 4"-20" SHALL HAVE A LOW TORQUE THRUST BEARING LOCATED ABOVE AND BELOW THE STEM COLLAR TO REDUCE FRICTION DURING OPERATION.

I. WATERWAY SHALL BE SMOOTH, UNOBSTRUCTED AND FREE OF ALL POCKETS, CAVITIES AND DEPRESSIONS IN THE SEAT AREA. VALVES 4" AND LARGER SHALL ACCEPT A FULL SIZE TAPPING CUTTER.

J. THE BODY, BONNET AND O-RING PLATE SHALL BE FUSION-BONDED EPOXY COATED, BOTH INTERIOR AND EXTERIOR ON BODY AND BONNET. EPOXY SHALL BE APPLIED IN ACCORDANCE WITH AWWA C550 AND BE NSF 61 CERTIFIED.

K. EACH GATE VALVE SHALL BE INSTALLED IN A VERTICAL POSITION WITH A ROADWAY TYPE VALVE BOX. GATE VALVES SET WITH VALVE BOXES SHALL BE PROVIDED WITH A 2-INCH SQUARE OPERATING NUT AND SHALL BE OPENED BY TURNING TO THE LEFT (COUNTER-CLOCKWISE). THERE SHALL BE A MAXIMUM 48" DEPTH OF VALVE OPERATING NUT. CONTRACTOR MUST USE EXTENSION STEMS, IF NECESSARY, TO RAISE OPERATOR NUT WITHIN 48" OF FINAL GRADE.

L. ALL BURIED GATE VALVES SHALL HAVE MECHANICAL JOINT ENDS.

M. PRIOR TO SHIPMENT FROM THE FACTORY, EACH VALVE SHALL BE TESTED BY HYDROSTATIC PRESSURE EQUAL TO THE REQUIREMENTS OF AWWA C515 (AND UL/FM WHERE APPLICABLE).

N. VALVES SHALL BE AS MANUFACTURED BY MUELLER, M&H, CLOW, AMERICAN VALVE & HYDRANT, KENNEDY, OR APPROVED EQUAL.

2.6 AIR RELEASE VALVES

A. VALVES SHALL BE INSTALLED AT THE HIGH POINTS OF THE FORCE MAIN OR AT LOCATIONS SELECTED BY THE ENGINEER. THIS WILL PERMIT DISCHARGING THE SURGE OF AIR FROM AN EMPTY LINE WHEN FILLING AND RELIEVE THE VACUUM WHEN DRAINING THE SYSTEM. VALVE SHALL ALSO RELEASE AN ACCUMULATION OF AIR WHEN THE SYSTEM IS UNDER PRESSURE. THIS SHALL BE ACCOMPLISHED IN A SINGLE VALVE BODY.

B. AN ISOLATION VALVE SHALL BE FURNISHED AND INSTALLED BETWEEN THE AIR RELEASE VALVE AND MAIN CONNECTION TO ISOLATE THE AIR RELEASE VALVE FROM THE SYSTEM. VALVE SHALL BE A FULL OPENING STAINLESS STEEL OR BRONZE BALL STYLE VALVE PROVIDED WITH THREADED CONNECTIONS AND BE INSTALLED USING STAINLESS STEEL PIPE.

C. AIR RELEASE VALVES SHALL BE COMBINATION AIR RELEASE VALVES (UNLESS OTHERWISE SPECIFIED BY STATE ENGINEER) AS MANUFACTURED BY A.R.I. OR OWNER APPROVED EQUAL. THE VALVE SHALL ALLOW AIR TO ESCAPE OUT OF THE LARGE ORIFICE WHEN AIR IS PRESENT AND CLOSE WHEN LIQUID ENTERS THE VALVE. WHEN THE VALVE IS CLOSED AND PRESSURIZED, THE SMALL AIR RELEASE ORIFICE WILL OPEN TO ALLOW SMALL POCKETS OF AIR TO ESCAPE AUTOMATICALLY AND INDEPENDENTLY OF THE LARGE ORIFICE. THE LARGE ORIFICE SHALL ALSO ALLOW AIR TO ENTER TO BREAK VACUUM. THE BODY

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AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

1/4/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

INLET SHALL BE BAFFLED TO PROTECT THE FLOAT FROM DIRECT FORCES OF RUSHING AIR AND WATER TO PREVENT PREMATURE VALVE SHUT-OFF.

1. MATERIALS SHALL CONFORM TO THE FOLLOWING:
   a. BODY AND COVER: DUCTILE IRON (ASTM A536 GR 65-45-12)
   b. FLOAT: STAINLESS STEEL (ASTM A240)
   c. NEEDLE & SEAT: BUNA-N
   d. PLUG: STAINLESS STEEL (ASTM A276)
   e. LEVERAGE FRAME: DELRIN/CAST IRON (ASTM D4184/ASTM A126 GR. B)
   f. THE VALVES SHALL BE RATED FOR 150 PSI WORKING PRESSURE, AND CONFORM TO AWWA C512.

2.7 CASING AND JACKING PIPE

A. DESCRIPTION
1. ALL CASING AND JACKING PIPE AND HORIZONTAL BORES SHALL BE APPROVED BY THE UTILITY.

B. STEEL CASING PIPE
1. STEEL CASING PIPE SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM A53 WITH 35,000 PSI MINIMUM YIELD STRENGTH, AND HAVE THE FOLLOWING MINIMUM WALL THICKNESSES:

<= 24" STEEL CASING SHALL HAVE 0.250" MINIMUM WALL THICKNESS
30" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
36" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
42" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS

2. ALL ENCASEMENT PIPE JOINTS SHALL BE WELDED.
3. THE CASING PIPE DIAMETER EQUALS THE CARRIER PIPE'S LARGEST OUTSIDE DIAMETER PLUS 4-INCHES MINIMUM.
4. CARRIER PIPE: PER SECTION 2.3 OR 2.4 OF THESE SPECIFICATIONS.

C. CASING SPACERS
1. MANUFACTURED CASING SPACERS OR WOOD BLOCKING SPACERS ARE REQUIRED ON THE BOTTOM AND TOP TO PREVENT PIPE FROM "FLOATING" DURING GROUT FILLING PROCEDURE.
2. CASING SPACERS SHOULD BE AT 6-FOOT MAXIMUM, CENTER-TO-CENTER, PER DETAIL.

2.8 MANHOLES

A. DESCRIPTION
1. STANDARD MANHOLES SHALL BE CONSTRUCTED COMPLETE, READY FOR USE, INCLUDING EXCAVATION, BACKFILL, CONCRETE WORK, CAST IRON FRAMES AND COVERS, AND PERTINENT WORK AS SHOWN ON THE DRAWINGS. ALL MANHOLES SHALL BE MADE WATERTIGHT, AND THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND PERFORM ALL WORK NECESSARY FOR WATERTIGHT CONSTRUCTION.
2. ALL PROPOSED CASTINGS SET IN PAVED AREAS SHALL BE FLUSH WITH THE FINAL PAVEMENT ELEVATIONS. ALL PROPOSED CASTINGS TO BE SET IN NON-PAVED AREAS SHALL STAND APPROXIMATELY THREE (3) INCHES ABOVE FLUSH WITH THE FINAL GROUND.
3. MAXIMUM MANHOLE SPACING SHALL BE FOUR HUNDRED (400) FEET, UNLESS APPROVAL IS GIVEN BY THE UTILITY STATE ENGINEER.
4. DESIGN ENGINEER SHALL VERIFY THAT THE LOWEST ELEVATION TO HAVE GRAVITY SANITARY SEWER SERVICE WITHIN EACH HOME OR BUILDING IS MORE THAN ONE (1) FOOT ABOVE THE LOWEST TOP OF CASTING ELEVATION OF EITHER THE FIRST UPSTREAM OR DOWNSTREAM MANHOLE ON THE GRAVITY SEWER TO WHICH THE CONNECTION IS TO BE MADE. THIS DESIGN CONSIDERATION MUST BE INCORPORATED INTO FINISHED FLOOR ELEVATIONS (FFE) AND A MINIMUM FFE LABEL FOR THE LOTS WHERE THE PAD ELEVATION DOES NOT MEET THIS REQUIREMENT.
5. MANHOLE ELEVATIONS MUST BE SET EIGHTEEN (18) INCHES ABOVE THE CURRENT PUBLISHED INDIANA DEPARTMENT OF NATURAL RESOURCES 100-YEAR BASE FLOOD ELEVATION OF NEARBY WATERWAYS (INCLUDING, BUT NOT LIMITED TO, LAKES, PONDS, STREAMS, AND EMERGENCY SPILLWAYS OR STORM WATER ROUTING). IF THIS REQUIREMENT CANNOT BE MET, THEN WATER TIGHT BOLTED AND GASKETED CASTINGS MUST BE INSTALLED.
6. MANHOLES SHALL BE INSTALLED AT A 6-FOOT MINIMUM DEPTH (7-FOOT PREFERRED), AS MEASURED FROM THE TOP OF CASTING TO THE INVERT.
7. ALL LIFT HOLES IN PRECAST SECTIONS SHALL BE WETTED AND COMPLETELY FILLED WITH NON-SHRINK GROUT, SMOOTHED.
8. MANHOLES EXTERIOR SHALL BE COATED WITH BITUMINOUS WATERPROOFING MATERIAL TO ENSURE WATER TIGHTNESS.

B. REINFORCED CONCRETE MANHOLES AND ACCESSORIES
1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ASTM C478, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS. MANHOLES SHALL BE A MINIMUM DIAMETER OF 48 INCHES WITH A MINIMUM ACCESS DIAMETER OF 24 INCHES. THE MINIMUM WALL THICKNESS SHALL BE FIVE (5) INCHES FOR MANHOLES FOUR (4) FEET IN DIAMETER.
2. THE PRECAST TOPS SHALL BE OF THE ECCENTRIC CONE TYPE. PRECAST FLAT COVERS SHALL BE NOT LESS THAN EIGHT (8) INCHES THICK AND REINFORCED WITH TWO LAYERS OF STEEL WITH A MINIMUM AREA OF 0.39 SQUARE INCHES PER LINEAR FOOT IN BOTH DIRECTIONS IN EACH LAYER. PRECAST FLAT BOTTOMS OF MANHOLES SHALL ALSO BE REINFORCED THE SAME AS SPECIFIED HEREIN FOR PRECAST FLAT TOP. HOISTING LUGS OR HOOKS SHALL BE CAST IN PLACE FOR HANDLING AND SETTING OF THE RINGS. NO THROUGH HOLES SHALL BE PERMITTED. OPENINGS OF PROPER SIZES AND SUITABLE DESIGN SHALL BE CAST IN PLACE FOR RECEIVING THE SEWER AND/OR DROP PIPES AND CONNECTIONS. ADJUSTING RISER RINGS SHALL BE PROVIDED, WITH NO MORE THAN 12-INCHES OF RISER RINGS ALLOWED.
3. ALL MANHOLE JOINTS SHALL BE TONGUE AND GROOVE AND THEY SHALL BE SEALED WITH 1-1/4" BUTYL MASTIC JOINT SEALANT MEETING ASTM C-990. CRACKED OR DAMAGED BARREL JOINTS SHALL NOT BE ALLOWED. ALL JOINTS SHALL ALSO HAVE AN EXTERIOR JOINT WRAP SIMILAR TO THE INFI-SHIELD GATOR WRAP AS MANUFACTURED BY SEALING SYSTEMS INC. OR APPROVED EQUAL. THE JOINT WRAP SHALL BE A MINIMUM OF SIX (6") IN WIDTH.
4. MANHOLE STEPS SHALL BE INSTALLED IN ALL SANITARY SEWER MANHOLES. MANHOLE STEPS SHALL BE POLYPROPYLENE. MANHOLE STEPS SHALL BE INSTALLED IN A VERTICAL ROW ON 16-INCH CENTERS.
5. MANHOLE BASES SHALL BE OF CAST-IN-PLACE MONOLITHIC CONCRETE OR PRECAST CONCRETE. WHERE SEWER LINES PASS THROUGH OR ENTER MANHOLES, THE INVERT CHANNELS SHALL BE SMOOTH AND SEMI-CIRCULAR IN CROSS SECTION WITH THE WALL EXTENDING TO FULL DEPTH ELEVATION OF THE PIPE. THE INVERT CHANNELS SHALL BE FORMED DIRECTLY IN THE CONCRETE OF THE MANHOLE BASE. CHANGES OF DIRECTION OF FLOW WITHIN THE MANHOLES SHALL BE MADE WITH A SMOOTH CURVE WITH AS LONG AS A RADIUS AS POSSIBLE. THE WALLS OF THE CHANNELS MAY BE FLARED OUT TO ALLOW TESTING EQUIPMENT TO BE INSERTED AND REMOVED. THE FLOOR OF THE MANHOLE OUTSIDE THE CHANNELS SHALL BE SMOOTH AND SLOPE TOWARD THE CHANNEL NOT LESS THAN ONE (1) INCH PER FOOT.
6. FOR CAST IN PLACE BASES, NO MORTAR OR CONCRETE SHALL BE PLACED IN WATER, AND NO WATER SHALL BE ALLOWED TO FLOW OVER OR AGAINST THE CONCRETE BEFORE IT HAS HAD ADEQUATE TIME TO SET IN ORDER TO PREVENT DAMAGE TO THE STRUCTURE.
7. THE STANDARD MANHOLE IS FORTY-EIGHT (48") IN DIAMETER. LARGER DIAMETER MANHOLES MAY BE REQUIRED IN INSTANCES WITH LARGE PIPE DIAMETERS OR WITH CERTAIN INTERNAL DROPS, IF APPROVED. MANHOLE BARREL SECTIONS SHALL BE IN ONE, TWO, THREE, OR FOUR FOOT SECTIONS. THE CONE SECTION SHALL BE OF THE ECCENTRIC CONE TYPE, TWO OR THREE FEET IN LENGTH.
8. ADJUSTING RINGS. WHERE ONE (1) SOLID RISER OR BARREL SECTION CANNOT BE USED, FINAL ADJUSTMENTS IN ELEVATION OF THE FRAME AND COVER SHALL ONLY BE ACCOMPLISHED BY THE USE OF PRECAST CONCRETE ADJUSTING RINGS CONFORMING TO ASTM C 478. RINGS SHALL BE OF A NOMINAL THICKNESSES OF FOUR (4"), OR SIX (6") INCHES. NOT MORE THAN TWO (2) RINGS AND NOT MORE THAN TWELVE (12) INCHES TOTAL OF ADJUSTING RINGS SHALL BE ALLOWED FOR ADJUSTMENT OF THE MANHOLE FRAME AND COVER TO REQUIRED ELEVATION. GRADE RING JOINTS SHALL HAVE A 1 ¼" THICK PREFORMED BUTYL RUBBER FLEXIBLE SEALANT CONFORMING TO ASTM C990.
9. ALL PRECAST CONCRETE FOR MANHOLES THAT WILL BE RECEIVING A FORCE MAIN OR ARE WITHIN FIVE HUNDRED (500') FEET UPSTREAM OR DOWNSTREAM OF THE RECEIVING MANHOLE SHALL HAVE THE INTERIOR OF THE MANHOLE LINED WITH SPECTRASHIELD, CEMENTITIOUS LINERS WITH CALCIUM ALUMINATE MORTARS SUCH AS STRONGSEAL, SAUEREISEN, MADEWELL, CONCO SPRAYROQ OR APPROVED EQUAL. APPLY COATING PER MANUFACTURER'S RECOMMENDATION.
   a. A BOLTED AND GASKETED CASTING MUST BE INSTALLED ON EACH MANHOLE WITHIN TWO HUNDRED (200) FEET OF A FORCE MAIN DISCHARGE.
10. MINIMUM MANHOLE DIAMETERS
   a. THE FOLLOWING ARE MINIMUM MANHOLE DIAMETERS FOR SANITARY SEWERS ENTERING/EXITING A MANHOLE AT THE FOLLOWING RANGE OF ANGLES:

PIPE SIZE	PIPES ENTERING / LEAVING AT 0° - 45° BEND	PIPES ENTERING / LEAVING AT 45° - 90° BEND
8" - 21"	48"	48"
24"	48"	60"
27" - 30"	60"	60"
33" - 36"	60" *	72"

* NOTE 72" IF THE "A-LOK" CONNECTOR IS USED.

   B. THE MINIMUM MANHOLE DIAMETER TO ACCOMMODATE AN INSIDE DROP IS 60".

C. MANHOLE BASE CHANNELS:
1. MANHOLE CHANNELS SHALL BE MAIN LINE PIPE MATERIAL. LAY MAIN PIPE THROUGH MANHOLE AND CUT TOP OF PIPE OUT TO BE THREE-FOURTHS OF PIPE DIAMETER. FOR ALL MANHOLES WITH EQUAL DIAMETER INFLUENT AND EFFLUENT PIPES, A MINIMUM 0.10 FOOT DROP BETWEEN THE INVERTS AND EFFLUENT PIPES SHALL BE MAINTAINED. FOR CHANGES IN DIRECTION 45 TO 90 DEGREES, A MINIMUM 0.20 FOOT DROP SHALL BE MAINTAINED.

D. SEWER PIPE TO MANHOLE CONNECTIONS
1. TO CONNECT A SANITARY SEWER TO A MANHOLE, A RESILIENT PIPE TO MANHOLE CONNECTOR SHALL BE USED MEETING THE REQUIREMENTS OF ASTM C-923. EITHER A FLEXIBLE BOOT KOR-N-SEAL 1 OR 2, CAST-IN-PLACE DURA-SEAL GASKET OR "A-LOK" GASKET OR AN APPROVED EQUAL SHALL BE USED. CONNECTIONS TO AN EXISTING MANHOLE SHALL BE A FLEXIBLE BOOT SEAL.
2. IF THE FLEXIBLE BOOT CONNECTION IS USED, IT SHALL BE PLACED IN THE REINFORCED CONCRETE MANHOLE BASE AND SECURED TO THE PIPE BY A STAINLESS STEEL CLAMP. FLEXIBLE CONNECTORS SHALL CONFORM TO ASTM C 923.
3. ALL CONNECTIONS SHALL PROVIDE FOR A WATERTIGHT SEAL BETWEEN THE PIPE AND MANHOLE. THE CONNECTOR SHALL BE THE SOLE ELEMENT RELIED UPON TO ASSURE A FLEXIBLE WATERTIGHT SEAL OF THE PIPE TO THE MANHOLE.
4. THE INVERT OF THE CONNECTION SHALL BE GROUTED WITH NON-SHRINK GROUT. THE REMAINDER OF THE RESILIENT CONNECTION SHALL BE FREE OF GROUT TO PROMOTE FLEXIBILITY OF THE CONNECTION.
5. THE RUBBER FOR THE CONNECTOR SHALL CONFORM TO ASTM C 923 AND SHALL BE RESISTANT TO OZONE, WEATHER ELEMENTS, CHEMICALS, INCLUDING ACIDS AND ALKALIS, ANIMAL AND VEGETABLE FATS, OILS AND PETROLEUM PRODUCTS.
6. THE STAINLESS STEEL ELEMENTS OF THE CONNECTOR SHALL BE TOTALLY NON-MAGNETIC SERIES 305 STAINLESS STEEL. THE STAINLESS STEEL CLAMP SHALL BE CAPABLE OF SUSTAINING APPLIED TORQUE IN EXCESS OF EIGHTY (80) INCH-POUNDS.
7. FOR CORED HOLES, PENETRATIONS, AND/OR OTHER OPENING THROUGH A MANHOLE OR OTHER SANITARY STRUCTURE, THE UTILITY RECOMMENDS A SEPARATION OF GREATER THAN EIGHTEEN (18) INCHES BETWEEN THE OUTER EDGES OF RESILIENT CONNECTORS. IF A SEPARATION OF LESS THAN EIGHTEEN (18) INCHES EXISTS, THEN ADDITIONAL REINFORCEMENT WILL BE REQUIRED IN THE STRUCTURE OR STRUCTURE DIAMETER SHALL BE ENLARGED TO PROVIDE THE REQUIRED SEPARATION.
8. ALL CORED HOLES, PENETRATIONS AND/OR OTHER OPENING THROUGH A MANHOLE OR OTHER SANITARY STRUCTURE MUST HAVE A MINIMUM SEPARATION OF EIGHT (8) INCHES FROM THE OUTER EDGE OF RESILIENT CONNECTORS.
9. ALL CORED HOLES, PENETRATIONS AND/OR OTHER OPENING INTO A MANHOLE OR OTHER SANITARY STRUCTURE MUST HAVE A MINIMUM SEPARATION OF SIX (6) INCHES FROM ANY JOINT, AS MEASURED FROM THE NEAREST JOINT SHOULDER, TO THE PENETRATION.
10. NEW CONNECTIONS MADE TO ANY EXISTING STRUCTURE SHALL BE DRILLED IN THE DIRECTION OF FLOW. THE INTERNAL BASE MATERIAL SHALL BE REMOVED AND RE-POURED WITH THE CHANNELS MEETING THE REQUIREMENTS OF THE MANHOLE BASE SECTION. IF THE STRUCTURAL INTEGRITY OF THE CONCRETE BASE SECTION IS COMPROMISED DURING THE REMOVAL OF THE INTERIOR BASE, THE ENTIRE BASE SECTION SHALL BE REPLACED. THE CONNECTOR BOOT SHALL BE APPROPRIATELY SIZED TO FIT THE OPENING AND SHALL BE KOR-N-SEAL® BY NPC, INC., A-LOK PRODUCTS, INC., OR APPROVED EQUAL.

E. BENCH WALLS
1. IF AN END RUN MANHOLE HAS NO STUBS AND WILL BE EXTENDED IN THE FUTURE, THEN NO BENCH WALL SHALL BE INSTALLED UNTIL THE EXTENSION IS CONSTRUCTED.
2. IF AN END RUN MANHOLE WILL NOT BE EXTENDED IN THE FUTURE, THEN THE BENCH WALL MUST EXTEND ACROSS THE ENTIRE WIDTH OF THE MANHOLE WITH A GROUTED FLOW TRANSITION AT THE FAR WALL TO THE TOP OF THE BENCH WALL.

F. INVERT ELEVATION DIFFERENCES
1. THE INVERT ELEVATION DIFFERENCE SHALL BE 0.10 FEET IN MANHOLES WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF ONE HUNDRED THIRTY-FIVE (135) DEGREES TO ONE HUNDRED EIGHTY (180) DEGREES.
2. THE INVERT ELEVATION DIFFERENCE SHALL BE 0.20 FEET IN MANHOLES WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF NINETY (90) DEGREES TO ONE HUNDRED THIRTY-FIVE (135) DEGREES.
3. THE INVERT ELEVATION DIFFERENCE FOR MANHOLES IN WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF LESS THAN NINETY (90) DEGREES WILL BE DETERMINED ON A CASE BY CASE BASIS. THIS SITUATION WILL ONLY BE ALLOWED WHERE NO OTHER ALTERNATIVE IS AVAILABLE AND THE INVERT ELEVATION DIFFERENCE SHALL BE A MINIMUM OF 0.30 FEET.
4. THE INVERT ELEVATION DIFFERENCE IN WHICH A SMALLER SEWER JOINS A LARGER ONE IS DETERMINED AS SPECIFIED IN ACCORDANCE WITH SECTION 33.6 (CHANGES IN PIPE SIZE) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES "TEN STATES STANDARDS".

G. DROP MANHOLES
1. WHERE A SANITARY SEWER OR SANITARY LATERAL ENTERS A MANHOLE TWENTY-FOUR (24) INCHES OR MORE ABOVE THE INVERT OF THE OUTGOING SEWER, THE INCOMING SEWER SHALL BE CONNECTED TO THE MANHOLE BY MEANS OF A DROP CONNECTION.
2. OUTSIDE DROP CONNECTIONS MAY BE EITHER PRECAST OR FIELD FABRICATED. DROP CONNECTIONS ON THE INSIDE OF MANHOLES SHALL BE SECURED TO THE INTERIOR WALL OF THE MANHOLE AND PROVIDE ACCESS FOR CLEANING, AND DROP PIPE CONNECTIONS ON THE OUTSIDE OF MANHOLES SHALL BE ENCASED IN CONCRETE.

H. SAMPLE MANHOLE REQUIREMENTS
1. ALL WAREHOUSE AND INDUSTRIAL SITES SHALL INSTALL A SAMPLING MANHOLE PRIOR TO CONNECTION TO THE UTILITY SEWER.
2. THE SAMPLING MANHOLE SHALL BE A STANDARD 48-INCH PRECAST CONCRETE MANHOLE.
3. THE SAMPLING MANHOLE SHALL HAVE A THREE (3) FOOT STRAIGHT LATERAL RUN ON BOTH SIDES OF THE MANHOLE.

I. CASTINGS
1. STANDARD MANHOLES SHALL HAVE A SELF-SEALING, HEAVY-DUTY FRAME AND COVER, NEENAH R-1772 OR APPROVED EQUAL. MATERIAL SHALL BE IN COMPLIANCE WITH ASTM A-48, CL. 35. EACH LID SHALL HAVE "SANITARY SEWER" MOLDED INTO THE EXTERIOR SURFACE IN LETTERS TWO (2) INCHES IN HEIGHT RECESSED, AND FLUSH WITH SURFACE.
2. WHERE WATERTIGHT CASTINGS ARE REQUIRED, THE MANHOLES SHALL HAVE A BOLT DOWN NEENAH 1772 OR 1022ZI CASTING BY EAST JORDAN IRON WORKS, OR APPROVED EQUAL. THE FRAME SHALL BE ANCHORED THROUGH THE RISER RINGS (IF PROVIDED) TO THE CONE SECTION WITH FOUR (4) GALVANIZED RODS.
3. NO OPEN PICK HOLES SHALL BE ALLOWED.

J. FRAME, CHIMNEY AND JOINT SEAL
1. ALL MANHOLES SHALL HAVE AN EXTERNAL CHIMNEY SEAL AND JOINT SEALS.
2. THE SECTION OF THE MANHOLE FROM THE ECCENTRIC CONE TO THE CASTING FRAME SHALL BE WRAPPED ON THE EXTERIOR WITH JOINT WRAP MEETING THE REQUIREMENTS OF THE UNI-BAND SEALING SYSTEM AS MANUFACTURED BY SEALING SYSTEMS, INC. OR APPROVED EQUAL.
3. ALL MANHOLE JOINTS SHALL BE WRAPPED ON THE EXTERIOR WITH JOINT WRAP MEETING THE REQUIREMENTS OF THE INFI-SHIELD GATOR WRAP AS MANUFACTURED BY SEALING SYSTEMS INC. OR APPROVED EQUAL. THE JOINT WRAP SHALL BE A MINIMUM OF SIX (6") IN WIDTH.

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

1/4/2021
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SANITARY SEWER SPECIFICATIONS

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AQUA INDIANA STATE STANDARDS
SANITARY SEWER CONSTRUCTION

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FOREWORD

THE “AQUA INDIANA STATE STANDARDS” FOR AQUA INDIANA AND ITS SUBSIDIARIES (THE UTILITY) HAVE BEEN PREPARED TO SET FORTH AQUA INDIANA’S MINIMUM CRITERIA FOR CONSTRUCTION WITHIN THE UTILITY’S LIMITS.

ALL CONSTRUCTION PROJECTS WHICH ARE CONNECTED TO THE UTILITY SYSTEM SHALL CONFORM TO THESE STANDARDS. CONSTRUCTION DRAWINGS AND SPECIFICATIONS MUST BE APPROVED BY THE UTILITY AND A WRITTEN PERMIT OBTAINED FOR SEWER EXTENSIONS IN ACCORDANCE WITH EXISTING ORDINANCES BEFORE CONSTRUCTION BEGINS. IN ADDITION, SANITARY SEWER PROJECTS MUST BE SUBMITTED TO THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM) FOR APPROVAL AND ISSUANCE OF A CONSTRUCTION PERMIT. DEVELOPERS MAY NOT SUBMIT PROJECTS TO IDEM UNTIL THE UTILITY ISSUES A WASTELOAD ALLOCATION AND APPROVAL OF PLANS.

CONSTRUCTION OBSERVATION WILL BE PERFORMED BY THE UTILITY. A MINIMUM OF 48 HOURS’ NOTICE SHALL BE GIVEN PRIOR TO STARTING CONSTRUCTION.

THESE STANDARDS WERE PREPARED WITH THE INTENT OF OBTAINING THE HIGHEST QUALITY OF CONSTRUCTION POSSIBLE, CONSISTENT WITH ACCEPTED INDUSTRY PRACTICES AND SPECIFICATIONS. AS NEW MATERIALS BECOME AVAILABLE AND ACCEPTABLE, THE STANDARDS MAY BE REVISED AND UPDATED.

CRITICAL DESIGN CRITERIA FOR SANITARY SEWER CONSTRUCTION:

1. ALL SANITARY SEWERS SHALL COMPLY WITH THE LATEST EDITION OF THE “GLUMRB (GREAT LAKES UPPER MISSISSIPPI RIVER BOARD) RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES”.
2. STATE UTILITY ENGINEER WILL MAKE THE DETERMINATION AS TO THE NEED FOR IMPROVEMENTS TO DOWNSTREAM SANITARY SEWER FACILITIES. EARLY COORDINATION IS RECOMMENDED TO ELIMINATE DELAYS DURING DESIGN.
3. STATE UTILITY ENGINEER WILL MAKE FINAL DETERMINATIONS AS TO THE ABILITY TO REASONABLY COMPLY WITH THESE DESIGN SPECIFICATIONS.
4. THESE DESIGN SPECIFICATIONS ARE INTENDED TO DEFINE THE DESIGN REQUIREMENTS OF SANITARY SEWER FACILITIES WHICH ARE CONSTRUCTED AND OPERATED UNDER TYPICAL CONDITIONS IN AQUA INDIANA SERVICE AREAS. DEPENDING ON FIELD CONDITIONS AND THE COMPOSITION AND CHARACTERISTICS OF THE SANITARY SEWER FLOW, DIFFERENT OR UNUSUAL CONDITIONS MAY OCCUR WHICH CANNOT BE ANTICIPATED IN A DOCUMENT OF THIS NATURE. CONSEQUENTLY, THE STATE UTILITY ENGINEER MAY IMPOSE ADDITIONAL OR SPECIAL DESIGN REQUIREMENTS UNDER SUCH CIRCUMSTANCES.
5. AQUA INDIANA WILL NOT ACCEPT GRAVITY SEWERS DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN SECTION 33.41 (RECOMMENDED MINIMUM SLOPES) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES “TEN STATES STANDARDS” (MOST RECENT EDITION) AND/OR 327 IAC ARTICLE 3, WHICHEVER IS MORE RESTRICTIVE. IT IS STRONGLY RECOMMENDED THAT GRAVITY SEWERS BE DESIGNED AT SLOPES GREATER THAN THE MINIMUM REGULATORY REQUIREMENTS.
6. ALL NEW COMMERCIAL OR INDUSTRIAL ENTITIES, WHICH EITHER GENERATE AND/OR WASTE OIL, GREASE OR THE BY-PRODUCTS THERETO, SHALL CONSTRUCT A 1,000-GALLON (MINIMUM) GREASE TRAP. THE DESIGN ENGINEER SHALL SUBMIT DETAILED CALCULATIONS FOR SIZE JUSTIFICATION OF SAID TRAP TO AQUA. CALCULATIONS SHALL BE ACCOMPANIED WITH REFERENCES, SPECIFICALLY DENOTING ORIGIN OF SIZING/CALCULATION METHOD.
7. TOILETS, URINALS, SINKS, SHOWERS, AND OTHER SIMILAR FIXTURES SHALL NOT WASTE THROUGH THE GREASE INTERCEPTOR. ALL OTHER WASTE SHALL ENTER THROUGH THE GREASE TRAP INTERCEPTOR, THROUGH THE INLET PIPE ONLY.
8. THE GREASE INTERCEPTOR AND GREASE TRAP SHALL BE DESIGNED SUCH THAT IT IS EASILY ACCESSIBLE, FOR INSPECTION/SAMPLING AND CLEANING, AT ALL TIMES. THE GREASE TRAP SHALL HAVE A MINIMUM OF TWO (2) COMPARTMENTS, WITH FITTINGS, DESIGNED FOR GREASE INTERCEPTION.
9. THE OIL/GREASE TRAP SHALL BE LOCATED OUTSIDE THE BUILDING AND AT A DISTANCE FAR ENOUGH TO ALLOW SOLUBLE GREASE/OIL TO BECOME INSOLUBLE.
10. NO GRAVITY SEWER MAIN CONVEYING RAW WASTEWATER SHALL BE LESS THAN 8 INCHES IN DIAMETER.
11. ALL SEWERS SHALL BE DESIGNED AND CONSTRUCTED TO GIVE MEAN VELOCITY, WHEN FLOWING FULL, OF NOT LESS THAN 2.0 FEET PER SECOND, BASED ON MANNING FORMULA USING AN “N” VALUE OF 0.013.
12. LATERALS SHALL BE A MINIMUM OF 6-INCHES IN DIAMETER WITH A SLOPE OF 1.00%.
13. SERVICE LATERALS SHALL BE SDR-26 PIPE FROM THE SEWER MAIN TO THE BUILDING. ONE LATERAL SHALL BE INSTALLED PER BUILDING. ALL LATERALS SHALL BE INSPECTED BY AN AQUA REPRESENTATIVE PRIOR TO BACKFILLING.
14. ALL LATERALS AND TEE-WYE FITTINGS SHALL BE PVC SDR-26. SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION. LATERAL CONNECTIONS SHALL ONLY OCCUR AT TEE-WYES.
15. A MINIMUM OF ONE CLEAN-OUT SHALL BE INSTALLED FOR EACH LATERAL. WHERE THE LENGTH OF A LATERAL EXCEEDS 100 FEET, THEN ONE CLEAN-OUT SHALL BE INSTALLED FOR EVERY 100 FEET OF LATERAL LENGTH. IN ANY EVENT A CLEAN-OUT SHALL BE LOCATED NO FARTHER THAN 4 FEET FROM THE BUILDING.
16. THE LOWEST INTERNAL PLUMBING ELEVATION TO RECEIVE GRAVITY SANITARY SERVICE MUST BE ONE (1) FOOT ABOVE THE TOP OF MANHOLE CASTING ELEVATION OF EITHER THE FIRST UPSTREAM OR DOWNSTREAM MANHOLE ON THE PUBLIC SEWER TO WHICH CONNECTION IS TO BE MADE. THOSE PORTIONS OF THE BUILDING NOT MEETING THE STATED GRAVITY SANITARY SERVICE REQUIREMENT SHALL BE PROVIDED AND MAINTAINED BY THE PROPERTY OWNER WITH A GRINDER PUMP SYSTEM, OR AN AQUA APPROVED EQUAL, DISCHARGING TO THE GRAVITY BUILDING CONNECTION OUTSIDE OF THE PUBLIC RIGHT-OF-WAY.
17. SEWER CONNECTION PERMIT FROM AQUA REQUIRES A LEGIBLE DIAGRAM, NAME OF PROPERTY OWNER, ADDRESS, TELEPHONE NUMBERS OF BOTH PROPERTY OWNER AND CONTRACTOR, DEPTH AND POSITION OF LATERAL BETWEEN MAINLINE SEWER TO THE BUILDING, LOCATION OF CONNECTION POINT REFERENCED TO ANY PERMANENT OBJECT, LENGTH AND SIZE OF PIPE TO BE INSTALLED, PIPE MATERIAL, SLOPE OF PIPE, BEDDING TYPE, PIPE CONTRACTOR, AND METHOD OF CONNECTION.
18. CONTRACTOR SHALL, WHEN CURBS ARE AVAILABLE, ENGRAVE A 3-LNCH HIGH BY 1/8-LNCH DEEP “S” ON THE CURB DIRECTLY ABOVE EACH SERVICE LATERAL. WHERE CURBS ARE NOT AVAILABLE, CONTRACTOR SHALL NOTCH THE SIDEWALK DIRECTLY ABOVE EACH SERVICE LATERAL.
19. NO DIRECT BASEMENT CONNECTIONS ARE PERMITTED.
20. NO ROOF DRAIN CONNECTIONS ARE PERMITTED.
21. SANITARY SEWERS SHALL NOT BE LOCATED IN REAR YARDS OR OTHER INACCESSIBLE AREAS UNLESS APPROVED BY AQUA.
22. ALL SANITARY SEWER FACILITIES AND LATERALS SHALL BE SEPARATED FROM EXISTING OR PROPOSED WATERBODIES BY A MINIMUM TWENTY (20) FEET HORIZONTALLY AS MEASURED FROM THE OUTSIDE EDGE OF THE SANITARY SEWER FACILITY TO THE TOP OF BANK. SANITARY SEWERS, FORCE MAINS, AND LATERALS CROSSING EXISTING OR PROPOSED LAKES, PONDS, AND/OR RETENTION OR DETENTION AREAS (EITHER WET OR DRY) ARE PROHIBITED.
23. CASTINGS SHALL BE SET AT TWO TENTHS (0.2) FEET ABOVE FINISH GRADE TO INSURE DRAINAGE AWAY FROM MANHOLE. CASTINGS WHICH ARE SURROUNDED BY ASPHALT, STONE DRIVES OR CONCRETE SHALL BE CONSTRUCTED WITHIN A TOLERANCE OF ±0.1 FEET OF THE DESIGNED ELEVATION. ALL OTHER CASTINGS SHALL BE CONSTRUCTED WITHIN A TOLERANCE OF ±0.2 FEET OF THE DESIGNED ELEVATION. ELEVATIONS WILL BE CHECKED WITH THE AS-BUILT DRAWINGS. UNDER NO CIRCUMSTANCE SHALL A MANHOLE CASTING BE BURIED.
24. THERE SHALL BE A MINIMUM OF 0.1 FEET OF FALL BETWEEN THE UPSTREAM INVERT(S) AND THE DOWNSTREAM INVERT IN A MANHOLE STRUCTURE FOR PIPES OF THE SAME DIAMETER. FOR CHANGE IN DIRECTION 45 DEGREES TO 75 DEGREES, A MINIMUM 0.20 FEET DROP SHALL BE MAINTAINED. FOR CHANGE IN DIRECTION 75 DEGREES TO 90 DEGREES, A MINIMUM 0.30 FEET DROP SHALL BE MAINTAINED. CHANGES IN DIRECTION OVER 90 DEGREES ARE NOT PERMITTED. FOR PIPES OF DIFFERING DIAMETERS, THE CROWN OF THE UPSTREAM PIPE SHALL MATCH THE CROWN OF THE DOWNSTREAM PIPE. AN OUTSIDE DROP MANHOLE IS REQUIRED FOR UPSTREAM INVERTS WHICH ARE TWO FEET HIGHER THAN THE DOWNSTREAM INVERT.

PART 1 - GENERAL

1.1 DEFINITIONS

BEDDING: FILL PLACED UNDER, BESIDE, AND DIRECTLY OVER PIPE, PRIOR TO SUBSEQUENT BACKFILL OPERATIONS.

CONTRACTOR: COMPANY OR INDIVIDUAL AUTHORIZED BY THE UTILITY TO PERFORM WORK AS CALLED FOR BY ISSUANCE OF A SEWER CONSTRUCTION PERMIT.

DEVELOPER: ANY PUBLIC AGENCY, PRIVATE COMPANY, OR INDIVIDUAL WHO PROPOSES THE DEVELOPMENT OF PROPERTY WHICH REQUIRES CONSTRUCTION OF SANITARY SEWERS OR LATERALS.

EMBEDMENT: EARTH OR OTHER SPECIAL MATERIAL USED TO REPLACE MATERIAL REMOVED FROM TRENCHES DURING CONSTRUCTION FROM THE SEWER SUBGRADE.

MAIN SEWER: REFERS TO ANY EXISTING OR PROPOSED SEWER DEDICATED TO PUBLIC USE WITHIN THE PUBLIC RIGHT-OF-WAY OR EASEMENT.

LATERAL: REFERS TO ANY EXISTING OR PROPOSED PIPE WHICH CONNECTS FROM THE BUILDING PLUMBING TO THE MAIN SEWER.

GRINDER PUMP: REFERS TO A PUMP USED TO GRIND WASTEWATER UP AND PUMP IT TO THE NEAREST GRAVITY SEWER.

1.2 ABBREVIATIONS

DI: DUCTILE IRON PIPE

IDEM: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

PVC: POLYVINYL CHLORIDE PLASTIC

SDR: STANDARD DIMENSION RATIO

HDPE: HIGH DENSITY POLYETHYLENE

CCTV: CLOSED CIRCUIT TELEVISION

IAC: INDIANA ADMINISTRATIVE CODE

1.3 DELIVERY, STORAGE, AND HANDLING

STORE PLASTIC PIPING PROTECTED FROM DIRECT SUNLIGHT AND SUPPORT TO PREVENT SAGGING AND BENDING. PROTECT STORED PIPING FROM MOISTURE AND DIRT BY ELEVATING ABOVE GRADE. PROTECT FLANGES, FITTINGS, AND SPECIALTIES FROM MOISTURE AND DIRT. HANDLE MANHOLES ACCORDING TO MANUFACTURER’S WRITTEN RIGGING INSTRUCTIONS.

1.4 REFERENCE STANDARDS

THE PUBLICATIONS LISTED BELOW FORM A PART OF THIS SPECIFICATION TO THE EXTENT REFERENCED. THE PUBLICATIONS ARE REFERENCED IN THE TEXT BY THE BASIC DESIGNATION ONLY. MOST RECENT STANDARDS APPLY.

A. ASTM INTERNATIONAL:

1. ASTM C443 - STANDARD SPECIFICATION FOR JOINTS FOR CONCRETE PIPE AND MANHOLES, USING RUBBER GASKETS
2. ASTM D1785 - STANDARD SPECIFICATION FOR POLY(VINYL CHLORIDE) (PVC) PLASTIC PIPE, SCHEDULES 40, 80, AND 120.
3. ASTM D2564 - STANDARD SPECIFICATION FOR SOLVENT CEMENTS FOR POLY(VINYL CHLORIDE) (PVC) PLASTIC PIPING SYSTEMS.
4. ASTM D2729 - STANDARD SPECIFICATION FOR POLY(VINYL CHLORIDE) (PVC) SEWER PIPE AND FITTINGS.
5. ASTM D2855 - STANDARD PRACTICE FOR MAKING SOLVENT-CEMENTED JOINTS WITH POLY(VINYL CHLORIDE) (PVC) PIPE AND FITTINGS.
6. ASTM D3034 - STANDARD SPECIFICATION FOR TYPE PSM POLY(VINYL CHLORIDE) (PVC) SEWER PIPE AND FITTINGS.
7. ASTM D6938 - STANDARD TEST METHOD FOR IN-PLACE DENSITY AND WATER CONTENT OF SOIL AND SOIL-AGGREGATE BY NUCLEAR METHODS (SHALLOW DEPTH).

B. ASTM F477 - STANDARD SPECIFICATION FOR ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE.

C. AMERICAN WATER WORKS ASSOCIATION (AWWA):

1. AWWA C111 - RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS.
2. AWWA C150 - THICKNESS DESIGN OF DUCTILE-IRON PIPE.
3. AWWA C151 - DUCTILE-IRON PIPE, CENTRIFUGALLY CAST.

1.5 COORDINATION

A. COORDINATE CONNECTION TO SANITARY SEWER MAIN WITH THE UTILITY. A UTILITY REPRESENTATIVE MUST BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION STARTUP.

1.6 SANITARY SEWER SERVICE AREA STUDY

A. THE APPLICANT SHALL PREPARE A SERVICE AREA STUDY FOR ALL PROPOSED SANITARY SEWER FACILITIES. THE INTENT IS TO MAXIMIZE THE SERVICE AREA TO THE GREATEST EXTENT PRACTICAL. AQUA INDIANA WILL DETERMINE IF THE PROJECTED SERVICE AREA HAS BEEN MAXIMIZED. THE SERVICE AREA STUDY SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING:

1. SERVICE AREA MAP
2. PROJECT BOUNDARIES
3. PROJECTED SERVICE AREA BOUNDARIES FOR COLLECTION SYSTEM
4. ALL RELEVANT TOPOGRAPHIC INFORMATION WITH ELEVATION CONTOUR LINES
5. DESIGN FLOW FOR PROJECTED SERVICE AREA BOUNDARY
6. EXISTING SANITARY SEWER FACILITIES WITH INVERT AND TOP OF CASTING ELEVATIONS. AS-BUILT INFORMATION MAY BE USED
7. ANY OTHER INFORMATION DEEMED NECESSARY BY AQUA INDIANA

B. SANITARY SEWER FACILITIES MUST BE DESIGNED TO SERVE THE ANTICIPATED FLOWS FROM THE ENTIRE UPSTREAM SERVICE AREA. DESIGNER SHALL CONTACT STATE UTILITY ENGINEER TO DETERMINE THE APPLICABILITY OF OVER-SIZING COSTS FOR EACH PROJECT.

1.7 EASEMENTS

A. MINIMUM EASEMENT WIDTH IS 20 FEET WITH THE SEWER CENTERED IN THE EASEMENT. THE EASEMENT SHALL BE DEDICATED TO THE UTILITY.

DEPTH OF SEWER	EASEMENT WIDTH (FEET)
UP TO 15 FEET	20
15 – 20 FEET	25
20 – 25 FEET	30
25 – 35 FEET	40
OVER 35 FEET	50

B. A MINIMUM OF TWENTY (20) FEET OF HORIZONTAL SEPARATION (AS MEASURED HORIZONTALLY FROM THE SEWER SPRING LINE) MUST BE MAINTAINED BETWEEN GRAVITY SEWERS AND THE TOP OF BANK OF ALL WATER WAYS, BODIES OF WATER AND DRY DETENTION AREAS.

C. WHEN CROSSING A WATER WAY, THE SANITARY SEWER FACILITIES SHOULD BE DESIGNED TO CROSS AS CLOSE TO NINETY (90) DEGREES AS POSSIBLE. THE UTILITY WILL NOT PERMIT THE CROSSING OF BODIES OF WATER INCLUDING, LAKES AND RETENTION/DETENTION PONDS OR DRY DETENTION AREAS.

1.8 CLOSEOUT SUBMITTALS

THE FOLLOWING DOCUMENTS ARE REQUIRED FOR UTILITY PROJECT ACCEPTANCE AND CLOSEOUT:

1. RESULTS OF ALL TESTING (PDF FORMAT)
2. CCTV OF ALL SEWER LINES TO BE DEDICATED (VIDEO FORMAT)
3. AS-BUILTS (2) TWO 24X36” FULL SIZE COPIES – PAPER (CERTIFIED)
4. AS-BUILTS – PDF FORMAT (CERTIFIED)
5. AS-BUILTS – ELECTRONIC CAD FORMAT (IN STATE PLANE AND ON NAVD 88)
6. RECORDED PLAT – PDF FORMAT

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
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SANITARY SEWER SPECIFICATIONS

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7. CONSTRUCTION PLANS – PDF FORMAT
8. ENGINEER OF RECORD CERTIFICATION – PDF FORMAT
9. CERTIFICATE OF SEWER MAIN COST (DESIGN ENGINEER CERTIFIED) – PDF FORMAT
10. 2 YEAR MAINTENANCE BOND (10%) – PAPER AND PDF FORMAT
11. TRANSFER OF OWNERSHIP – SEWER FACILITIES – PAPER (NOTARIZED)

PART 2 - PRODUCTS

2.1 EXCAVATION

A. DESCRIPTION

1. THE CONTRACTOR SHALL CONSTRUCT ALL EARTH EXCAVATIONS TO THE WIDTHS AND DEPTHS DETAILED IN THE DRAWINGS. EXCAVATION SHALL INCLUDE ALL KINDS OF MATERIALS, WET AND/OR DRY, EXCAVATED, OR WHICH ARE TO BE EXCAVATED, INCLUDING ROCK, SHALE, HARDPAN, MUCK, ETC.
2. EXCAVATION INCLUDES ALL EXCAVATION, SURFACE REMOVAL, CLEARING, DISPOSAL OF SURPLUS MATERIAL, DEWATERING, BORING AND JACKING, AND ALL OTHER WORK INCIDENTAL TO THE CONSTRUCTION OF TRENCHES OR TRENCHLESS MEANS FOR PIPE INSTALLATION. EXCAVATION ALSO INCLUDES THE SAME ACTIVITIES RELATED TO THE INSTALLATION OF MANHOLES OR OTHER REQUIRED STRUCTURES.
3. THE DEVELOPER AND HIS OR HER CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING THE PROTECTION OF ALL EXISTING IMPROVEMENTS, BOTH PUBLIC AND PRIVATE. THE UTILITY SHALL BE HELD HARMLESS FROM ANY AND ALL DAMAGES TO SAID EXISTING IMPROVEMENTS DURING THE CONSTRUCTION OF THE IMPROVEMENTS.
4. COMPLIANCE WITH THESE SPECIFICATIONS DOES NOT ELIMINATE THE NEED TO COMPLY WITH OTHER APPLICABLE CITY, COUNTY, STATE AND FEDERAL ORDINANCES, REGULATIONS, AND CONSTRUCTION REQUIREMENTS. THIS INCLUDES BUT IS NOT LIMITED TO CODES AND STANDARDS ISSUED BY IDEM, INDOT, OR OTHER GOVERNMENTAL AGENCIES.
5. THE PROVISIONS OF THIS DOCUMENT SHALL BE DEEMED AS ADDITIONAL REQUIREMENTS TO MINIMUM STANDARDS REQUIRED BY OTHER APPLICABLE ORDINANCES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST RESTRICTIVE SHALL APPLY.

2.2 EMBEDMENT AND BACKFILL

A. DESCRIPTION

1. ALL TRENCHES OR EXCAVATIONS SHALL BE BACKFILLED TO THE ORIGINAL SURFACE OF THE GROUND OR SUCH OTHER GRADES AS SHOWN ON THE DRAWINGS. IN GENERAL, BACKFILLING OPERATIONS SHALL BE CARRIED ALONG AS SPEEDILY AS POSSIBLE AND AS SOON AS THE PIPE HAS BEEN LAID AND BEDDING HAS BEEN PLACED.

B. DEFINITIONS AND GENERAL CONSIDERATIONS

1. PIPE BEDDING SHALL BE CONSIDERED THE AREA USED FOR SUPPORT DIRECTLY UNDER THE PIPE FOR THE FULL WIDTH OF THE TRENCH. THE HAUNCH IS THE AREA FROM THE TOP OF THE BEDDING TO THE SPRINGLINE (HORIZONTAL CENTERLINE OF THE PIPE) FOR THE FULL WIDTH OF THE TRENCH. INITIAL BACKFILL IS THE AREA FROM THE SPRINGLINE TO TWELVE (12") INCHES ABOVE THE CROWN (TOP) OF THE PIPE. PIPE EMBEDMENT IS THE TOTAL AREA THAT INCLUDES THE BEDDING, HAUNCH AND INITIAL BACKFILL. THE FINAL BACKFILL IS ALL OF THE AREA ABOVE THE TOP OF THE INITIAL BACKFILL ELEVATION.
2. SPECIAL FOUNDATION MATERIAL MAY BE REQUIRED UNDER THE PIPE BEDDING FOR AREAS OF UNSTABLE SOIL MATERIAL. IN CIRCUMSTANCES WHERE UNSTABLE SOIL MATERIAL IS ENCOUNTERED, THE AREA SHALL BE EXCAVATED AND REPLACED WITH SUITABLE CRUSHED STONE TO FORM A SOUND FOUNDATION. THE PIPE BEDDING CAN THEN BE PLACED UPON THE FOUNDATION MATERIAL.
3. THE CONTRACTOR SHALL NOT PLACE PIPE EMBEDMENT MATERIALS BY METHODS THAT WILL DAMAGE OR DISTURB THE PIPE OR OTHER UTILITIES. CARE SHALL BE TAKEN THAT COMPACTION EQUIPMENT DOES NOT COME INTO CONTACT WITH THE PIPE. PRIOR TO PERFORMING COMPACTION OPERATION OVER THE PIPE, THE CONTRACTOR MUST ENSURE THAT SUFFICIENT BACKFILL IS INSTALLED OVER THE PIPE TO PREVENT DAMAGE OR EXCESSIVE DEFLECTION.

C. BEDDING AND BACKFILL OF TRENCH EXCAVATIONS FOR PIPES AND CONDUITS

1. BEDDING AND BACKFILL MATERIALS FOR PIPE INSTALLATION AND TRENCH BACKFILL SHALL CONFORM TO THE TYPES DETAILED IN PART 3 OF THIS SPECIFICATION FOR THE SPECIFIC PIPE TYPE INSTALLED.

D. STRUCTURAL BACKFILL

1. BACKFILL MATERIALS FOR BACKFILL OF STRUCTURES OTHER THAN PIPES AND CONDUITS SHALL BE ACCORDING THE STANDARD DETAILS.

2.3 GRAVITY SANITARY SEWER PIPE

A. DESCRIPTION

1. THE CONTRACTOR SHALL FURNISH AND LAY SEWER PIPE, AND ALL ACCESSORIES, TO THE LINES AND GRADES SHOWN ON THE DRAWINGS. SEWER PIPE SHALL BE CONSTRUCTED OF THE PIPE MATERIALS AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS.
2. RELATED WORK DESCRIBED ELSEWHERE:
   a. EXCAVATION
   b. EMBEDMENT AND BACKFILL

B. QUALITY ASSURANCE

1. CODES AND STANDARDS
   a. EACH LENGTH OF PIPE SHALL BE MARKED PER THE REQUIREMENTS OF THE RESPECTIVE ASTM STANDARD.
   b. ALL CODES AND STANDARDS SHALL BE SET FORTH IN THE LATEST ASTM STANDARD.
2. UPON REQUEST BY THE UTILITY, THE CONTRACTOR SHALL FURNISH COPIES OF ALL MATERIAL TESTS REQUIRED BY THE APPLICABLE ASTM STANDARD.
3. NO PUBLIC GRAVITY SEWER WILL BE LESS THAN EIGHT (8) INCHES IN DIAMETER.
4. THE UTILITY WILL NOT ACCEPT GRAVITY SEWERS DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN SECTION 33.41 (RECOMMENDED MINIMUM SLOPES) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES "TEN STATES STANDARDS" (MOST RECENT EDITION) AND/OR 327 IAC ARTICLE 3, WHICHEVER IS MORE RESTRICTIVE. IT IS STRONGLY RECOMMENDED THAT GRAVITY SEWERS BE DESIGNED AT SLOPES GREATER THAN THE MINIMUM REGULATORY REQUIREMENTS.
5. IF A DROP MANHOLE CAN BE CONSTRUCTED TO AVOID SLOPES GREATER THAN 5.00%, THEN AQUA INDIANA GENERALLY WILL REQUIRE THE DROP MANHOLE TO BE CONSTRUCTED.
6. MAXIMUM ALLOWED INFILTRATION IN NEW GRAVITY SANITARY SEWERS SHALL BE 100 GALLONS PER 24 HOUR PERIOD PER INCH-DIAMETER-MILE.

C. POLYVINYL CHLORIDE (PVC) PIPE, SDR-35, SDR-26, OR SDR-21

1. MATERIAL
   a. POLYVINYL CHLORIDE (PVC) FOR GRAVITY SANITARY SEWER PIPE SHALL BE THE INTEGRAL WALL BELL AND SPIGOT TYPE WITH ELASTOMERIC SEAL JOINTS AND SMOOTH INNER WALLS MEETING OR EXCEEDING ALL OF THE REQUIREMENTS SET FORTH IN ASTM D-3034 FOR PIPE DIAMETERS 15-INCHES OR LESS.
   b. FOR DIAMETERS 15-INCHES OR LESS, THE PIPE SHALL HAVE A MINIMUM CELL CLASSIFICATION OF 12454 OR 12364; WITH ALL PIPE HAVING A MINIMUM TENSILE STRENGTH OF 34.50 MPA AS DEFINED IN ASTM D-1784.
   c. PVC SANITARY SEWER PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR 35 AND 115 PSI FOR SDR 26 FOR EACH DIAMETER, WHEN MEASURED AT 5% VERTICAL RING DEFLECTION AND TESTED IN ACCORDANCE WITH ASTM D-2412.
   d. FOR PIPE INSTALLATION WHERE THE SEWER IS CLOSER THAN 51 FEET TO A RESIDENTIAL WATER WELL, THE SEWER SHALL BE CONSTRUCTED FROM SDR-21 IN ACCORDANCE WITH ASTM D-2241, WITH A MINIMUM CELL CLASS OF 12454.
   e. ULTIMATE DEPTH (FROM INVERT TO GRADE) GUIDANCE:

DEPTH OF SEWER	PIPE TYPE
UP TO 15 FEET	PVC: ASTM D3034 (SDR 35). ASTM F679 (T-1, SDR 35, PS 46)
UP TO 25 FEET	PVC: ASTM D3034 (SDR 26), ASTM D2241 (SDR 21, PS 225 OR GREATER), AWWA C-900 (DR 18, PS 364 OR GREATER), OR AWWA C-905 (DR 25 OR DR 18, PS 115 OR GREATER)
UP TO 30 FEET	AWWA C-900 (DR 18, PS 364 OR GREATER) OR AWWA C-905 (DR 25 OR DR 18, PS 115 OR GREATER)
OVER 30 FEET	CONTACT STATE UTILITY ENGINEER

2. JOINTS
   a. FLEXIBLE GASKET 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. THE ASSEMBLY OF JOINTS SHALL BE IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS AND ASTM D-3212 FOR PIPE CONFORMING TO ASTM D-3034 OR JOINTS SHALL MEET THE REQUIREMENTS OF ASTM D-3139 FOR PIPE CONFORMING TO ASTM D-2241. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO THE REQUIREMENTS OF ASTM F-477.
   b. NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.
   c. ALL FIELD-CUTTING OF PIPE SHALL BE DONE IN A NEAT MANNER AS PER MANUFACTURER'S RECOMMENDATIONS 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 THE PIPE WALL THICKNESS. FIELD CUT PIPE WILL ONLY BE ALLOWED TO BE INSTALLED AT MANHOLES, AT PREFABRICATED TEES AND WYES, AND AT THE CONNECTION OF NEW SANITARY SEWER TO EXISTING SANITARY SEWER.
3. FITTINGS
   a. ALL PIPE FITTINGS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE LATEST ASTM D-3034 AND ASTM F-679 STANDARDS AND SHALL HAVE A MINIMUM PIPE STIFFNESS OF 46 PSI FOR SDR 35 AND 115 PSI FOR SDR 26 IN ALL DIRECTIONS. THE MINIMUM CELL CLASSIFICATION SHALL BE 12454 OR 12364 PER THE LATEST ASTM D-1784 STANDARD. ALL FITTINGS SHALL BE "HEAVY WALL" AND PROVIDED GASKETS MEETING OR EXCEEDING THE STANDARDS FOR THE PIPE.
   b. ALL SEWER MAIN LATERAL CONNECTIONS SHALL BE PRE-FABRICATED WYE FITTINGS. ALL PIPE FITTINGS SHALL BE INJECTION MOLDED UNLESS PRIOR AUTHORIZATION IS GRANTED BY THE UTILITY.
   c. SADDLE CONNECTIONS SHALL NOT BE ALLOWED FOR NEW CONSTRUCTION. FOR INSTALLATION OF A NEW LATERAL ON EXISTING SEWERS, CONNECTION WITH A SADDLE MAY BE CONSIDERED ON PIPE 10-INCHES IN DIAMETER AND LARGER.
4. DESIGN
   a. THE MINIMUM WALL THICKNESS FOR PVC SEWER PIPE AND LATERAL SEWER PIPE 15- INCHES OR LESS IN DIAMETER SHALL CONFORM TO SDR-35, SDR-26, OR SDR-21 AS SPECIFIED IN ASTM D-3034 OR ASTM D-2241.
5. MARKINGS
   a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION (E.G. "PVC-SDR-26"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION AND FITTING IN ACCORDANCE WITH THE ASTM D-3034.
6. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

D. POLYVINYL CHLORIDE (PVC) PIPE, C-900/C-905

1. PIPE
   a. PVC GRAVITY SEWER MAIN PIPE SHALL CONFORM TO ASTM SPECIFICATION D-2241, STANDARD SPECIFICATION FOR POLYVINYL CHLORIDE (PVC) PLASTIC PIPE (SDR PR). THE MATERIAL USED SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CLASS 12454. THE MINIMUM PRESSURE CLASS FOR A STREAM CROSSING SHALL BE CLASS 200.
   b. THE PIPE FITTINGS SHALL BE PRESSURE RATED IN ACCORDANCE WITH RECOMMENDATIONS OF THE PLASTIC PIPE INSTITUTE.
   c. PVC GRAVITY SEWER MAIN SHALL BE IN COMPLIANCE WITH AWWA C-900 FOR 4" THROUGH 12" AND AWWA C-905 FOR 14" AND GREATER. THE MINIMUM DIMENSION RATIO SHALL BE DR18 WITH A PRESSURE RATING OF 235 PSI.
   d. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C-900, WHICH SHALL INCLUDE THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL. IN ADDITION, THE PLAIN END OF EACH PIPE LENGTH SHALL HAVE TWO (2) RINGS, ONE INCH (1") APART, PAINTED AROUND THE PIPE AT THE PROPER LOCATION TO ALLOW FIELD CHECKING OF THE CORRECT SETTING DEPTH OF THE PIPE IN THE BELL OR COUPLING.
2. JOINTS
   a. JOINTS SHALL BE BELL END OR COUPLING PUSH-ON TYPE.
   b. THE PUSH-ON JOINT AND JOINT COMPOUNDS SHALL MEET THE REQUIREMENTS FOR ASTM SPECIFICATION D-3139, JOINT FOR THE PLASTIC PIPE, USING FLEXIBLE ELASTOMERIC SEALS. THE JOINT SHALL BE DESIGNED SO AS TO PROVIDE FOR THE THERMAL EXPANSION AND CONTRACTION EXPERIENCED WITH A TOTAL TEMPERATURE CHANGE OF SEVENTY-FIVE (75) DEGREES F IN EACH JOINT OF PIPE. DETAILS OF THE JOINT DESIGN AND ASSEMBLY SHALL BE IN ACCORDANCE WITH JOINT MANUFACTURER'S STANDARD PRACTICE.
   c. THE LUBRICANT SHALL HAVE NO DETERIORATING EFFECTS ON THE GASKET OR THE PIPE. THE LUBRICANT CONTAINERS SHALL BE LABELED WITH MANUFACTURER'S NAME.
   d. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO ASTM F-477. GASKETS SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI STANDARD A- 21.11.
3. FITTINGS
   a. FITTINGS SHALL BE MANUFACTURED IN ONE PIECE OF INJECTION MOLDED PVC COMPOUND MEETING THE REQUIREMENTS OF ASTM D1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE @ 73 DEGREES F IN ACCORDANCE WITH ASTM D1599.
   b. ALL SEWER MAIN LATERAL CONNECTIONS SHALL BE PRE-FABRICATED WYE FITTINGS TO FIT C900 PIPE. ALL PIPE FITTINGS SHALL BE INJECTION MOLDED UNLESS PRIOR AUTHORIZATION IS GRANTED BY THE UTILITY.
4. MARKINGS
   a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION (E.G. "PVC-C900"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION AND FITTING IN ACCORDANCE WITH THE ASTM D-3034.
5. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

E. NON-PRESSURE TYPE TRANSITION COUPLINGS

1. COMPLY WITH ASTM C1173, ELASTOMERIC, SLEEVE TYPE, REDUCING OR TRANSITION COUPLING, FOR JOINING UNDERGROUND NONPRESSURE PIPING. INCLUDE ENDS TO MATCH SAME SIZES OF MAIN LINE PIPING AND INSTALL CORROSION-RESISTANT METAL TENSION BANDS AND TIGHTENING MECHANISM ON EACH END.
2. SLEEVE MATERIALS:
   a. FOR PLASTIC PIPES: ASTM F477, ELASTOMERIC SEAL.
   b. FOR DISSIMILAR PIPES: PVC OR OTHER MATERIAL COMPATIBLE WITH PIPE MATERIALS BEING JOINED.
3. NON-SHEAR, FLEXIBLE COUPLINGS:
   a. COUPLINGS SHALL BE ELASTOMERIC SLEEVE WITH STAINLESS STEEL SHEAR RING AND CORROSION-RESISTANT-METAL TENSION BAND AND TIGHTENING MECHANISM ON EACH END.

F. LATERALS

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AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

1. LATERALS SHALL BE 6-INCH PVC SDR 26 LAID AT A MINIMUM OF 1.00% SLOPE FROM THE SEWER MAIN TO THE RIGHT OF WAY LINE (OR EASEMENT LINE).
   a. EACH PROPERTY HAVING A SEPARATE PROPERTY OWNER SHALL HAVE ITS OWN LATERAL FROM THE BUILDING TO THE MAINLINE SEWER.
2. EXCEPT AS PROVIDED IN A WRITTEN APPROVAL ISSUED BY THE UTILITY, NO PERSON SHALL CONNECT A LATERAL TO A SANITARY OR COMBINED SEWER WHEN THE LATERAL HAS ANY OF THE FOLLOWING SOURCES OF CLEAR WATER:
   a. FOUNDATION/FOOTING DRAINS;
   b. SUMP PUMPS WITH OR WITHOUT FOUNDATION DRAINS CONNECTED;
   c. ROOF DRAINS;
   d. HEAT PUMP DISCHARGE;
   e. COOLING WATER; OR
   f. ANY OTHER SOURCES OF CLEAR WATER, SUCH AS, BUT NOT LIMITED TO, YARD AND / OR DRIVEWAY DRAINS.
3. BASEMENTS
   a. THE UTILITY DOES NOT ALLOW ANY DIRECT BASEMENT CONNECTIONS TO A GRAVITY LATERAL.
   b. ALL BUILDINGS CONSTRUCTED WITH A BASEMENT (BELOW GROUND LEVEL) SHALL USE A SUMP PIT AND SEWAGE EJECTOR PUMP ARRANGEMENT TO LIFT THE SEWAGE ABOVE THE OUTSIDE GRADE RELATIVE TO THE DIRECTION AND LOCATION OF THE SANITARY SEWER MAIN (OVERHEAD SEWER). ALL PIPING SHALL BE ARRANGED AS TO PRECLUDE THE PUMP FROM PUMPING SEWAGE TO AN UPPER LEVEL WHEN THE PUMP IS PUMPING AGAINST A HEAD (BLOCKED SEWER MAIN OR LATERAL).
   c. A CHECK VALVE SUITABLE FOR THE PIPE MATERIAL BEING USED SHALL BE INSTALLED HORIZONTALLY IN THE DOWNSTREAM PIPING OF THE EJECTOR PUMP PRIOR TO DISCHARGE INTO THE HOUSE GRAVITY LATERAL. THE CHECK VALVE SHALL BE ABLE TO WITHSTAND NORMAL PUMPING PRESSURE AND WATER HAMMER. THE CHECK VALVE SHALL BE ACCESSIBLE FOR NORMAL MAINTENANCE. A BALL-TYPE SHUT-OFF VALVE SHALL BE INSTALLED ON BOTH DOWNSTREAM AND UPSTREAM SIDE OF THE CHECK VALVE FOR EASE OF MAINTENANCE.
4. THE UTILITY PREFERS NOT TO INSTALL LATERALS ON SEWERS WITH AN ULTIMATE DEPTH OF TWENTY (20) FEET OR GREATER AND/OR TO SEWERS EIGHTEEN (18) INCHES OR LARGER. THEREFORE, DESIGN ENGINEER SHALL CONTACT STATE UTILITY ENGINEER TO DISCUSS ALTERNATIVES. FOR EXAMPLE, A PARALLEL SHALLOW SEWER, SPECIAL LATERAL CONSTRUCTION, ETC.
5. GENERALLY, THE UTILITY DOES NOT ALLOW LATERAL CONNECTIONS TO A SEWER BEYOND THOSE INSTALLED DURING ORIGINAL CONSTRUCTION. LATERALS MUST CONNECT TO THE SANITARY SEWER ONLY AT MANUFACTURED FITTINGS (EXCEPT AS OTHERWISE PERMITTED BY THESE DESIGN SPECIFICATIONS). IF IT IS DETERMINED BY STATE UTILITY ENGINEER THAT AN EXCEPTION SHOULD BE GRANTED REFER TO SECTION 2.9 LATERAL CONNECTION TO EXISTING SEWER LINE.
6. ALL LATERALS MUST BE A MINIMUM OF SIX (6) INCHES IN DIAMETER AND SIZED BASED ON THE ANTICIPATED FLOWS. FOR EXAMPLE, A LATERAL SERVICING A POOL HOUSE MAY NEED TO BE LARGER BASED ON THE PEAK FILTER BACKWASH FLOW.
7. LATERAL LENGTH
   a. UNLESS APPROVED BY STATE UTILITY ENGINEER IN WRITING, NO MORE THAN ONE HUNDRED (100) FEET OF A LATERAL SHALL EXIST WITHIN A PUBLIC RIGHT-OF-WAY OR BEYOND THE BOUNDARY OF THE LOT OR PARCEL FOR WHICH THE LATERAL IS DESIGNED TO SERVICE.
   b. UNLESS APPROVED BY STATE UTILITY ENGINEER IN WRITING, NO LATERAL SHALL BE GREATER THAN TWO HUNDRED (200) FEET IN LENGTH.
8. SLOPE
   a. SLOPE REQUIREMENTS MUST CONFORM TO THE LATEST EDITION OF THE STATE OF INDIANA (UNIFORM PLUMBING CODE), LOCAL CODES AND TO THESE DESIGN SPECIFICATIONS, WHICHEVER IS MORE STRINGENT.
   b. LATERALS MUST BE INSTALLED AT A MINIMUM OF 1.00% AND WHERE POSSIBLE, NOT EXCEED 6.00%. STATE UTILITY ENGINEER, DEPENDING ON SITE CONDITIONS, MAY WAIVE THE SLOPE REQUIREMENTS.
9. NO MORE THAN ONE (1) BUILDING OR RESIDENCE WILL BE PERMITTED TO CONNECT INTO A LATERAL UNLESS THE PRIOR WRITTEN APPROVAL OF STATE UTILITY ENGINEER IS OBTAINED. EXCEPT FOR EXISTING HOMES SERVED BY LATERALS INSTALLED WITH NEW CONSTRUCTION TWO EXISTING HOMES MAY BE SERVED BY A SINGLE LATERAL.
10. LATERALS CANNOT CONNECT DIRECTLY INTO A MANHOLE, EXCEPT AS FOLLOWS:
    a. APPROVED BY STATE UTILITY ENGINEER IN WRITING.
    b. ON DEEP LINES (GREATER THAN TWELVE (12) FEET) OR INTERCEPTORS GREATER THAN TEN (10) INCHES IN DIAMETER.
    c. ON BUILDINGS IN WHICH AQUA INDIANA MAY WISH TO FLOW MONITOR OR SAMPLE FLOW CHARACTERISTICS.
    d. ON BUILDINGS IN WHICH ADDITIONAL ACCESS TO THE LATERAL WOULD BE HELPFUL. FOR EXAMPLE, SCHOOLS.
11. LATERALS MUST CONNECT TO THE MAIN LINE SEWER AT AN ANGLE (AS MEASURED FROM THE DIRECTION OF FLOW) THAT IS GREATER THAN NINETY (90) DEGREES.
12. WHERE POSSIBLE, WYES AND LATERALS SHOULD BE LOCATED TO AVOID THE FOLLOWING SITUATIONS:
    a. INSTALLATION ON INTERCEPTORS GREATER THAN TEN (10) INCHES.
    b. INSTALLATION ON SEWERS WHICH ARE CONCRETE ENCASED/CAPPED.
    c. INSTALLATION BELOW PAVEMENT OR CONCRETE, INCLUDING STREETS, DRIVEWAYS, PARKING LOTS, ETC.
    d. INSTALLATION BELOW STORM SEWERS OR WATER WAYS.
    e. INSTALLATION BELOW OTHER UTILITIES.
    f. INSTALLATION BELOW MOUNDING, RETAINING/LANDSCAPING/ENTRANCE WALLS AND LANDSCAPING.
    g. INSTALLED WITH LESS THAN TEN (10) FEET OF HORIZONTAL SEPARATION FROM UTILITIES, STREETS, STORM SEWERS, WATER WAYS, BUILDINGS, ETC.
13. WHEN A LATERAL CROSSES A PARCEL OTHER THAN THE PROPERTY IT IS INTENDED TO SERVICE, IT MUST BE CONSTRUCTED WITHIN A SANITARY SEWER EASEMENT OR UTILITY EASEMENT. THE LATERAL MUST MAINTAIN A MINIMUM HORIZONTAL SEPARATION OF TEN (10) FEET MEASURED FROM THE SPRING LINE OF THE PIPE TO THE EDGE OF THE EASEMENT. ADDITIONAL SEPARATION MAY BE REQUIRED BASED UPON ULTIMATE DEPTH OF THE LATERAL AND/OR SOIL/GROUNDWATER CONDITIONS.
14. DURING CONSTRUCTION OF THE MAIN LINE SEWER, LATERALS MUST TERMINATE WITHIN A SANITARY SEWER OR UTILITY EASEMENT AND BE SEALED WITH A MANUFACTURED CAP/PLUG MADE SPECIFICALLY FOR THE PURPOSED OF SEALING/CAPPING THE END OF THE SANITARY SEWER TO ENSURE 100% WATER TIGHTNESS. THE TERMINATION POINT MUST BE A MINIMUM OF FIVE (5) FEET FROM THE BUILDING LINE.
15. ALL PVC FITTINGS MUST BE ASTM D-3034 SDR-26 HEAVY WALL MINIMUM. BELL TO SPIGOT FITTINGS MAY ONLY BE APPROVED BY THE STATE UTILITY ENGINEER.
16. FROM THE BUILDING TO THE MAIN LINE SEWER, IT IS RECOMMENDED THAT A CLEAN-OUT BE INSTALLED AFTER EVERY THREE (3) FITTINGS OF 22.5 DEGREES OR MORE, BUT IN NO CASE EXCEEDING FIVE (5) FITTINGS BETWEEN CLEAN-OUTS.
17. WHEN SERVICE IS FROM THE REAR A CLEAN-OUT MUST BE INSTALLED EITHER ON THE SIDE OR FRONT OF THE BUILDING SO THAT A CLEAN-OUT IS ALWAYS ACCESSIBLE, NOT FENCED IN.
18. TYPE 1 CLEAN-OUTS MUST BE INSTALLED IN GRASS OR LANDSCAPE AREAS LOCATED WITHIN THREE (3) FEET OF THE BUILDING'S EXTERIOR WALL. ALL OTHER INSTALLATIONS MUST BE TYPE 2 OR TYPE 3.
19. ALL CLEAN-OUTS MUST BE THE SAME DIAMETER AS THE HORIZONTAL LATERAL INTO WHICH THE CLEAN-OUT IS CONNECTED BEING A MINIMUM OF SIX (6) INCHES.

G. CLEANOUTS
1. PVC CLEANOUTS:
   a. PVC BODY WITH PVC THREADED PLUG: CLEANOUT SHALL BE AS PER ASTM D3034. PVC SEWER PIPE FITTING AND RISER TO CLEANOUT.
   b. CLEANOUT SHALL BE INSTALLED AT A MINIMUM OF 3 FEET FROM THE OUTSIDE OF BUILDING WALL AND EVERY 100 FEET OF LATERAL UNTIL CONNECTION AT THE MAINLINE SEWER.
   c. CLEANOUT RISER: SEWER PIPE FITTING ON MAIN LINE SEWER AND RISER SHALL MATCH MAIN LINE PIPING.
   d. CLEANOUT SHUT-OFF VALVE: A CLEANOUT VALVE SHALL BE PROVIDED, SEWUR VALVE OR APPROVED EQUAL.

2.4 PRESSURE PIPE

A. DESCRIPTION
1. THE CONTRACTOR SHALL FURNISH AND LAY, AS REQUIRED, SANITARY PRESSURE PIPE, TOGETHER WITH ALL FITTINGS, THRUST BLOCKING OR OTHER INCIDENTALS AS SHOWN ON THE APPROVED PLANS OR SPECIFIED AND, NECESSARY TO COMPLETE THE WORK. SANITARY PRESSURE PIPE SHALL BE CONSTRUCTED OF THE PIPE MATERIALS AS SPECIFIED HEREIN.
2. ALL SANITARY PRESSURE PIPES TO BE FURNISHED UNDER THIS CONTRACT SHALL CONFORM TO SPECIFICATIONS OF THIS SECTION.
3. PRESSURE PIPE MAY BE INSTALLED BY THE HORIZONTAL DIRECTIONAL DRILLING (HDD) METHOD.
4. RELATED WORK DESCRIBED ELSEWHERE:
   a. EXCAVATION
   b. EMBEDMENT AND BACKFILL
5. FLOW FROM PRESSURE PIPES SHALL BE DIRECTED TOWARDS THE OUTLET PIPE WITHIN THE DISCHARGE MANHOLE. MODIFICATIONS TO THE BENCH MAY BE NECESSARY.
6. NO PUBLIC FORCE MAIN WILL BE LESS THAN FOUR (4) INCHES IN DIAMETER, EXCEPT IN A LOW PRESSURE TYPE GRINDER PUMP COLLECTION SYSTEM APPROVED BY THE UTILITY.
7. VELOCITIES IN FORCE MAINS OF LESS THAN TWO (2) FEET PER SECOND WILL NOT BE ACCEPTED.
8. FORCE MAINS MUST BE DESIGNED AT A CONSTANT POSITIVE SLOPE FROM LOW POINTS AND CLEAN-OUTS TO AIR/VACUUM RELIEF VALVES.

B. QUALITY ASSURANCE
1. CODES AND STANDARDS
   a. EACH LENGTH OF PIPE SHALL BE MARKED PER THE REQUIREMENTS OF THE RESPECTIVE ASTM STANDARD.
   b. ALL CODES AND STANDARDS SHALL BE SET FORTH IN THE LATEST ASTM STANDARD.
   c. UPON REQUEST BY THE ENGINEER, THE CONTRACTOR SHALL FURNISH COPIES OF ALL MATERIAL TESTS REQUIRED BY THE APPLICABLE ASTM STANDARD.

C. DUCTILE IRON PIPE
1. MATERIAL
   a. DUCTILE IRON PIPE SHALL BE CENTRIFUGALLY CAST AND SHALL CONFORM TO ANSI SPECIFICATIONS A-21 AND AWWA C-151, LATEST REVISION. DUCTILE IRON PIPE SHALL BE PRESSURE CLASS 350, 300 OR 250.
2. COATINGS AND LININGS
   a. PIPE SHALL BE SULFATE RESISTING CEMENT LINED IN ACCORDANCE WITH AWWA C-104. THE PIPE OUTSIDE SHALL BE SEAL COATED WITH AN APPROVED BITUMINOUS SEAL COAT IN ACCORDANCE WITH AWWA SPECIFICATION C-151 (ANSI A21).
   b. THE PIPE SHALL ALSO HAVE EITHER OF THE FOLLOWING INTERIOR COATINGS:
      1) POLYURETHANE IN ACCORDANCE WITH ASTM D16 TYPE V (1000 MICRONS MINIMUM THICKNESS)
      2) EPOXY (40 MILS MINIMUM THICKNESS)
      3) POLYETHYLENE (1500 MICRONS MINIMUM THICKNESS)
3. FITTINGS
   a. FITTINGS SHALL BE STANDARDIZED FOR THE TYPE OF PIPE AND JOINT SPECIFIED AND SHALL COMPLY WITH AWWA C-110 (ANSI A-21) OR AWWA C-153 (ANSI A-21).
4. JOINTS
   a. MECHANICAL JOINTS OR SLIP JOINTS SHALL BE PROVIDED
   b. MECHANICAL JOINTS AND ACCESSORIES SHALL CONFORM TO AWWA STANDARD C-111, ANSI A-21. THE BOLTS AND NUTS SHALL BE CORROSION RESISTANT HIGH STRENGTH ALLOY STEEL.
   c. THE O-RING GASKETS SEALING THE SLIP JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURER OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER; AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS LIKELY TO BE IMPOSED BY THIS SERVICE. THE GASKET SHALL CONFORM TO THE REQUIREMENTS OF AWWA C-111 (ANSI A-21.11).
   d. WHERE INDICATED ON PLANS, RESTRAINED JOINT PIPE SHALL BE PROVIDED. RESTRAINED JOINTS SHALL BE DESIGNED IN ACCORDANCE WITH AWWA C-111 AND SHALL PERMIT HORIZONTAL AND/OR VERTICAL DEFLECTION AFTER ASSEMBLY, YET ADEQUATELY RESTRAIN THE JOINT AT THE FULL DESIGN PRESSURE.
5. DUCTILE IRON ENCASEMENT
   a. POLYETHYLENE ENCASEMENT SHALL BE REQUIRED FOR ALL DUCTILE IRON PIPE AND SHALL BE INSTALLED IN ACCORDANCE WITH ANSI/AWWA C105/A21.5.
6. MARKINGS
   a. THE CLASS DESIGNATIONS FOR THE VARIOUS CLASSES OF PIPE AND FITTINGS, MANUFACTURER'S NAME AND THE YEAR OF MANUFACTURE SHALL BE CAST ONTO FITTINGS IN RAISED NUMERALS, AND CAST OR STAMPED ON THE OUTSIDE OF EACH JOINT OF PIPE.
7. LOCATING TRACING WIRE
   a. ALL DUCTILE IRON PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.
   b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.
   c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.
8. CERTIFICATION
   a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

D. POLYVINYL CHLORIDE PIPE (PVC)
1. PIPE
   a. PVC FORCE MAIN SHALL CONFORM TO ASTM D2241, AWWA C900 OR AWWA C905.
   b. PVC FORCE MAIN PIPE MATERIAL SHALL CONFORM TO ASTM SPECIFICATION D-1784, STANDARD SPECIFICATION OF RIGID POLYVINYL CHLORIDE AND CHLORINATED POLYVINYL CHLORIDE COMPOUNDS, CELL CLASS 12454 (PVC 1120).
   c. FOR ASTM D2241, THE MATERIAL SHALL CONFORM TO ASTM D1784, CELL CLASS 12454 AND HYDROSTATIC DESIGN STRESS OF 2000 PSI. THE MINIMUM PRESSURE CLASS/SDR RATING SHALL BE CLASS 200/SDR 21.
   d. FOR AWWA C900, THE MATERIAL SHALL HAVE A DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING SHALL BE CLASS 200/DR 14.
   e. FOR AWWA C905, THE MATERIAL SHALL HAVE A HYDROSTATIC DESIGN BASIS OF 4000 PSI AND THE MINIMUM PRESSURE CLASS/DR RATING ACCEPTABLE SHALL BE CLASS 200/DR 21.
   f. PVC FORCE MAIN SHALL BE IN COMPLIANCE WITH AWWA C-900 FOR 4" THROUGH 12" AND AWWA C-905 FOR 14" AND GREATER.
   g. ALL PLASTIC PIPE AND COUPLINGS SHALL BEAR IDENTIFICATION MARKINGS IN ACCORDANCE WITH SECTION 2.5.2 AND 2.5.3 OF AWWA C-900, WHICH SHALL INCLUDE THE NATIONAL SANITATION FOUNDATION (NSF) SEAL OF APPROVAL. IN ADDITION, THE PLAIN END OF EACH PIPE LENGTH SHALL HAVE TWO (2) RINGS, ONE INCH (1") APART, PAINTED AROUND THE PIPE AT THE PROPER LOCATION TO ALLOW FIELD CHECKING OF THE CORRECT SETTING DEPTH OF THE PIPE IN THE BELL OR COUPLING.
2. JOINTS
   a. JOINTS SHALL BE BELL END OR COUPLING PUSH-ON TYPE WITH JOINT RESTRAINTS AS NEEDED. JOINT RESTRAINTS SHALL BE MEGALUG STYLE MECHANICAL JOINTS FOR PVC PIPE AS MANUFACTURED BY EBAA IRON OR APPROVED EQUAL.
   b. THE PUSH-ON JOINT AND JOINT COMPOUNDS SHALL MEET THE REQUIREMENTS FOR ASTM SPECIFICATION D-3139, JOINT FOR THE PLASTIC PIPE, USING FLEXIBLE ELASTOMERIC SEALS. THE JOINT SHALL BE DESIGNED SO AS TO PROVIDE FOR THE THERMAL EXPANSION AND CONTRACTION EXPERIENCED WITH A TOTAL TEMPERATURE CHANGE OF SEVENTY-FIVE (75) DEGREES F IN EACH JOINT OF PIPE. DETAILS OF THE JOINT DESIGN AND ASSEMBLY SHALL BE IN ACCORDANCE WITH JOINT MANUFACTURER'S STANDARD PRACTICE.
   c. THE LUBRICANT SHALL HAVE NO DETERIORATING EFFECTS ON THE GASKET OR THE PIPE. THE LUBRICANT CONTAINERS SHALL BE LABELED WITH MANUFACTURER'S NAME.
   d. THE GASKETS SEALING THE JOINT SHALL BE MADE OF RUBBER OF SPECIAL COMPOSITION HAVING A TEXTURE TO ASSURE A WATERTIGHT AND PERMANENT SEAL AND SHALL BE THE PRODUCT OF A MANUFACTURER HAVING AT LEAST FIVE (5) YEARS OF EXPERIENCE IN THE MANUFACTURE OF RUBBER GASKETS FOR PIPE JOINTS. THE GASKET SHALL BE A CONTINUOUS RING OF FLEXIBLE JOINT RUBBER OF A COMPOSITION AND TEXTURE WHICH IS RESISTANT TO COMMON INGREDIENTS OF SEWAGE, INDUSTRIAL WASTES AND GROUNDWATER AND WHICH WILL ENDURE PERMANENTLY UNDER THE CONDITIONS IMPOSED BY THIS

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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SANITARY SEWER SPECIFICATIONS

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SERVICE. THE GASKET SHALL CONFORM TO ASTM F-477. GASKETS SHALL MEET ALL APPLICABLE REQUIREMENTS OF ANSI STANDARD A- 21.11.

3. FITTINGS

a. FITTINGS SHALL BE MANUFACTURED IN ONE PIECE OF INJECTION MOLDED PVC COMPOUND MEETING THE REQUIREMENTS OF ASTM D1784. FITTINGS SHALL BE DESIGNED TO WITHSTAND A MINIMUM OF 755 PSI QUICK BURST PRESSURE @ 73 DEGREES F IN ACCORDANCE WITH ASTM D1599.

b. FOR RESTRAINED JOINTS, FITTINGS SHALL BE RESTRAINED JOINT DUCTILE IRON FITTINGS CONFORMING TO AWWA C110 AND AWWA C111.

4. LOCATING TRACING WIRE

a. ALL PVC PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.

b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.

c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.

5. MARKINGS

a. THE DATE OF MANUFACTURE, SHIFT CODE, CLASS OF PIPE, ASTM SPECIFICATION DESIGNATION ("PVC-C900"), SIZE OF PIPE, NAME OR TRADEMARK OF MANUFACTURER, AND IDENTIFICATION OF PLANT/LOCATION SHALL BE LEGIBLY MARKED ON THE OUTSIDE OF EACH PIPE SECTION IN ACCORDANCE WITH THE ASTM D-3034.

b. WHERE C900/905 IS USED FOR SEWER FORCE MAIN, IT SHALL BE GREEN IN COLOR TO DESIGNATE IT IS SEWER. ALTERNATELY, A PLASTIC TAPE "SEWER" COMPLYING WITH 327 IAC MAY BE INSTALLED.

6. CERTIFICATION

a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

E. HIGH DENSITY POLYETHYLENE PIPE (HDPE)

1. RESIN AND MATERIAL REQUIREMENTS

a. ALL MATERIAL SHALL BE MANUFACTURED FROM A PE 4710 RESIN LISTED WITH THE PLASTIC PIPE INSTITUTE (PPI) AS TR-4. THE RESIN MATERIAL SHALL MEET THE SPECIFICATIONS OF ASTM D 3350 WITH A MINIMUM CELL CLASSIFICATION OF 445474C. HDPE PIPE AND FITTINGS SHALL CONTAIN NO RECYCLED COMPOUNDS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. HDPE PRODUCTS SHALL BE HOMOGENEOUS THROUGHOUT AND FREE OF VISIBLE CRACKS, HOLES, FOREIGN INCLUSIONS, VOIDS, OR OTHER INJURIOUS DEFECTS.

2. PIPE

a. PIPE SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. THE POLYETHYLENE COMPOUND SHALL BE SUITABLY PROTECTED AGAINST DEGRADATION BY ULTRAVIOLET LIGHT BY MEANS OF CARBON BLACK OF NOT LESS THAN 2 PERCENT. THE MANUFACTURE OF THE HDPE RESIN SHALL CERTIFY THE CELL CLASSIFICATION INDICATED.

b. PIPE SIZES 3" AND LARGE SHALL HAVE A MANUFACTURING STANDARD OF ASTM F 714, WHILE PIPE SMALLER THAN 3" SHALL BE MANUFACTURED TO THE DIMENSIONAL REQUIREMENTS LISTED IN ASTM D 3035. DIMENSION RATIO (DR) AND OUTSIDE DIAMETER (IPS/DIPS) SHALL BE AS SPECIFIED ON PLANS.

c. PIPE SHALL MEET AWWA C901 (1/2" TO 3") OR AWWA C906 (4" TO 63"), AND SHALL BE LISTED AS MEETING NSF-61.

d. THE COLOR CODING SHALL BE PERMANENTLY CO-EXTRUDED STRIPES ON THE PIPE OUTSIDE SURFACE AS PART OF THE PIPE'S MANUFACTURING PROCESS. COLOR CODING SHALL BE AS FOLLOWS: SEWER – GREEN

3. JOINTS

a. HDPE PIPE SHALL BE JOINED INTO CONTINUOUS LENGTHS ON THE JOB SITE ABOVE GROUND. THE JOINING METHOD SHALL BE THE BUTT FUSION METHOD AND SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS. ELECTROFUSION SHALL NOT BE USED EXCEPT AS NEEDED TO CONNECT ADJACENT DIRECTIONALLY DRILLED SECTIONS WHICH ARE TO BE CONNECTED IN THE TRENCH BOTTOM. MECHANICAL JOINT ADAPTERS ARE REQUIRED TO MECHANICALLY CONNECT THE HDPE PIPE TO THE MAIN LINE. JOINT RESTRAINT TO PREVENT AXIAL SEPARATION SHALL BE INCORPORATED INTO THE DESIGN OF THE SLEEVE OR COUPLING USED TO CONNECT HDPE PIPE PLAIN ENDS. INTERNAL PIPE WALL STIFFENERS MUST BE USED WHEN RESTRAINING HDPE. THE RESTRAINED COUPLING SYSTEM SHALL BE SERIES 4800 MANUFACTURED BY EBAA IRON, INC. OR AN APPROVED EQUAL.

4. FITTINGS

a. BUTT FUSION FITTINGS- FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS OR ACCEPTED BY OWNER/ENGINEER. ALL FITTINGS SHALL MEET THE REQUIREMENTS OF AWWA C901 OR C906.

1) MOLDED FITTINGS SHALL COMPLY WITH THE REQUIREMENTS OF ASTM D 3261.

2) ALL FABRICATED ELBOWS, TEES, REDUCING TEES AND END CAPS SHALL BE PRODUCED AND MEET THE REQUIREMENTS OF ASTM F 2206, AS MANUFACTURED BY ISCO INDUSTRIES, INC OR OTHER APPROVED MANUFACTURER HOLDING AN ISO 9001 QUALITY SYSTEM CERTIFICATE. EACH FITTING WILL BE MARKED PER ASTM F 2206 SECTION 10 INCLUDING THE NOMINAL SIZE AND FITTING EDR, WHICH WILL MEET OR EXCEED THE PIPE DR IDENTIFIED FOR THE PROJECT. FABRICATED FITTINGS SHALL BE MANUFACTURED USING A MCELROY DATA LOGGER TO RECORD FUSION PRESSURE AND TEMPERATURE, AND SHALL BE STAMPED WITH UNIQUE JOINT NUMBER THAT CORRESPONDS TO THE JOINT REPORT. A GRAPHIC REPRESENTATION OF THE TEMPERATURE AND PRESSURE DATA FOR ALL FUSION JOINTS MADE PRODUCING FITTINGS SHALL BE MAINTAINED FOR A MINIMUM OF 5 YEARS AS PART OF THE QUALITY CONTROL AND WILL BE AVAILABLE UPON REQUEST OF OWNER. TEST RESULTS TO VALIDATE ASTM F 2206 SECTION 7.3 AND 9 SHALL BE PROVIDED TO OWNER OR OWNER'S REPRESENTATIVE UPON REQUEST.

3) SOCKET FITTINGS SHALL MEET ASTM D 2683.

b. ELECTROFUSION FITTINGS - FITTINGS SHALL BE MADE OF HDPE MATERIAL WITH A MINIMUM MATERIAL DESIGNATION CODE OF PE 4710 AND WITH A MINIMUM CELL CLASSIFICATION AS NOTED IN 2.01.A. ELECTROFUSION FITTINGS SHALL HAVE A MANUFACTURING STANDARD OF ASTM F1055. FITTINGS SHALL HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE TO WHICH THEY ARE JOINED UNLESS OTHERWISE SPECIFIED ON THE PLANS. FOR POTABLE WATER SYSTEMS, ALL ELECTROFUSION FITTINGS SHALL HAVE AWWA APPROVAL.

c. BOLTED CONNECTIONS- FLANGES AND MJ ADAPTERS SHALL BE FUSED ONTO THE PIPE AND HAVE A MINIMUM PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPE UNLESS OTHERWISE SPECIFIED ON THE PLANS.

1) METALLIC BACK-UP RINGS (VAN-STONE STYLE LAP JOINT FLANGES), SHALL HAVE A RADIUS ON THE INSIDE DIAMETER OF THE BORE SO AS TO BE COMPATIBLE WITH HDPE FLANGES. BACK UP RINGS SHALL HAVE BOLT PATTERN THAT WILL MATE WITH AWWA C207 CLASS D (GENERICALLY KNOWN AS 150 POUND PATTERNS).

2) WHERE SHOWN ON THE DRAWINGS, 4" AND LARGER TRANSITIONS TO MECHANICAL JOINT FITTINGS AND VALVES SHALL BE ACCOMPLISHED USING A MJ ADAPTER WITH KIT. THE D.I./HDPE MECHANICAL JOINT ADAPTOR SHALL CONSIST OF AN HDPE MECHANICAL JOINT TRANSITION FITTING, RUBBER GASKET, A MECHANICAL JOINT BACKUP DRIVE RING, AND CORTEN MECHANICAL JOINT TEE BOLTS.

d. MECHANICAL FITTINGS: THE USE OF MECHANICAL COUPLING AND SADDLES SHALL BE APPROVED BY THE OWNER OR ENGINEER PRIOR TO INSTALLATION. MECHANICAL FITTINGS SHALL BE DESIGNED FOR USE AND COMPATIBLE WITH HDPE PIPE, INCLUDING SS STIFFENERS WHEN REQUIRED BY MANUFACTURER. MECHANICAL FITTINGS SHALL HAVE A PRESSURE RATING EQUAL TO OR GREATER THAN THE PIPES.

5. MARKINGS

a. DURING THE EXTRUSION PRODUCTION, THE HDPE PIPE SHALL BE CONTINUOUSLY MARKED PER ASTM AND AWWA WITH DURABLE PRINTING WITH, AT A MINIMUM, THE FOLLOWING: NOMINAL PIPE SIZE, DIMENSION RATIO, PRESSURE RATING, TRADE NAME, MATERIAL CLASSIFICATION, CERTIFICATION BASES, AND DATE.

6. LOCATING TRACING WIRE

a. ALL HDPE PIPE FOR PRESSURE SANITARY SEWER SHALL BE INSTALLED WITH TRACING WIRE. TRACING WIRE SHALL BE 10 AWG SOLID COPPER HIGH STRENGTH TRACER WIRE, CCS REINFORCED BY COPPERHEAD OR APPROVED EQUAL.

b. LOCATING TRACER WIRE SHALL BE BROUGHT TO SURFACE NO LESS THAN EVERY 500 L.F.

c. LOCATE WIRE SHALL BE TESTED FOR CONTINUITY PRIOR TO ACCEPTANCE.

7. CERTIFICATION

a. THE CONTRACTOR SHALL FURNISH, UPON REQUEST, CERTIFIED REPORTS STATING THAT INSPECTION AND SPECIFIED TESTS HAVE BEEN MADE AND THAT THE RESULTS THEREOF COMPLY WITH THE APPLICABLE STANDARDS.

F. PRESSURE TYPE PIPE COUPLINGS:

1. TUBULAR-SLEEVE COUPLINGS:

2. COUPLINGS SHALL MEET AWWA C219, WITH CENTER SLEEVE, GASKETS, END RINGS, AND BOLT FASTENERS.

3. METAL, BOLTED, SLEEVE-TYPE, REDUCING OR TRANSITION COUPLINGS FOR JOINING UNDERGROUND PRESSURE PIPING:

4. COUPLINGS SHALL MEET A 200-PSI MINIMUM PRESSURE RATING AND ENDS OF SAME SIZES OF THE MAIN LINE PIPING.

5. CENTER-SLEEVE MATERIAL:

6. SLEEVE SHALL BE STAINLESS STEEL.

7. GASKET MATERIAL: GASKETS SHALL BE NATURAL OR SYNTHETIC RUBBER RESISTANT TO SEWAGE.

8. METAL COMPONENT FINISH: FINISH SHALL BE A CORROSION-RESISTANT MATERIAL OR COATING.

2.5 RESILIENT WEDGE GATE VALVES

A. VALVES SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C515 COVERING RESILIENT SEATED GATE VALVES FOR WATER SUPPLY SERVICE.

B. THE VALVES SHALL HAVE A DUCTILE IRON BODY, BONNET, AND O-RING PLATE. THE WEDGE SHALL BE TOTALLY ENCAPSULATED WITH RUBBER.

C. THE SEALING RUBBER SHALL BE PERMANENTLY BONDED TO THE WEDGE PER ASTM D-429.

D. VALVES SHALL BE SUPPLIED WITH O-RING SEALS AT ALL PRESSURE RETAINING JOINTS. NO FLAT GASKETS SHALL BE ALLOWED.

E. THE VALVES SHALL BE NON-RISING STEM OPENING BY TURNING LEFT AND PROVIDED WITH 2" SQUARE OPERATING NUT OR A HANDWHEEL WITH THE WORD "OPEN" AND AN ARROW TO INDICATE THE DIRECTION TO OPEN.

F. STEMS SHALL BE CAST COPPER ALLOY WITH INTEGRAL COLLARS IN FULL COMPLIANCE WITH AWWA. ALL STEMS SHALL OPERATE WITH COPPER ALLOY STEM NUTS INDEPENDENT OF WEDGE AND OF STEM (IN NRS VALVES).

G. ALL STEMS SHALL HAVE TWO O-RINGS LOCATED ABOVE THE THRUST COLLAR AND ONE O-RING BELOW. STEM O-RINGS SHALL BE REPLACEABLE WITH VALVE FULLY OPENED AND SUBJECTED TO FULL PRESSURE.

H. THE STEMS ON 4"-20" SHALL HAVE A LOW TORQUE THRUST BEARING LOCATED ABOVE AND BELOW THE STEM COLLAR TO REDUCE FRICTION DURING OPERATION.

I. WATERWAY SHALL BE SMOOTH, UNOBSTRUCTED AND FREE OF ALL POCKETS, CAVITIES AND DEPRESSIONS IN THE SEAT AREA. VALVES 4" AND LARGER SHALL ACCEPT A FULL SIZE TAPPING CUTTER.

J. THE BODY, BONNET AND O-RING PLATE SHALL BE FUSION-BONDED EPOXY COATED, BOTH INTERIOR AND EXTERIOR ON BODY AND BONNET. EPOXY SHALL BE APPLIED IN ACCORDANCE WITH AWWA C550 AND BE NSF 61 CERTIFIED.

K. EACH GATE VALVE SHALL BE INSTALLED IN A VERTICAL POSITION WITH A ROADWAY TYPE VALVE BOX. GATE VALVES SET WITH VALVE BOXES SHALL BE PROVIDED WITH A 2-INCH SQUARE OPERATING NUT AND SHALL BE OPENED BY TURNING TO THE LEFT (COUNTER-CLOCKWISE). THERE SHALL BE A MAXIMUM 48" DEPTH OF VALVE OPERATING NUT. CONTRACTOR MUST USE EXTENSION STEMS, IF NECESSARY, TO RAISE OPERATOR NUT WITHIN 48" OF FINAL GRADE.

L. ALL BURIED GATE VALVES SHALL HAVE MECHANICAL JOINT ENDS.

M. PRIOR TO SHIPMENT FROM THE FACTORY, EACH VALVE SHALL BE TESTED BY HYDROSTATIC PRESSURE EQUAL TO THE REQUIREMENTS OF AWWA C515 (AND UL/FM WHERE APPLICABLE).

N. VALVES SHALL BE AS MANUFACTURED BY MUELLER, M&H, CLOW, AMERICAN VALVE & HYDRANT, KENNEDY, OR APPROVED EQUAL.

2.6 AIR RELEASE VALVES

A. VALVES SHALL BE INSTALLED AT THE HIGH POINTS OF THE FORCE MAIN OR AT LOCATIONS SELECTED BY THE ENGINEER. THIS WILL PERMIT DISCHARGING THE SURGE OF AIR FROM AN EMPTY LINE WHEN FILLING AND RELIEVE THE VACUUM WHEN DRAINING THE SYSTEM. VALVE SHALL ALSO RELEASE AN ACCUMULATION OF AIR WHEN THE SYSTEM IS UNDER PRESSURE. THIS SHALL BE ACCOMPLISHED IN A SINGLE VALVE BODY.

B. AN ISOLATION VALVE SHALL BE FURNISHED AND INSTALLED BETWEEN THE AIR RELEASE VALVE AND MAIN CONNECTION TO ISOLATE THE AIR RELEASE VALVE FROM THE SYSTEM. VALVE SHALL BE A FULL OPENING STAINLESS STEEL OR BRONZE BALL STYLE VALVE PROVIDED WITH THREADED CONNECTIONS AND BE INSTALLED USING STAINLESS STEEL PIPE.

C. AIR RELEASE VALVES SHALL BE COMBINATION AIR RELEASE VALVES (UNLESS OTHERWISE SPECIFIED BY STATE ENGINEER) AS MANUFACTURED BY A.R.I. OR OWNER APPROVED EQUAL. THE VALVE SHALL ALLOW AIR TO ESCAPE OUT OF THE LARGE ORIFICE WHEN AIR IS PRESENT AND CLOSE WHEN LIQUID ENTERS THE VALVE. WHEN THE VALVE IS CLOSED AND PRESSURIZED, THE SMALL AIR RELEASE ORIFICE WILL OPEN TO ALLOW SMALL POCKETS OF AIR TO ESCAPE AUTOMATICALLY AND INDEPENDENTLY OF THE LARGE ORIFICE. THE LARGE ORIFICE SHALL ALSO ALLOW AIR TO ENTER TO BREAK VACUUM. THE BODY INLET SHALL BE BAFFLED TO PROTECT THE FLOAT FROM DIRECT FORCES OF RUSHING AIR AND WATER TO PREVENT PREMATURE VALVE SHUT-OFF.

D. MATERIALS SHALL CONFORM TO THE FOLLOWING:

1. BODY AND COVER: DUCTILE IRON (ASTM A536 GR 65-45-12)

2. FLOAT: STAINLESS STEEL (ASTM A240)

3. NEEDLE & SEAT: BUNA-N

4. PLUG: STAINLESS STEEL (ASTM A276)

5. LEVERAGE FRAME: DELRIN/CAST IRON (ASTM D4184/ASTM A126 GR. B)

6. THE VALVES SHALL BE RATED FOR 150 PSI WORKING PRESSURE, AND CONFORM TO AWWA C512.

2.7 CASING AND JACKING PIPE

A. DESCRIPTION

1. ALL CASING AND JACKING PIPE AND HORIZONTAL BORES SHALL BE APPROVED BY THE UTILITY.

B. STEEL CASING PIPE

1. STEEL CASING PIPE SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM A53 WITH 35,000 PSI MINIMUM YIELD STRENGTH, AND HAVE THE FOLLOWING MINIMUM WALL THICKNESSES:

<= 24" STEEL CASING SHALL HAVE 0.250" MINIMUM WALL THICKNESS
30" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
36" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS
42" STEEL CASING SHALL HAVE 0.375" MINIMUM WALL THICKNESS

2. ALL ENCASEMENT PIPE JOINTS SHALL BE WELDED.

3. THE CASING PIPE DIAMETER EQUALS THE CARRIER PIPE'S LARGEST OUTSIDE DIAMETER PLUS 4-INCHES MINIMUM.

4. CARRIER PIPE: PER SECTION 2.3 OR 2.4 OF THESE SPECIFICATIONS.

C. CASING SPACERS

1. MANUFACTURED CASING SPACERS OR WOOD BLOCKING SPACERS ARE REQUIRED ON THE BOTTOM AND TOP TO PREVENT PIPE FROM "FLOATING" DURING GROUT FILLING PROCEDURE.

2. CASING SPACERS SHOULD BE AT 6-FOOT MAXIMUM, CENTER-TO-CENTER, PER DETAIL.

2.8 MANHOLES

A. DESCRIPTION

1. STANDARD MANHOLES SHALL BE CONSTRUCTED COMPLETE, READY FOR USE, INCLUDING EXCAVATION, BACKFILL, CONCRETE WORK, CAST IRON FRAMES AND COVERS, AND PERTINENT WORK AS SHOWN ON THE DRAWINGS. ALL MANHOLES SHALL BE MADE WATERTIGHT, AND THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND PERFORM ALL WORK NECESSARY FOR WATERTIGHT CONSTRUCTION.

2. ALL PROPOSED CASTINGS SET IN PAVED AREAS SHALL BE FLUSH WITH THE FINAL PAVEMENT ELEVATIONS. ALL PROPOSED CASTINGS TO BE SET IN NON-PAVED AREAS SHALL STAND APPROXIMATELY THREE (3) INCHES ABOVE FLUSH WITH THE FINAL GROUND.

3. MAXIMUM MANHOLE SPACING SHALL BE FOUR HUNDRED (400) FEET, UNLESS APPROVAL IS GIVEN BY THE UTILITY STATE ENGINEER.

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4. DESIGN ENGINEER SHALL VERIFY THAT THE LOWEST ELEVATION TO HAVE GRAVITY SANITARY SEWER SERVICE WITHIN EACH HOME OR BUILDING IS MORE THAN ONE (1) FOOT ABOVE THE LOWEST TOP OF CASTING ELEVATION OF EITHER THE FIRST UPSTREAM OR DOWNSTREAM MANHOLE ON THE GRAVITY SEWER TO WHICH THE CONNECTION IS TO BE MADE. THIS DESIGN CONSIDERATION MUST BE INCORPORATED INTO FINISHED FLOOR ELEVATIONS (FFE) AND A MINIMUM FFE LABEL FOR THE LOTS WHERE THE PAD ELEVATION DOES NOT MEET THIS REQUIREMENT.

5. MANHOLE ELEVATIONS MUST BE SET EIGHTEEN (18) INCHES ABOVE THE CURRENT PUBLISHED INDIANA DEPARTMENT OF NATURAL RESOURCES 100-YEAR BASE FLOOD ELEVATION OF NEARBY WATERWAYS (INCLUDING, BUT NOT LIMITED TO, LAKES, PONDS, STREAMS, AND EMERGENCY SPILLWAYS OR STORM WATER ROUTING). IF THIS REQUIREMENT CANNOT BE MET, THEN WATER TIGHT BOLTED AND GASKETED CASTINGS MUST BE INSTALLED.

6. MANHOLES SHALL BE INSTALLED AT A 6-FOOT MINIMUM DEPTH (7-FOOT PREFERRED), AS MEASURED FROM THE TOP OF CASTING TO THE INVERT.

7. ALL LIFT HOLES IN PRECAST SECTIONS SHALL BE WETTED AND COMPLETELY FILLED WITH NON-SHRINK GROUT, SMOOTHED.

8. MANHOLES EXTERIOR SHALL BE COATED WITH BITUMINOUS WATERPROOFING MATERIAL TO ENSURE WATER TIGHTNESS.

B. REINFORCED CONCRETE MANHOLES AND ACCESSORIES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ASTM C478, STANDARD SPECIFICATIONS FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS. MANHOLES SHALL BE A MINIMUM DIAMETER OF 48 INCHES WITH A MINIMUM ACCESS DIAMETER OF 24 INCHES. THE MINIMUM WALL THICKNESS SHALL BE FIVE (5) INCHES FOR MANHOLES FOUR (4) FEET IN DIAMETER.

2. THE PRECAST TOPS SHALL BE OF THE ECCENTRIC CONE TYPE. PRECAST FLAT COVERS SHALL BE NOT LESS THAN EIGHT (8) INCHES THICK AND REINFORCED WITH TWO LAYERS OF STEEL WITH A MINIMUM AREA OF 0.39 SQUARE INCHES PER LINEAR FOOT IN BOTH DIRECTIONS IN EACH LAYER. PRECAST FLAT BOTTOMS OF MANHOLES SHALL ALSO BE REINFORCED THE SAME AS SPECIFIED HEREIN FOR PRECAST FLAT TOP. HOISTING LUGS OR HOOKS SHALL BE CAST IN PLACE FOR HANDLING AND SETTING OF THE RINGS. NO THROUGH HOLES SHALL BE PERMITTED. OPENINGS OF PROPER SIZES AND SUITABLE DESIGN SHALL BE CAST IN PLACE FOR RECEIVING THE SEWER AND/OR DROP PIPES AND CONNECTIONS. ADJUSTING RISER RINGS SHALL BE PROVIDED, WITH NO MORE THAN 12-INCHES OF RISER RINGS ALLOWED.

3. ALL MANHOLE JOINTS SHALL BE TONGUE AND GROOVE AND THEY SHALL BE SEALED WITH 1-1/4" BUTYL MASTIC JOINT SEALANT MEETING ASTM C-990. CRACKED OR DAMAGED BARREL JOINTS SHALL NOT BE ALLOWED. ALL JOINTS SHALL ALSO HAVE AN EXTERIOR JOINT WRAP SIMILAR TO THE INFI-SHIELD GATOR WRAP AS MANUFACTURED BY SEALING SYSTEMS INC. OR APPROVED EQUAL. THE JOINT WRAP SHALL BE A MINIMUM OF SIX (6") IN WIDTH.

4. MANHOLE STEPS SHALL BE INSTALLED IN ALL SANITARY SEWER MANHOLES. MANHOLE STEPS SHALL BE POLYPROPYLENE. MANHOLE STEPS SHALL BE INSTALLED IN A VERTICAL ROW ON 16-INCH CENTERS.

5. MANHOLE BASES SHALL BE OF CAST-IN-PLACE MONOLITHIC CONCRETE OR PRECAST CONCRETE. WHERE SEWER LINES PASS THROUGH OR ENTER MANHOLES, THE INVERT CHANNELS SHALL BE SMOOTH AND SEMI-CIRCULAR IN CROSS SECTION WITH THE WALL EXTENDING TO FULL DEPTH ELEVATION OF THE PIPE. THE INVERT CHANNELS SHALL BE FORMED DIRECTLY IN THE CONCRETE OF THE MANHOLE BASE. CHANGES OF DIRECTION OF FLOW WITHIN THE MANHOLES SHALL BE MADE WITH A SMOOTH CURVE WITH AS LONG AS A RADIUS AS POSSIBLE. THE WALLS OF THE CHANNELS MAY BE FLARED OUT TO ALLOW TESTING EQUIPMENT TO BE INSERTED AND REMOVED. THE FLOOR OF THE MANHOLE OUTSIDE THE CHANNELS SHALL BE SMOOTH AND SLOPE TOWARD THE CHANNEL NOT LESS THAN ONE (1) INCH PER FOOT.

6. FOR CAST IN PLACE BASES, NO MORTAR OR CONCRETE SHALL BE PLACED IN WATER, AND NO WATER SHALL BE ALLOWED TO FLOW OVER OR AGAINST THE CONCRETE BEFORE IT HAS HAD ADEQUATE TIME TO SET IN ORDER TO PREVENT DAMAGE TO THE STRUCTURE.

7. THE STANDARD MANHOLE IS FORTY-EIGHT (48") IN DIAMETER. LARGER DIAMETER MANHOLES MAY BE REQUIRED IN INSTANCES WITH LARGE PIPE DIAMETERS OR WITH CERTAIN INTERNAL DROPS, IF APPROVED. MANHOLE BARREL SECTIONS SHALL BE IN ONE, TWO, THREE, OR FOUR FOOT SECTIONS. THE CONE SECTION SHALL BE OF THE ECCENTRIC CONE TYPE, TWO OR THREE FEET IN LENGTH.

8. ADJUSTING RINGS. WHERE ONE (1) SOLID RISER OR BARREL SECTION CANNOT BE USED, FINAL ADJUSTMENTS IN ELEVATION OF THE FRAME AND COVER SHALL ONLY BE ACCOMPLISHED BY THE USE OF PRECAST CONCRETE ADJUSTING RINGS CONFORMING TO ASTM C 478. RINGS SHALL BE OF A NOMINAL THICKNESSES OF FOUR (4"), OR SIX (6") INCHES. NOT MORE THAN TWO (2) RINGS AND NOT MORE THAN TWELVE (12) INCHES TOTAL OF ADJUSTING RINGS SHALL BE ALLOWED FOR ADJUSTMENT OF THE MANHOLE FRAME AND COVER TO REQUIRED ELEVATION. GRADE RING JOINTS SHALL HAVE A 1 ¼" THICK PREFORMED BUTYL RUBBER FLEXIBLE SEALANT CONFORMING TO ASTM C990.

9. ALL PRECAST CONCRETE FOR MANHOLES THAT WILL BE RECEIVING A FORCE MAIN OR ARE WITHIN FIVE HUNDRED (500') FEET UPSTREAM OR DOWNSTREAM OF THE RECEIVING MANHOLE SHALL HAVE THE INTERIOR OF THE MANHOLE LINED WITH SPECTRASHIELD, CEMENTITIOUS LINERS WITH CALCIUM ALUMINATE MORTARS SUCH AS STRONGSEAL, SAUEREISEN, MADEWELL, CONCO SPRAYROQ OR APPROVED EQUAL. APPLY COATING PER MANUFACTURER'S RECOMMENDATION.

   a. A BOLTED AND GASKETED CASTING MUST BE INSTALLED ON EACH MANHOLE WITHIN TWO HUNDRED (200) FEET OF A FORCE MAIN DISCHARGE.

10. MINIMUM MANHOLE DIAMETERS

   a. THE FOLLOWING ARE MINIMUM MANHOLE DIAMETERS FOR SANITARY SEWERS ENTERING/EXITING A MANHOLE AT THE FOLLOWING RANGE OF ANGLES:

PIPE SIZE	PIPES ENTERING / LEAVING AT 0° - 45° BEND	PIPES ENTERING / LEAVING AT 45° - 90° BEND
8" - 21"	48"	48"
24"	48"	60"
27" - 30"	60"	60"
33" - 36"	60" *	72"

* NOTE 72" IF THE "A-LOK" CONNECTOR IS USED.

   b. THE MINIMUM MANHOLE DIAMETER TO ACCOMMODATE AN INSIDE DROP IS 60".

C. MANHOLE BASE CHANNELS:

1. MANHOLE CHANNELS SHALL BE MAIN LINE PIPE MATERIAL. LAY MAIN PIPE THROUGH MANHOLE AND CUT TOP OF PIPE OUT TO BE THREE-FOURTHS OF PIPE DIAMETER. FOR ALL MANHOLES WITH EQUAL DIAMETER INFLUENT AND EFFLUENT PIPES, A MINIMUM 0.10 FOOT DROP BETWEEN THE INVERTS AND EFFLUENT PIPES SHALL BE MAINTAINED. FOR CHANGES IN DIRECTION 45 TO 90 DEGREES, A MINIMUM 0.20 FOOT DROP SHALL BE MAINTAINED.

D. SEWER PIPE TO MANHOLE CONNECTIONS

1. TO CONNECT A SANITARY SEWER TO A MANHOLE, A RESILIENT PIPE TO MANHOLE CONNECTOR SHALL BE USED MEETING THE REQUIREMENTS OF ASTM C-923. EITHER A FLEXIBLE BOOT KOR-N-SEAL 1 OR 2, CAST-IN-PLACE DURA-SEAL GASKET OR "A-LOK" GASKET OR AN APPROVED EQUAL SHALL BE USED. CONNECTIONS TO AN EXISTING MANHOLE SHALL BE A FLEXIBLE BOOT SEAL.

2. IF THE FLEXIBLE BOOT CONNECTION IS USED, IT SHALL BE PLACED IN THE REINFORCED CONCRETE MANHOLE BASE AND SECURED TO THE PIPE BY A STAINLESS STEEL CLAMP. FLEXIBLE CONNECTORS SHALL CONFORM TO ASTM C 923.

3. ALL CONNECTIONS SHALL PROVIDE FOR A WATERTIGHT SEAL BETWEEN THE PIPE AND MANHOLE. THE CONNECTOR SHALL BE THE SOLE ELEMENT RELIED UPON TO ASSURE A FLEXIBLE WATERTIGHT SEAL OF THE PIPE TO THE MANHOLE.

4. THE INVERT OF THE CONNECTION SHALL BE GROUTED WITH NON-SHRINK GROUT. THE REMAINDER OF THE RESILIENT CONNECTION SHALL BE FREE OF GROUT TO PROMOTE FLEXIBILITY OF THE CONNECTION.

5. THE RUBBER FOR THE CONNECTOR SHALL CONFORM TO ASTM C 923 AND SHALL BE RESISTANT TO OZONE, WEATHER ELEMENTS, CHEMICALS, INCLUDING ACIDS AND ALKALIS, ANIMAL AND VEGETABLE FATS, OILS AND PETROLEUM PRODUCTS.

6. THE STAINLESS STEEL ELEMENTS OF THE CONNECTOR SHALL BE TOTALLY NON-MAGNETIC SERIES 305 STAINLESS STEEL. THE STAINLESS STEEL CLAMP SHALL BE CAPABLE OF SUSTAINING APPLIED TORQUE IN EXCESS OF EIGHTY (80) INCH-POUNDS.

7. FOR CORED HOLES, PENETRATIONS, AND/OR OTHER OPENING THROUGH A MANHOLE OR OTHER SANITARY STRUCTURE, THE UTILITY RECOMMENDS A SEPARATION OF GREATER THAN EIGHTEEN (18) INCHES BETWEEN THE OUTER EDGES OF RESILIENT CONNECTORS. IF A SEPARATION OF LESS THAN EIGHTEEN (18) INCHES EXISTS, THEN ADDITIONAL REINFORCEMENT WILL BE REQUIRED IN THE STRUCTURE OR STRUCTURE DIAMETER SHALL BE ENLARGED TO PROVIDE THE REQUIRED SEPARATION.

8. ALL CORED HOLES, PENETRATIONS AND/OR OTHER OPENING THROUGH A MANHOLE OR OTHER SANITARY STRUCTURE MUST HAVE A MINIMUM SEPARATION OF EIGHT (8) INCHES FROM THE OUTER EDGE OF RESILIENT CONNECTORS.

9. ALL CORED HOLES, PENETRATIONS AND/OR OTHER OPENING INTO A MANHOLE OR OTHER SANITARY STRUCTURE MUST HAVE A MINIMUM SEPARATION OF SIX (6) INCHES FROM ANY JOINT, AS MEASURED FROM THE NEAREST JOINT SHOULDER, TO THE PENETRATION.

10. NEW CONNECTIONS MADE TO ANY EXISTING STRUCTURE SHALL BE DRILLED IN THE DIRECTION OF FLOW. THE INTERNAL BASE MATERIAL SHALL BE REMOVED AND RE-POURED WITH THE CHANNELS MEETING THE REQUIREMENTS OF THE MANHOLE BASE SECTION. IF THE STRUCTURAL INTEGRITY OF THE CONCRETE BASE SECTION IS COMPROMISED DURING THE REMOVAL OF THE INTERIOR BASE, THE ENTIRE BASE SECTION SHALL BE REPLACED. THE CONNECTOR BOOT SHALL BE APPROPRIATELY SIZED TO FIT THE OPENING AND SHALL BE KOR-N-SEAL® BY NPC, INC., A-LOK PRODUCTS, INC., OR APPROVED EQUAL.

E. BENCH WALLS

1. IF AN END RUN MANHOLE HAS NO STUBS AND WILL BE EXTENDED IN THE FUTURE, THEN NO BENCH WALL SHALL BE INSTALLED UNTIL THE EXTENSION IS CONSTRUCTED.

2. IF AN END RUN MANHOLE WILL NOT BE EXTENDED IN THE FUTURE, THEN THE BENCH WALL MUST EXTEND ACROSS THE ENTIRE WIDTH OF THE MANHOLE WITH A GROUTED FLOW TRANSITION AT THE FAR WALL TO THE TOP OF THE BENCH WALL.

F. INVERT ELEVATION DIFFERENCES

1. THE INVERT ELEVATION DIFFERENCE SHALL BE 0.10 FEET IN MANHOLES WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF ONE HUNDRED THIRTY-FIVE (135) DEGREES TO ONE HUNDRED EIGHTY (180) DEGREES.

2. THE INVERT ELEVATION DIFFERENCE SHALL BE 0.20 FEET IN MANHOLES WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF NINETY (90) DEGREES TO ONE HUNDRED THIRTY-FIVE (135) DEGREES.

3. THE INVERT ELEVATION DIFFERENCE FOR MANHOLES IN WHICH THE EFFLUENT AND INFLUENT PIPES CREATE AN ANGLE OF LESS THAN NINETY (90) DEGREES WILL BE DETERMINED ON A CASE BY CASE BASIS. THIS SITUATION WILL ONLY BE ALLOWED WHERE NO OTHER ALTERNATIVE IS AVAILABLE AND THE INVERT ELEVATION DIFFERENCE SHALL BE A MINIMUM OF 0.30 FEET.

4. THE INVERT ELEVATION DIFFERENCE IN WHICH A SMALLER SEWER JOINS A LARGER ONE IS DETERMINED AS SPECIFIED IN ACCORDANCE WITH SECTION 33.6 (CHANGES IN PIPE SIZE) OF RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES "TEN STATES STANDARDS".

G. DROP MANHOLES

1. WHERE A SANITARY SEWER OR SANITARY LATERAL ENTERS A MANHOLE TWENTY-FOUR (24) INCHES OR MORE ABOVE THE INVERT OF THE OUTGOING SEWER, THE INCOMING SEWER SHALL BE CONNECTED TO THE MANHOLE BY MEANS OF A DROP CONNECTION.

2. OUTSIDE DROP CONNECTIONS MAY BE EITHER PRECAST OR FIELD FABRICATED. DROP CONNECTIONS ON THE INSIDE OF MANHOLES SHALL BE SECURED TO THE INTERIOR WALL OF THE MANHOLE AND PROVIDE ACCESS FOR CLEANING, AND DROP PIPE CONNECTIONS ON THE OUTSIDE OF MANHOLES SHALL BE ENCASED IN CONCRETE.

H. SAMPLE MANHOLE REQUIREMENTS

1. ALL WAREHOUSE AND INDUSTRIAL SITES SHALL INSTALL A SAMPLING MANHOLE PRIOR TO CONNECTION TO THE UTILITY SEWER.

2. THE SAMPLING MANHOLE SHALL BE AS SPECIFIED IN STANDARD DETAILS DRAWING.

3. THE SAMPLING MANHOLE SHALL HAVE A THREE (3) FOOT STRAIGHT LATERAL RUN ON BOTH SIDES OF THE MANHOLE.

4. THE SAMPLING MANHOLE SHALL BE FURNISHED WITH A FLUME FOR FLOW MEASUREMENT.

I. CASTINGS

1. STANDARD MANHOLES SHALL HAVE A SELF-SEALING, HEAVY-DUTY FRAME AND COVER, NEENAH R-1772 OR APPROVED EQUAL. MATERIAL SHALL BE IN COMPLIANCE WITH ASTM A-48, CL 35. EACH LID SHALL HAVE "SANITARY SEWER" MOLDED INTO THE EXTERIOR SURFACE IN LETTERS TWO (2) INCHES IN HEIGHT RECESSED, AND FLUSH WITH SURFACE.

2. WHERE WATERTIGHT CASTINGS ARE REQUIRED, THE MANHOLES SHALL HAVE A BOLT DOWN NEENAH 1772 OR 1022ZI CASTING BY EAST JORDAN IRON WORKS, OR APPROVED EQUAL. THE FRAME SHALL BE ANCHORED THROUGH THE RISER RINGS (IF PROVIDED) TO THE CONE SECTION WITH FOUR (4) GALVANIZED RODS.

3. NO OPEN PICK HOLES SHALL BE ALLOWED.

J. FRAME, CHIMNEY AND JOINT SEAL

1. ALL MANHOLES SHALL HAVE AN EXTERNAL CHIMNEY SEAL AND JOINT SEALS.

2. THE SECTION OF THE MANHOLE FROM THE ECCENTRIC CONE TO THE CASTING FRAME SHALL BE WRAPPED ON THE EXTERIOR WITH JOINT WRAP MEETING THE REQUIREMENTS OF THE UNI-BAND SEALING SYSTEM AS MANUFACTURED BY SEALING SYSTEMS, INC. OR APPROVED EQUAL.

3. ALL MANHOLE JOINTS SHALL BE WRAPPED ON THE EXTERIOR WITH JOINT WRAP MEETING THE REQUIREMENTS OF THE INFI-SHIELD GATOR WRAP AS MANUFACTURED BY SEALING SYSTEMS INC. OR APPROVED EQUAL. THE JOINT WRAP SHALL BE A MINIMUM OF SIX (6") IN WIDTH.

2.9 LATERAL CONNECTION TO EXISTING SEWER LINE

A. ALL SEWER LATERAL PIPES AND FITTINGS SHALL NOT BE LESS THAN SIX INCHES IN DIAMETER.

B. CONNECTION OF A NEW SEWER LATERAL TO AN EXISTING SEWER MAIN SHALL BE MADE AIR AND WATERTIGHT IN AN ACCEPTABLE MANNER.

C. THE STANDARD CONNECTION SHALL UTILIZE STANDARD PIPE FITTING (OR MANUFACTURER'S RECOMMENDED ADAPTER) DESIGNED TO JOIN THE TYPE OF PIPES INVOLVED.

D. CONNECTION OF NEW LATERALS TO EXISTING SEWER MAINS WHEN A STANDARD FITTING IS NOT USED SHALL UTILIZE A ROMAC INDUSTRIES STYLE "CB" SEWER SADDLE, FORD SEWER SADDLE STYLE FSS SEWER SADDLE OR APPROVED EQUAL.

E. CCTV OF ALL NEW SEWER CONNECTIONS SHALL BE PERFORMED AND SUBMITTED TO AQUA (VIDEO FORMAT).

2.10 APPURTENANCES

A. OIL AND GREASE INTERCEPTOR AND GREASE REMOVAL PIT

1. PIT SHALL BE CONSTRUCTED OF REINFORCED PRECAST CONCRETE OR CAST-IN-PLACE CONCRETE OF THE SHAPE AND CONFIGURATION INDICATED ON THE PLANS. PRECAST VAULTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C857 AND BE RATED FOR AASHTO HS20-44 LOADING. THE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS, AND REINFORCEMENT SHALL COMPLY WITH ASTM A615, GRADE 60. ACCESS TO THE PIT SHALL BE THROUGH 24 INCHES DIAMETER MANHOLE FRAME AND COVER OR THROUGH HINGED ALUMINUM ACCESS MANWAYS.

2. BAFFLES SHALL BE CONSTRUCTED OF 1/4 INCH MILD CARBON STEEL WITH 1/4 INCH THERMOPLASTIC COATING.

3. THE PIT SHALL HOLD A VOLUME OF NO LESS THAN 1000 GALLONS.

PART 3 - EXECUTION

3.1 PREPARATION

A. REMOVE LARGE STONES OR OTHER HARD MATERIALS THAT COULD DAMAGE PIPE OR IMPEDE CONSISTENT BACKFILLING OR COMPACTION.

B. PROTECT AND SUPPORT EXISTING SEWER LINES, UTILITIES, AND APPURTENANCES.

3.2 EXCAVATION

A. CLEARING

1. PRIOR TO EXCAVATION, AREAS WITHIN THE PROJECT LIMITS SHALL BE FIRST CLEARED OF OBSTRUCTIONS, DEBRIS, AND EXISTING FACILITIES WITH THE EXCEPTION OF FACILITIES THAT MUST TEMPORARILY OR PERMANENTLY REMAIN. THE CONTRACTOR SHALL REMOVE AND KEEP SEPARATE THE TOPSOIL AND SHALL CAREFULLY REPLACE IT AFTER THE BACKFILLING IS COMPLETED.

B. PROTECTION OF EXISTING IMPROVEMENTS REQUIRED TO REMAIN IN PLACE

1. BEFORE ANY EXCAVATION IS STARTED, ADEQUATE PROTECTION SHALL BE PROVIDED FOR ALL LAWNS, TREES, SHRUBS, LANDSCAPE WORK, FENCES, SIDEWALKS, HYDRANTS, UTILITY POLES, STREET,

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

10

PLOT SCALE: 1:2.5849 EDIT DATE: 10/26/16 – 11:29 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20160196 4\DS.01(R4).DWG

ALLEY AND DRIVEWAY PAVING, CURBS, STORM SEWERS, DITCHES, HEADWALLS, CATCH BASINS, SURFACE INLETS AND ALL OTHER IMPROVEMENTS THAT ARE DESIGNATED TO REMAIN IN PLACE. SUCH PROTECTION SHALL BE PROVIDED AS LONG AS NECESSARY TO PREVENT DAMAGE FROM THE CONTRACTOR'S OPERATIONS.

2. THE CONTRACTOR SHALL EXERCISE EVERY PRECAUTION TO PREVENT DAMAGE TO PROPERTY WITHIN AND OUTSIDE THE IMMEDIATE VICINITY OF THE WORK. THE CONTRACTOR SHALL RESTORE THE GROUND SURFACES, REPLACE OR REPAIR DRIVEWAYS, BUILDINGS, FENCES, RETAINING WALLS, CULVERTS, DRAINS, PAVING, SIDEWALKS, ETC., WHICH ARE REMOVED OR DAMAGED DURING CONSTRUCTION AND WHICH ARE DESIGNATED ON THE PLANS TO REMAIN IN PLACE.

C. PAVEMENT REMOVAL

1. ALL PAVEMENT CUTTING AND REMOVAL SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY AGENCY RESPONSIBLE FOR THE MAINTENANCE OF THE ROADWAY.

D. MAINTENANCE OF ROADWAY ACCESS

1. ALL MAINTENANCE OF TRAFFIC SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE REGULATORY AGENCY OR AUTHORITY IN CHARGE OF MAINTAINING THE SUBJECT ROADWAY.

2. THE CONTRACTOR SHALL NOT CLOSE OR OBSTRUCT ANY PORTION OF A PUBLIC STREET WITHOUT FIRST NOTIFYING IN WRITING THE APPROPRIATE REGULATORY ROADWAY AUTHORITY. THE CONTRACTOR SHOULD BE AWARE THAT THERE IS SUFFICIENT TIME ALLOWED FOR THE AUTHORITY TO REVIEW AND ACT ON THE CLOSURE REQUEST.

3. UNLESS CLOSURE IS APPROVED, STREETS, ROADS, PRIVATE WAYS AND WALKS SHALL BE MAINTAINED PASSABLE BY THE DEVELOPER'S CONTRACTOR AT ALL TIMES, AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND SAFETY OF PROVISIONS MADE.

4. TO PROTECT PERSONS FROM INJURY AND TO AVOID PROPERTY DAMAGE, ADEQUATE BARRICADES, CONSTRUCTION SIGNS, WARNING LIGHTS, AND GUARDS AS REQUIRED SHALL BE PLACED AND MAINTAINED DURING THE PROGRESS OF THE CONSTRUCTION WORK AND UNTIL IT IS SAFE TO USE THE CONSTRUCTION AREA FOR ITS NORMAL PURPOSES.

E. UTILITY PROTECTION

1. PRIOR TO PROCEEDING WITH EXCAVATION, THE CONTRACTOR SHALL INITIATE THE LOCATION OF ALL UTILITIES IN THE AREA TO AID IN LOCATING THEIR UNDERGROUND SERVICES. UPON LOCATION OF UTILITIES, THE CONTRACTOR SHALL USE CARE IN EXCAVATING NEAR EXISTING UTILITIES IN ORDER TO PROTECT THEM FROM DAMAGE.

F. DEVIATIONS FROM LINE AND GRADE DUE TO UNFORESEEN UNDERGROUND ISSUES

1. WHEREVER OBSTRUCTIONS ARE ENCOUNTERED DURING THE PROGRESS OF THE WORK AND INTERFERE TO SUCH AN EXTENT THAT AN ALTERATION IN THE PLAN IS REQUIRED, THE ENGINEER MAY REVISE THE PLANS AND REQUEST A DEVIATION FROM THE LINE AND GRADE OR ARRANGE WITH THE OWNERS OF THE STRUCTURES FOR THE REMOVAL, RELOCATION OR RECONSTRUCTION OF THE OBSTRUCTIONS. WHERE SEWER, GAS, WATER, TELEPHONE, ELECTRICAL OR OTHER EXISTING UTILITIES ARE AN IMPEDIMENT TO THE VERTICAL OR HORIZONTAL ALIGNMENT OF THE PROPOSED PIPE LINE, THE CONTRACTOR MUST ARRANGE WITH THE CONFLICTING UTILITY TO RELOCATE OR HAVE THE ENGINEER REVISE THE DRAWINGS TO AVOID THE CONFLICT. ALL CHANGES IN THE LINES OR GRADES ON THE PLANS MUST BE APPROVED BY THE UTILITY PRIOR TO CONTINUING CONSTRUCTION.

G. CONSTRUCTION IN EASEMENTS

1. IN EASEMENTS ACROSS PRIVATE PROPERTY, THE CONTRACTOR SHALL CONFINE ALL OPERATIONS TO THE EASEMENT AREA. IN GENERAL, THE EASEMENT AREA IS INTENDED TO PROVIDE REASONABLE ACCESS AND WORKING AREA FOR EFFICIENT OPERATION BY THE CONTRACTOR. WHERE ADEQUATE EASEMENT SPACE FOR EFFICIENT OPERATION IS NOT PROVIDED, THE CONTRACTOR SHALL ADJUST CONSTRUCTION METHODS TO COMPLETE THE WORK WITHIN THE EASEMENT OR WORK WITH THE UTILITY TO GRANT OR ACQUIRE ADDITIONAL EASEMENT.

H. MAINTENANCE OF EXISTING DRAINAGE FLOW

1. THE CONTRACTOR SHALL MAKE PROVISIONS FOR HANDLING AND MAINTAINING ALL FLOWS IN EXISTING CREEKS, DITCHES, SEWERS AND TRENCHES BY PIPES, FLUMES OR OTHER APPROVED METHODS AT ALL TIMES WHEN HIS OPERATIONS WOULD, IN ANY WAY, INTERFERE WITH THE NATURAL FUNCTIONING OF SAID CREEKS, DITCHES, SEWERS AND DRAINS.

2. NO STORM WATER SHALL BE PERMITTED IN THE SANITARY SEWER.

I. TRENCH DIMENSIONS

1. THE WIDTH OF TRENCHES IN EARTH FOR SEWER PIPE, LATERALS, AND OTHER STRUCTURES SHALL PROVIDE A TRENCH WIDTH OF APPROXIMATELY 1.25 TIMES THE OUTSIDE DIAMETER OF THE PIPE PLUS TWELVE (12") INCHES.

2. SIDEWALLS OF PIPE TRENCHES SHALL BE VERTICAL FROM THE BOTTOM OF THE TRENCH TO A POINT NOT LESS THAN TWELVE (12") INCHES ABOVE THE TOP OF THE PIPE. ABOVE THAT POINT, SIDEWALLS MAY BE BATTERED TO SUCH SLOPES AS DIRECTED ON THE PLANS TO MAINTAIN A SAFE WORKING ENVIRONMENT.

3. TRENCH SHEETING AND BRACING OR A TRENCH SHIELD OR BOX SHALL BE USED AS REQUIRED BY THE RULES AND REGULATIONS OF OSHA. THE BOTTOM OF THE TRENCH SHALL CONFORM TO THE DETAILS SHOWN ON THE APPROVED PLANS.

J. EARTH EXCAVATION

1. EARTH MATERIALS SHALL BE EXCAVATED SO THAT THE OPEN CUTS CONFORM TO THE LINES, GRADES AND DIMENSIONS SHOWN ON THE DRAWINGS.

2. AFTER THE TRENCH IS EXCAVATED TO GRADE, THE ENGINEER SHALL EXAMINE THE BASE AND DETERMINE WHETHER OR NOT IT IS SATISFACTORY FOR PIPE LAYING. IF THE BASE IS NOT SATISFACTORY, IT SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE AS ORDERED BY THE ENGINEER. THE CRUSHED STONE SHALL BE #8 GRADATION AS SPECIFIED IN INDOT STANDARD SPECIFICATION, AND EXTEND A MINIMUM DEPTH OF SIX INCHES (6") BELOW THE BARREL OF THE PIPE. SHOULD THE BASE STILL NOT BE SUITABLE FOR ADEQUATE SUPPORT OF THE PIPE (I.E. A BOILING OR QUICKSAND CONDITION, MUCK, ETC.), THE CONTRACTOR SHALL PROPOSE ALTERNATE METHODS OF SUITABLE CONSTRUCTION PRACTICES TO THE UTILITY FOR APPROVAL. THE UTILITY SHALL APPROVE ALTERNATE BASE STABILIZATION METHODS PRIOR TO COMMENCING LAYING OF PIPE IN THE TRENCH.

3. EXCAVATED EARTH MATERIALS THAT ARE SUITABLE FOR BACKFILLING MAY BE USED FOR BACKFILL WHEN ALLOWED BY THE APPROVED PLANS AND SPECIFICATIONS. THIS EXCAVATED MATERIAL MAY ONLY BE USED AS FINAL BACKFILL IN AREAS NOT SUBJECT TO TRAFFIC LOADING OR PAVEMENT, AND AS SHOWN ON THE PROJECT DRAWINGS AND DETAILS.

4. THE TRENCH AND TRENCH BOTTOM SHOULD BE CONSTRUCTED IN ACCORDANCE WITH ASTM D 2321 - SECTION 7. EMBEDMENT MATERIALS SHOULD BE CLASS I, CLASS II OR CLASS III MATERIALS AS DEFINED IN ASTM D 2321 - SECTION 6. THE USE OF CLASS IV AND/OR CLASS V MATERIALS FOR EMBEDMENT IS NOT RECOMMENDED AND SHOULD BE ALLOWED ONLY WITH THE APPROVAL OF THE ENGINEER. BEDDING OF THE PIPE SHOULD BE PERFORMED IN ACCORDANCE WITH ASTM D 2321 - SECTION 8. COMPACTION SHOULD BE AS SPECIFIED IN ASTM D 2321. DEVIATIONS FROM THE SPECIFIED COMPACTION SHALL BE APPROVED BY THE STATE UTILITY ENGINEER.

K. BORING AND JACKING

1. IF CALLED FOR ON THE DRAWINGS, BORING AND JACKING OF PIPE MAY BE REQUIRED. THE SAME STANDARDS FOR LINE AND GRADE IN OPEN CUT INSTALLATIONS APPLY TO BORING OR JACKING OF PIPE.

L. REMOVAL OF WATER

1. THE CONTRACTOR SHALL AT ALL TIMES DURING CONSTRUCTION PROVIDE AND MAINTAIN AMPLE MEANS AND DEVICES WITH WHICH TO REMOVE AND PROPERLY DISPOSE OF ALL WATER ENTERING THE EXCAVATIONS OR OTHER PARTS OF THE WORK AND SHALL KEEP THE EXCAVATIONS DRY UNTIL THE STRUCTURES TO BE BUILT THEREIN ARE COMPLETED OR CONNECTIONS TO EXISTING STRUCTURES ARE COMPLETED.

2. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL EQUIPMENT AND LABOR TO MAINTAIN BYPASS PUMPING DURING CONNECTIONS TO EXISTING STRUCTURES. THE CONTRACTOR SHALL MAINTAIN ADEQUATE PUMPING CAPACITY AT ALL TIMES TO PREVENT ANY SPILLS, OVERFLOWS, OR DISCHARGES FROM THE EXISTING SANITARY SYSTEM.

3.3 EMBEDMENT AND BACKFILL

A. PIPE EMBEDMENT AND COMPACTION

1. FOR THE PURPOSE OF THIS SPECIFICATION, PIPE SHALL INCLUDE THOSE MADE OF PVC, HDPE, DUCTILE IRON, AND OTHER MATERIALS APPROVED BY THE UTILITY.

2. ALL NON-RIGID PIPE SHALL BE BEDDED, HAUNCHED, AND INITIALLY BACKFILLED WITH #8 CRUSHED STONE OR #8 FRACTURED FACE AGGREGATE. THE PIPE BEDDING SHALL BE PLACED ON A PREPARED FLAT TRENCH BOTTOM. THE PIPE BEDDING SHALL EXTEND A MINIMUM OF SIX (6") INCHES OR ONE HALF (1/2) THE OUTSIDE PIPE DIAMETER TO A MAXIMUM OF EIGHT (8") BELOW THE PIPE. AFTER THE PIPE HAS BEEN PLACED TO GRADE AND LINE, THERE REMAINS A 4-INCH MINIMUM DEPTH OF MATERIAL BELOW THE PIPE BARREL AND A MINIMUM OF 3-INCHES BELOW THE BELL.

3. THIS SAME GRANULAR MATERIAL SHALL BE USED TO HAUNCH (AREA FROM THE TOP OF THE BEDDING TO THE SPRINGLINE OF THE PIPE) AND FOR INITIAL BACKFILL (AREA FROM THE HAUNCH TO TWELVE (12") INCHES ABOVE THE PIPE) ON BOTH SIDES OF THE PIPE FOR THE FULL TRENCH WIDTH.

4. ALL MATERIALS SHALL BE PLACED IN THE TRENCH IN NO MORE THAN SIX (6") INCH LAYERS. EACH LAYER SHALL BE LEVELED AND EVENLY DISTRIBUTED ON BOTH SIDES OF THE PIPE SO AS NOT TO DISTURB, DISPLACE OR DAMAGE THE PIPE AND SHALL BE THOROUGHLY COMPACTED. COMPACTION OF THE CRUSHED STONE SHALL BE ACCOMPLISHED BY HAND TAMPING OR WALKING IN THE MATERIAL. MATERIAL FOR HAUNCHING CAN BE COMPACTED BY MANUAL COMPACTION METHODS OR BY SHOVEL SLICING.

5. FINAL BACKFILL IS CONSIDERED TO BE ALL MATERIAL ABOVE AN ELEVATION THAT IS TWELVE (12") INCHES ABOVE THE TOP OF THE PIPE TO THE BOTTOM OF THE SURFACE RESTORATION (TOP SOIL, PAVEMENTS, SIDEWALKS, ETC.) FOR THE FULL WIDTH OF THE TRENCH. ALL SANITARY SEWER PIPE SHALL BE BACKFILLED THE SAME DAY THAT IT IS INSTALLED. PRIOR TO USING HEAVY COMPACTION OR CONSTRUCTION EQUIPMENT DIRECTLY OVER THE PIPE, ENSURE THAT SUFFICIENT BACKFILL MATERIAL IS INSTALLED OVER THE PIPE TO PREVENT DAMAGE OR EXCESSIVE DEFLECTION. GRANULAR BACKFILL SHALL BE REQUIRED FOR ALL PIPE UNDER WALKS OR PAVEMENT.

6. COMPACTION OF FINAL BACKFILL IN AREAS SUBJECT TO TRAFFIC INFLUENCE OR PAVEMENT, WHICH ARE DEFINED AS BEING AREA SUBJECT TO ROUTINE VEHICLE USAGE SUCH AS ROADWAYS, ALLEYS, DRIVEWAYS, SIDEWALKS, ETC. SHALL BE PERFORMED ACCORDING TO THE LATEST REVISION OF THE ROADWAY REGULATORY AUTHORITY STANDARDS (STATE, COUNTY OR CITY). THE AREA OF TRAFFIC INFLUENCE IS NORMALLY CONSIDERED THE AREA WITHIN FIVE (5') FEET OF THE EDGE OF PAVEMENT, INCLUDING SHOULDERS AS MEASURED FROM THE OUTERMOST EDGE OF THE PIPE TRENCH CLOSEST TO THE EDGE OF THE TRAFFIC AREA. IT ALSO INCLUDES AREAS WITHIN A 1:1 SLOPE FROM THE EDGE OF THE TRAFFIC AREA, BASED UPON DEPTH AND DISTANCE, TAKEN FROM THE OUTER EDGE OF THE PIPE CLOSEST TO THE TRAFFIC. PLACEMENT AND COMPACTION OF THE FINAL BACKFILL SHALL BE IN ACCORDANCE WITH THE STANDARDS OF THE REGULATORY AGENCY HAVING JURISDICTION OVER THE ROADWAY.

7. PIPES INSTALLED IN AREAS NOT SUBJECT TO TRAFFIC INFLUENCE MAY BE BACKFILLED WITH SUITABLE EXCAVATED TRENCH SOIL MATERIALS. EXCAVATED TRENCH SOIL MATERIALS SHALL BE PLACED IN UNIFORM LAYERS, COMPACTED AS SPECIFIED, AND MOUNDED TO ACCOMMODATE SETTLEMENT DURING THE PROJECT DEVELOPMENT. EXCAVATED TRENCH MATERIAL FOR USAGE AS FINAL BACKFILL SHALL BE FREE FROM ROCKS (TWO INCHES IN DIAMETER OR GREATER), CONCRETE, ROOTS, STUMPS, LARGE AMOUNTS OF SOD OR ORGANIC MATTER, RUBBISH, FROZEN MATERIALS AND OTHER SIMILAR MATERIALS THAT MAY CAUSE EXCESSIVE SETTLEMENT. TO ALLOW FOR SETTLEMENT, THE SURFACE OF THE TRENCH SHALL GENERALLY BE LEFT IN A SLIGHTLY ROUNDED CONDITION.

8. HAUNCHING AND INITIAL BACKFILL SHOULD BE AS SPECIFIED IN ASTM D 2321 - SECTION 9 USING CLASS I, CLASS II OR CLASS III MATERIALS. MATERIALS USED AND COMPACTION SHALL BE AS SPECIFIED BY THE ENGINEER. IN CASES WHERE A COMPACTION OF 85 PERCENT STANDARD PROCTOR DENSITY IS NOT ATTAINABLE, THE DESIGNER MAY WISH TO INCREASE THE SDR OF THE PIPE TO PROVIDE ADEQUATE STIFFNESS. ASTM D 2321 - SECTION 11.2, MINIMUM COVER FOR LOAD APPLICATION, SECTION 11.3, USE OF COMPACTION EQUIPMENT AND SECTION 11.4, REMOVAL OF TRENCH PROTECTION, SHOULD APPLY UNLESS DIRECTED OTHERWISE BY THE STATE UTILITY ENGINEER.

B. STRUCTURES EMBEDMENT AND COMPACTION

1. FOR PURPOSES OF THIS SPECIFICATION, STRUCTURES SHALL INCLUDE BUT NOT BE LIMITED TO VAULTS AND MANHOLES, ITEMS SPECIFICALLY EXCLUDED FROM THIS DEFINITION OF "STRUCTURES" ARE PIPE, CONDUITS AND THEIR APPURTENANCES EXCEPT THOSE LISTED HEREIN.

2. STRUCTURE BACKFILLING AND COMPACTION SHALL COMPLY WITH THE REQUIREMENTS AS SPECIFIED FOR THE ADJACENT SANITARY SEWER.

3. ALL EXCAVATIONS SHALL BE BACKFILLED TO THE ORIGINAL SURFACE OF THE GROUND OR SUCH OTHER GRADE AS SHOWN ON THE PLANS. THE BACKFILLING SHALL BE PERFORMED AS SOON AS POSSIBLE AFTER CONCRETE, MORTAR AND PIPE JOINTS HAVE SUFFICIENT STRENGTH TO RESIST THE IMPOSED LOAD WITHOUT DAMAGE. ALL APPURTENANCES AND ATTACHMENTS TO STRUCTURE WALLS SHALL BE MADE AND ANY WALL COATINGS SHALL BE IN PLACE AND CURED PRIOR TO BACKFILLING AT THAT ELEVATION.

4. PRIOR TO BACKFILLING, ALL FORMWORK AND CONSTRUCTION DEBRIS WILL BE REMOVED. ANY FROZEN OR WET SUBSOIL WILL BE THAWED OR DRIED AND COMPACTED OR REMOVED PRIOR TO RECEIVING BACKFILL. DURING COLD SEASONS, GRADES RECEIVING BACKFILL WILL BE PROTECTED FROM FROST DURING THE WORK PROGRESS.

5. RAINFALL AND/OR GROUNDWATER TRAPPED IN THE EXCAVATION DURING BACKFILL OPERATIONS SHALL BE PUMPED OUT BY THE CONTRACTOR. EXCESSIVELY WET SOIL OR SOIL WHICH HAS ERODED INTO THE EXCAVATION SHALL BE REMOVED OR EXCAVATED AND RE-COMPACTED PRIOR TO PLACING ADDITIONAL BACKFILL MATERIAL.

6. OPENINGS IN STRUCTURES TO RECEIVE PIPE SHALL BE TEMPORARILY PLUGGED OR BULKHEADED DURING BACKFILL OPERATIONS. BACKFILL SHALL PROCEED TO AN ELEVATION LEVEL WITH THE INVERT OF THE PIPE. THE PIPE SHALL THEN BE BEDDED AND BACKFILLED IN ACCORDANCE WITH THE APPLICABLE DRAWING DETAILS AND SPECIFICATIONS.

C. TEMPORARY SURFACES SUBJECT TO TRAFFIC

1. THE CONTRACTOR SHALL OPEN STREETS TO TRAFFIC IMMEDIATELY AFTER COMPLETING THE BACKFILL OPERATION. THE CONTRACTOR SHALL ACCOMPLISH THIS BY INSTALLING THE COMPACTED AGGREGATE BASE IMMEDIATELY AFTER GRANULAR BACKFILL. WHEN TEMPORARY ASPHALT PAVEMENT IS REQUIRED THIS SHALL ALSO BE INSTALLED IMMEDIATELY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF THE TEMPORARY SURFACE TO PROMOTE SAFETY OF THE TRAVELLING PUBLIC.

D. MAINTAINING TRENCH SURFACES

1. ALL SURFACE SETTLEMENT OF THE BACKFILL ALONG TRENCHES LOCATED BENEATH STREETS, ROADS, ALLEYS, DRIVEWAYS AND PARKING LOTS WHICH ARE SUBJECT TO TRAFFIC SHALL BE KEPT FILLED LEVEL WITH OR SLIGHTLY ABOVE THE ORIGINAL PAVED SURFACE AT ALL TIMES WITH COMPACTED AGGREGATE BASE MATERIAL UNTIL THE PERMANENT PAVEMENT IS SATISFACTORILY RESTORED. WHEN TEMPORARY ASPHALT PAVEMENT IS USED, DEPRESSIONS AND "POT HOLES" SHALL BE PROMPTLY FILLED WITH THE TEMPORARY ASPHALT MATERIAL. ATTENTION SHALL BE GIVEN BY THE CONTRACTOR TO THE TIMELY AND PROPER MAINTENANCE, LEVELING AND GRADING OF THE SURFACE OF ALL BACKFILLED TRENCHES, ESPECIALLY THOSE SUBJECT TO TRAFFIC AND ESPECIALLY FOLLOWING RAINS. THE SURFACE OF STREETS, ROADS AND ALLEYS SHALL BE MAINTAINED SMOOTH AND FREE OF RUTS AND WATER TRAPPING DEPRESSIONS BY PERIODIC BLADING, SCARIFYING; AND/OR FILLING SETTLED AREAS, RUTS, POCKETS, OR HOLES WITH COMPACTED AGGREGATE BASE MATERIAL OR TEMPORARY ASPHALT WHERE USED.

2. IN EXISTING RESIDENTIAL AREAS WHERE STONE AGGREGATE HAS BEEN TEMPORARILY USED TO RESTORE THE ROADWAY SURFACE, DUST PREVENTION MAY BE REQUIRED TO REDUCE THE EFFECT OF DUST UPON LOCAL RESIDENTS.

3. IN AREAS OUTSIDE OF THE INFLUENCE OF TRAFFIC, UNLESS OTHERWISE SPECIFIED, THE BACKFILL SHALL BE NEATLY ROUNDED OVER THE TRENCH TO A SUFFICIENT HEIGHT TO ALLOW FOR SETTLEMENT TO GRADE AFTER CONSOLIDATION. PRIOR TO THE ACCEPTANCE OF THE WORK, ANY SURFACE SETTLEMENT BELOW ORIGINAL GROUND SURFACE SHALL BE REFILLED AND RESTORED.

3.4 GRAVITY SANITARY SEWER PIPE INSTALLATION

A. DESCRIPTION

1. THIS SECTION ON THE LAYING OF SEWERS ADDRESSES NON-RIGID PIPE. POLYVINYL CHLORIDE (PVC), HDPE, EITHER AWWA C900/C905 OR SDR 35, 26 OR 21, PIPE SHALL BE CONSIDERED NON-RIGID OR FLEXIBLE CONDUITS.

2. ALL PIPES SHALL BE HANDLED, STORED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

3. THE MINIMUM COVER FOR SANITARY SEWER SHALL BE FIVE (5) FEET. THE MAXIMUM ALLOWABLE DEPTH SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND SHALL BE BASED UPON THE BEDDING AND BACKFILL USED FOR THE INSTALLATION.

4. THE LEAST AMOUNT OF LATERAL COVER IS GENERALLY WHERE THE LATERAL CROSSES BELOW THE GUTTER OF THE STREET ON THE FAR SIDE OF THE ROAD. THE STATE UTILITY ENGINEER CALCULATES LATERAL COVER BY ASSUMING:

   a. THE LATERAL INVERT ELEVATION IS THE TOP OF PIPE ELEVATION OF THE MAIN LINE TO WHICH THE LATERAL CONNECTS.

   b. THE LATERAL IS INSTALLED AT 1.00%.

5. SANITARY SEWERS SHALL BE CONSTRUCTED WITH A TEN (10) FOOT MINIMUM SEPARATION FROM AN EXISTING OR PROPOSED WATER MAIN AND/OR STORM SEWER, MEASURED HORIZONTALLY FROM THE

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AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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SANITARY SEWER SPECIFICATIONS

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OUTSIDE EDGE OF THE SANITARY SEWER TO THE OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER. A VERTICAL SEPARATION OF A MINIMUM OF EIGHTEEN (18") INCHES, MEASURED VERTICALLY FROM THE OUTSIDE EDGE OF THE SANITARY SEWER TO THE OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER, MUST ALSO BE MAINTAINED. WHEN A SANITARY SEWER MAIN CROSSES A WATER MAIN OR STORM SEWER, IT SHALL CROSS AT AS NEARLY TO NINETY (90) DEGREES AS POSSIBLE BUT NOT LESS THAN FORTY-FIVE (45) DEGREES, MEASURED FROM THE CENTERLINES OF THE SANITARY SEWER AND WATER MAIN OR STORM SEWER. NO SANITARY MANHOLE SHALL BE LOCATED WITHIN EIGHT (8') FEET OF A WATER MAIN OR STORM SEWER, MEASURED FROM THE OUTSIDE EDGE OF THE SANITARY SEWER MANHOLE TO THE CLOSEST OUTSIDE EDGE OF THE WATER MAIN OR STORM SEWER.

6. WHERE REQUIRED HORIZONTAL AND/OR VERTICAL SEPARATION FROM WATER OR STORM SEWER LINES CANNOT BE MET, THE SEWER MATERIAL SHALL BE CONSTRUCTED OF PVC SDR 21 OR PVC AWWA C900/C905 PIPE FOR A DISTANCE OF TEN (10') FEET ON EITHER SIDE OF THE CROSSING POINT AND SHALL MEET THE REQUIREMENTS OF 327 IAC.

B. ALIGNMENT AND GRADE

1. ALL PIPE SHALL BE CONSTRUCTED BEGINNING FROM THE LOWEST POINT AND SHALL BEGIN AT EITHER A NEW STRUCTURE OR CONNECTION TO AN EXISTING STRUCTURE. CONSTRUCTION SHALL PROCEED TO THE LINES AND GRADES SHOWN ON THE APPROVED DRAWINGS. LINE AND GRADE BETWEEN MANHOLES SHALL BE MAINTAINED BY USE OF LASER.
2. THE UTILITY WILL NOT ACCEPT GRAVITY SEWER DESIGNED OR INSTALLED BELOW MINIMUM SLOPE AS SPECIFIED IN 327 IAC ARTICLE 3.
3. THE MINIMUM SLOPE OF END RUN GRAVITY SEWERS SHALL BE 1.00%. END RUN LENGTH SHALL BE MAXIMIZED TO REDUCE THE NUMBER OF MANHOLES. AN END RUN SEWER IS DEFINED AS FOLLOWS:
   a. THE UPSTREAM MANHOLE HAS NO INFLUENT FLOWS FROM SEWERS, AND
   b. A SEWER IS NOT PLANNED TO BE EXTENDED FROM THE UPSTREAM MANHOLE IN THE FUTURE.
4. THE CONTRACTOR SHALL VERIFY THE INITIAL STARTING ELEVATION FROM AT LEAST TWO (2) ESTABLISHED BENCHMARKS.

C. TRENCHING

1. GENERAL
   a. EXCAVATION AND BACKFILLING SHALL BE PERFORMED ACCORDING TO THE EMBEDMENT AND BACKFILLING SECTION, SECTION 3.3 OF THESE SPECIFICATIONS.

D. PIPE LAYING

1. ALL PIPE, FITTINGS AND VALVES SHALL BE LOWERED CAREFULLY INTO THE TRENCH IN SUCH A MANNER AS TO PREVENT DAMAGE TO MATERIALS AND PROTECTIVE COATINGS AND LININGS. UNDER NO CIRCUMSTANCES SHALL GRAVITY SEWER MAIN MATERIALS BE DROPPED OR DUMPED INTO THE TRENCH. THE TRENCH SHALL BE DEWATERED PRIOR TO INSTALLATION OF THE PIPE.
2. EXAMINATION OF MATERIAL
   a. ALL PIPE, FITTINGS AND VALVES AND OTHER APPURTENANCES SHALL BE EXAMINED CAREFULLY FOR DAMAGE AND OTHER DEFECTS IMMEDIATELY BEFORE INSTALLATION.
3. PIPE ENDS
   a. ALL LUMPS, BLISTERS, AND EXCESS COATING SHALL BE REMOVED FROM THE SOCKET AND PLAIN ENDS OF EACH PIPE, AND THE OUTSIDE OF THE PLAIN END AND THE INSIDE OF THE BELL SHALL BE WIPED CLEAN AND DRY AND BE FREE FROM DIRT, SAND, GRIT OR ANY FOREIGN MATERIALS BEFORE THE PIPE IS LAID.
4. PIPE CLEANLINESS
   a. FOREIGN MATERIAL SHALL BE PREVENTED FROM ENTERING THE PIPE WHILE IT IS BEING PLACED IN THE TRENCH.
5. PIPE PLACEMENT
   a. AS EACH LENGTH OF PIPE IS PLACED IN THE TRENCH, THE JOINT SHALL BE ASSEMBLED AND THE PIPE BROUGHT TO CORRECT LINE AND GRADE. THE PIPE SHALL BE SECURED IN PLACE WITH SPECIFIED BACKFILL MATERIAL.
6. PIPE PLUGS
   a. AT TIMES WHEN PIPE-LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY A WATERTIGHT PLUG. THE PLUG SHALL BE FITTED WITH A MEANS FOR VENTING. WHEN PRACTICAL, THE PLUG SHALL REMAIN IN PLACE UNTIL THE TRENCH IS PUMPED COMPLETELY DRY. CARE MUST BE TAKEN TO PREVENT PIPE FLOTATION, SHOULD THE TRENCH FILL WITH WATER.
   b. PRIOR TO REMOVAL OF THE PLUG FOR EXTENDING THE LINE OR FOR ANY OTHER REASON, AIR AND/OR WATER PRESSURE IN THE LINE SHALL BE RELEASED.

E. JOINT ASSEMBLY

1. JOINTS SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. ASSEMBLY
   a. AFTER PLACING A LENGTH OF PIPE IN THE TRENCH, THE MANUFACTURER'S LUBRICANT SHALL BE PROPERLY APPLIED. SPIGOT END SHALL THEN BE CENTERED IN THE BELL AND THE PIPE PUSHED HOME AND BROUGHT TO CORRECT LINE AND GRADE. PIPE AND FITTINGS WHICH DO NOT ALLOW A SUFFICIENT AND UNIFORM SPACE FOR JOINTS SHALL BE REMOVED AND REPLACED WITH PIPE OF PROPER DIMENSIONS TO INSURE SUCH UNIFORM SPACE. PRECAUTIONS SHALL BE TAKEN TO PREVENT DIRT FROM ENTERING THE JOINT SPACE.
3. PIPE CUTTING
   a. CUTTING PIPE FOR INSERTION OF VALVES, FITTINGS, OR CLOSURE PIECES SHALL BE DONE IN CONFORMANCE RECOMMENDATIONS OF THE MANUFACTURER OF THE CUTTING EQUIPMENT. CUTTING SHALL BE DONE IN A SAFE, WORKMANLIKE MANNER WITHOUT CREATING DAMAGE TO THE PIPE LINING. AN OXYACETYLENE TORCH SHALL NOT BE USED.
   b. CUT ENDS AND ROUGH EDGES SHALL BE GROUND SMOOTH, AND FOR PUSH-ON JOINT CONNECTIONS THE CUT END SHALL BE BEVELED BY METHODS RECOMMENDED BY THE MANUFACTURER.

3.5 PRESSURE PIPE INSTALLATION

A. DESCRIPTION

1. PRESSURE SEWER MAINS SHALL BE INSTALLED IN ACCORDANCE WITH AWWA/ASTM D-2774 STANDARDS AND MANUFACTURER'S RECOMMENDATIONS. IF ANY CONFLICT BETWEEN THESE STANDARDS AND MANUFACTURER'S RECOMMENDATIONS, THE MANUFACTURER'S RECOMMENDATIONS SHALL TAKE PRECEDENCE.

B. ALIGNMENT AND GRADE

1. THE PRESSURE SEWER MAINS SHALL BE LAID AND MAINTAINED TO LINES AND GRADES ESTABLISHED BY THE DRAWINGS, WITH FITTINGS AND VALVES AT THE REQUIRED LOCATIONS. VALVE OPERATING STEMS SHALL BE ORIENTED IN A MANNER TO ALLOW PROPER OPERATION.
2. CLEARANCE
   a. WHEN CROSSING EXISTING PIPELINES OR OTHER STRUCTURES, ALIGNMENT AND GRADE MAY BE ADJUSTED AS NECESSARY, TO PROVIDE CLEARANCE AS REQUIRED BY FEDERAL, STATE, AND LOCAL REGULATIONS AND TO PREVENT FUTURE DAMAGE OR CONTAMINATION OF EITHER THE PIPELINES OR STRUCTURES.
3. DEPTH
   a. THE MINIMUM VERTICAL COVER FOR SANITARY FORCE MAINS SHALL BE FOUR AND A HALF (4.5) FEET FROM GRADE TO THE CROWN OF THE PIPE. THE MAXIMUM ALLOWABLE DEPTH SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND SHALL BE BASED UPON THE BEDDING AND BACKFILL USED FOR THE INSTALLATION.
4. SLOPE
   a. FORCE MAINS MUST BE DESIGNED AT A CONSTANT POSITIVE SLOPE FROM LOW POINTS AND CLEAN-OUTS TO AIR/VACUUM RELIEF VALVES.

C. TRENCHING

1. GENERAL
   a. EXCAVATION AND BACKFILLING SHALL BE PERFORMED ACCORDING TO THE EMBEDMENT AND BACKFILLING SECTION, SECTION 3.3 OF THESE SPECIFICATIONS.

D. PIPE LAYING

1. ALL PIPE, FITTINGS AND VALVES SHALL BE LOWERED CAREFULLY INTO THE TRENCH IN SUCH A MANNER AS TO PREVENT DAMAGE TO MATERIALS AND PROTECTIVE COATINGS AND LININGS. UNDER NO CIRCUMSTANCES SHALL PRESSURE SEWER MAIN MATERIALS BE DROPPED OR DUMPED INTO THE TRENCH. THE TRENCH SHALL BE DEWATERED PRIOR TO INSTALLATION OF THE PIPE.
2. EXAMINATION OF MATERIAL
   a. ALL PIPE, FITTINGS AND VALVES AND OTHER APPURTENANCES SHALL BE EXAMINED CAREFULLY FOR DAMAGE AND OTHER DEFECTS IMMEDIATELY BEFORE INSTALLATION.
3. PIPE ENDS
   a. ALL LUMPS, BLISTERS, AND EXCESS COATING SHALL BE REMOVED FROM THE SOCKET AND PLAIN ENDS OF EACH PIPE, AND THE OUTSIDE OF THE PLAIN END AND THE INSIDE OF THE BELL SHALL BE WIPED CLEAN AND DRY AND BE FREE FROM DIRT, SAND, GRIT OR ANY FOREIGN MATERIALS BEFORE THE PIPE IS LAID.
4. PIPE CLEANLINESS
   a. FOREIGN MATERIAL SHALL BE PREVENTED FROM ENTERING THE PIPE WHILE IT IS BEING PLACED IN THE TRENCH.
5. PIPE PLACEMENT
   a. AS EACH LENGTH OF PIPE IS PLACED IN THE TRENCH, THE JOINT SHALL BE ASSEMBLED AND THE PIPE BROUGHT TO CORRECT LINE AND GRADE. THE PIPE SHALL BE SECURED IN PLACE WITH SPECIFIED BACKFILL MATERIAL.
6. PIPE PLUGS
   a. AT TIMES WHEN PIPE-LAYING IS NOT IN PROGRESS, THE OPEN ENDS OF PIPE SHALL BE CLOSED BY A WATERTIGHT PLUG. THE PLUG SHALL BE FITTED WITH A MEANS FOR VENTING. WHEN PRACTICAL, THE PLUG SHALL REMAIN IN PLACE UNTIL THE TRENCH IS PUMPED COMPLETELY DRY. CARE MUST BE TAKEN TO PREVENT PIPE FLOTATION, SHOULD THE TRENCH FILL WITH WATER.
   b. PRIOR TO REMOVAL OF THE PLUG FOR EXTENDING THE LINE OR FOR ANY OTHER REASON, AIR AND/OR WATER PRESSURE IN THE LINE SHALL BE RELEASED.

E. JOINT ASSEMBLY

1. JOINTS SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
2. ASSEMBLY
   a. AFTER PLACING A LENGTH OF PIPE IN THE TRENCH, THE MANUFACTURER'S LUBRICANT SHALL BE PROPERLY APPLIED. SPIGOT END SHALL THEN BE CENTERED IN THE BELL AND THE PIPE PUSHED HOME AND BROUGHT TO CORRECT LINE AND GRADE. PIPE AND FITTINGS WHICH DO NOT ALLOW A SUFFICIENT AND UNIFORM SPACE FOR JOINTS SHALL BE REMOVED AND REPLACED WITH PIPE OF PROPER DIMENSIONS TO INSURE SUCH UNIFORM SPACE. PRECAUTIONS SHALL BE TAKEN TO PREVENT DIRT FROM ENTERING THE JOINT SPACE.
3. PIPE CUTTING
   a. CUTTING PIPE FOR INSERTION OF VALVES, FITTINGS, OR CLOSURE PIECES SHALL BE DONE IN CONFORMANCE RECOMMENDATIONS OF THE MANUFACTURER OF THE CUTTING EQUIPMENT. CUTTING SHALL BE DONE IN A SAFE, WORKMANLIKE MANNER WITHOUT CREATING DAMAGE TO THE PIPE LINING. AN OXYACETYLENE TORCH SHALL NOT BE USED.
   b. CUT ENDS AND ROUGH EDGES SHALL BE GROUND SMOOTH, AND FOR PUSH-ON JOINT CONNECTIONS THE CUT END SHALL BE BEVELED BY METHODS RECOMMENDED BY THE MANUFACTURER.

F. INSTALLATION BY HORIZONTAL DIRECTIONAL DRILLING (HDD)

1. EQUIPMENT
   a. THE DIRECTIONAL DRILLING SYSTEM SHALL BE REMOTELY STEERABLE AND PERMIT ELECTRONIC MONITORING OF TUNNEL DEPTH AND LOCATION. THE SYSTEM SHALL BE ABLE TO CONTROL THE DEPTH AND DIRECTION OF THE PIPE AND MUST BE ACCURATE TO +/- 2 INCHES.
   b. THE SYSTEM SHALL UTILIZE A FLUID-CUTTING PROCESS, USING A LIQUID CLAY SUCH AS BENTONITE. THIS CLAY SHALL BE TOTALLY INERT AND CONTAIN NO RISK TO THE ENVIRONMENT.
   c. THE LIQUID CLAY SHALL REMAIN IN THE BORE HOLE TO INCREASE THE STABILITY OF THE BORE HOLE AND TO PROVIDE A LUBRICANT TO REDUCE FRICTIONAL DRAG WHEN THE PIPE IS INSTALLED.
   d. THE SPOILS SHALL BE RECOVERED BY USE OF A VACUUM SYSTEM MOUNTED ON A VEHICLE FOR REMOVAL OF THE SPOILS. SPOILS SHALL NOT BE DISCHARGED INTO SEWERS OR STORM DRAINS. THE CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF ALL SPOIL MATERIAL.
2. DRILLING PROCEDURE
   a. CONTRACTOR SHALL CALIBRATE THE DIRECTIONAL DRILLING HEAD LOCATOR AT THE START OF THE DAY AND AT EACH NEW DIRECTIONAL DRILLING OPERATION.
   b. THE MAXIMUM DRILL ANGLE SHALL BE FIFTEEN DEGREES MEASURE PERPENDICULAR TO GRADE TO THE DESIGN DEPTH ELEVATION.
   c. A PILOT HOLE SHALL BE DRILLED ON THE DRILL PATH WITH NO DEVIATIONS GREATER THAN 5% OF DEPTH OVER A LENGTH OF 100 FEET.
   d. UPON SUCCESSFUL COMPLETION OF THE PILOT HOLE, CONTRACTOR WILL REAM THE DRILL HOLE TO A MINIMUM OF 25% GREATER THAN THE OUTSIDE DIAMETER OF THE INSTALLED PIPE USING THE APPROPRIATE TOOLS.
   e. THREE STRANDS OF TRACER WIRE SHALL BE PULLED BACK WITH THE PIPE. THE WIRES SHALL BE INSTALLED ALONG THE PIPE, FASTENED SECURELY TO THE PIPE AT FIVE (5) FOOT INTERVALS, AND TERMINATING ABOVE GROUND WITH THE LEAD TAPED AROUND EACH STRUCTURE.
   f. TEST/PRESSURE RELIEF HOLES (POTHOLES) DUG EVERY 25 FEET SHALL BE REQUIRED ALONG THE BORE ROUTE TO CONFIRM ALIGNMENT AND GRADE, AND TO RELIEVE SUBSURFACE PRESSURE.
   g. AFTER THE PIPE HAS BEEN INSTALLED, ALLOW PIPE MANUFACTURER'S RECOMMENDED AMOUNT OF TIME, BUT NOT LESS THAN FOUR (4) HOURS, FOR COOLING AND RELAXATION DUE TO TENSILE STRESSING PRIOR TO HYDROSTATIC TESTING.

G. THRUST RESTRAINT

1. FITTINGS
   a. ALL PLUGS, CAPS, TEES, REDUCERS AND BENDS, UNLESS OTHERWISE SPECIFIED, SHALL BE PROVIDED WITH SUITABLY RESTRAINED JOINTS. VALVES ARE CONSIDERED DEAD ENDS AND SHALL BE RESTRAINED AS SUCH. SEE THRUST BLOCKING DETAIL ON AQUA INDIANA'S LIFT STATION DETAIL SHEET.
   b. NO FITTINGS OF GREATER THAN FORTY-FIVE (45) DEGREES (1/8 BEND) CAN BE USED, EXCEPT WITHIN THE VALVE VAULT.
2. DESIGN
   a. THE DESIGN PRESSURE IS THE MAXIMUM PRESSURE TO WHICH THE PIPELINE WILL BE SUBJECTED, WITH CONSIDERATION GIVEN TO THE VULNERABILITY OF THE PIPE SOIL SYSTEM WHEN THE PRESSURE IS EXPECTED TO BE APPLIED. IN MOST CASES, THIS WILL BE THE TEST PRESSURE OF THE PIPE, APPLIED SHORTLY AFTER INSTALLATION, WHEN THE PIPE-SOIL SYSTEM IS NORMALLY MOST VULNERABLE.
   b. FOR BURIED PIPELINES, THRUST RESTRAINT IS ACHIEVED BY TRANSFERRING THE THRUST FORCE TO THE SOIL STRUCTURE OUTSIDE THE PIPE. THE OBJECTIVE OF THE DESIGN IS TO DISTRIBUTE THE THRUST FORCES TO THE SOIL STRUCTURE IN SUCH A MANNER THAT JOINT SEPARATION WILL NOT OCCUR IN UNRESTRAINED JOINTS.
3. RESTRAINING MECHANISMS FOR PUSH-ON OR MECHANICAL JOINTS: TIE RODS, CLAMPS, OR OTHER COMPONENTS OF DISSIMILAR METAL SHALL BE PROTECTED AGAINST CORROSION BY HAND APPLICATION OF A SUITABLE COATING OR BY ENCASEMENT OF THE ENTIRE ASSEMBLY WITH 8-MIL LOOSE POLYETHYLENE FILM IN ACCORDANCE WITH ANSI/AWWA C105/A21.5.
   a. GLANDS SHALL BE MANUFACTURED OF DUCTILE IRON CONFORMING TO ASTM A536- 80, GRADE 60-42-10. SET SCREWS SHALL BE HARDENED DUCTILE IRON. THESE DEVICES SHALL HAVE PRESSURE RATING WITH A SAFETY FACTOR OF 281. GLANDS SHALL BE LISTED WITH UL AND FACTORY MANUAL.

H. AIR RELIEF

1. AIR RELIEF VALVES SHALL BE INSTALLED AT EVERY INTERMEDIATE APEX POINT WHERE AIR MAY ACCUMULATE IN THE FORCE MAIN.
2. EACH AIR RELIEF VALVE THAT EXHAUSTS ABOVE GROUND MUST BE EQUIPPED WITH AN EXHAUST PIPE EXTENDING TO A DOWNWARD FACING ELBOW COVERED WITH A CORROSION-RESISTANT, TWENTY-FOUR (24) MESH SCREENED OPENING AT AN ELEVATION OF EIGHTEEN (18") INCHES ABOVE GROUND.
3. AUTOMATIC AIR RELIEF VALVES SHALL NOT BE USED IN AREAS WITHIN THE ONE HUNDRED (100) YEAR FLOOD ELEVATION OR IN AREAS WHERE FLOODING MAY OCCUR UNLESS THEY ARE EQUIPPED WITH A DOWNWARD FACING EXHAUST PIPE COVERED WITH A CORROSION-RESISTANT, TWENTY-FOUR (24) MESH SCREENED OPENING AT AN ELEVATION OF EIGHTEEN (18) INCHES ABOVE THE GROUND SURFACE AND ABOVE THE ONE HUNDRED (100) YEAR FLOOD ELEVATION.
4. MANUALLY OPERATED AIR RELIEF VALVES SHALL BE USED IN AREAS WITHIN THE ONE HUNDRED (100) YEAR FLOOD PLAIN AND WHERE FLOODING MAY OCCUR.

I. FORCE MAIN DISCHARGE TO MANHOLES

1. IT IS RECOMMENDED THAT THE DISCHARGE BE ONE HUNDRED EIGHTY (180) DEGREES FROM THE EFFLUENT SEWER. IF THE DISCHARGE CANNOT BE ONE HUNDRED EIGHTY (180) DEGREES FROM THE EFFLUENT SEWER, THEN IT MUST BE CONSTRUCTED TWO (2) INCHES ABOVE THE TOP OF THE EFFLUENT PIPE, BUT NOT GREATER THAN TWO (2) FEET ABOVE THE INVERT OF THE EFFLUENT PIPE.
2. CHANNELS MUST BE PROVIDED IN THE MANHOLE FOR ALL FORCE MAIN DISCHARGES.
3. CHANNELS MUST BE THE SIZE OF THE EFFLUENT SEWER.
4. CHANNELS MUST BE STRAIGHT (NOT WITH A RADIUS) TO THE GREATEST EXTENT POSSIBLE.

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AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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5. CHANNELS MUST BE DESIGNED WITH THE SAME ELEVATION DIFFERENCE AS SPECIFIED FOR SANITARY SEWER MANHOLES IN THIS SECTION OF THESE DESIGN SPECIFICATIONS.

3.6 HORIZONTAL BORING INSTALLATION

A. PITS OR APPROACH TRENCHES

1. EXCAVATE APPROACH TRENCHES OR PITS AS SITE CONDITIONS REQUIRE.
2. ENSURE CASING ENTRANCE FACES AS NEAR PERPENDICULAR TO ALIGNMENT AS CONDITIONS PERMIT.
3. ESTABLISH VERTICAL ENTRANCE FACE AT LEAST 1 FOOT ABOVE TOP OF CASING.
4. INSTALL DEWATERING MEASURES AND EXCAVATION SUPPORTS.

B. CASING PIPE

1. BORING:
   a. PUSH PIPE INTO GROUND WITH BORING AUGER, ROTATING WITHIN PIPE TO REMOVE SOIL.
   b. DO NOT ADVANCE CUTTING HEAD AHEAD OF CASING PIPE, EXCEPT FOR DISTANCE NECESSARY TO PERMIT CUTTING TEETH TO CUT CLEARANCE FOR PIPE.
   c. ARRANGE MACHINE BORE AND CUTTING HEAD TO BE REMOVABLE FROM WITHIN PIPE.
   d. ARRANGE FACE OF CUTTING HEAD TO PROVIDE BARRIER TO FREE FLOW OF SOFT MATERIAL.
   e. IF UNSTABLE SOIL IS ENCOUNTERED DURING BORING, RETRACT CUTTING HEAD INTO CASING TO PERMIT BALANCE BETWEEN PUSHING PRESSURE AND RATIO OF PIPE ADVANCEMENT TO QUANTITY OF SOIL.
   f. GROUT TO FILL VOIDS IF VOIDS DEVELOP GREATER THAN OUTSIDE DIAMETER OF PIPE BY APPROXIMATELY 1 INCH.
   g. IF BORING IS OBSTRUCTED, RELOCATE, JACK, OR TUNNEL AS DIRECTED BY THE UTILITY REPRESENTATIVE.
2. JACKING:
   a. CONSTRUCT ADEQUATE THRUST WALL NORMAL TO PROPOSED LINE OF THRUST.
   b. IMPART THRUST LOAD TO PIPE THROUGH SUITABLE THRUST RING SUFFICIENTLY RIGID TO ENSURE UNIFORM DISTRIBUTION OF THRUST LOAD ON FULL PIPE CIRCUMFERENCE.
3. CARRIER PIPE:
   a. CLEAN AND INSPECT PIPE.
   b. PLACE CARRIER PIPE PER DETAIL. EXERCISE CARE TO PREVENT DAMAGE TO PIPE JOINTS WHEN CARRIER PIPE IS PLACED IN CASING.
   c. SUPPORT PIPELINE WITHIN CASING SO NO EXTERNAL LOADS ARE TRANSMITTED TO CARRIER PIPE.
   d. ATTACH SUPPORTS TO BARREL OF CARRIER PIPE; DO NOT REST CARRIER PIPE ON BELLS.
   e. THE ANNULAR SPACE BETWEEN THE CASING PIPE AND THE CARRIER PIPE SHALL BE GROUT FILLED.

3.7 MANHOLES

A. INSTALLATION

1. ALL MANHOLES SHALL BE INSTALLED SO THAT THE TOP OF THE MANHOLE CASTING AND FRAME:
   a. IN AREAS NOT SUBJECT TO TRAFFIC, THE LID SHALL BE SET AT THREE (3") INCHES ABOVE THE SURROUNDING SURFACE AFTER EARTH SETTLEMENT.
   b. IN AREAS SUBJECT TO TRAFFIC, THE LID SHALL BE FLUSH WITH THE FINAL GROUND ELEVATION.
2. ALL STRUCTURES SHALL BE BEDDED ON A MINIMUM OF TWELVE (12") INCHES OF COMPACTED AGGREGATE MEETING THE GRADATION OF #8 CRUSHED STONE PER INDOT STANDARD SPECIFICATIONS. NO STRUCTURE SHALL BE SET ON SOFT OR YIELDING SOILS. IF YIELDING SOILS ARE ENCOUNTERED, THE AREA SHALL BE EXCAVATED AND FILLED WITH COMPACTED CRUSHED STONE.
3. ALL LIFT HOLES IN PRECAST SECTIONS SHALL BE WETTED AND COMPLETELY FILLED WITH NON-SHRINK GROUT, SMOOTHED AND COATED WITH BITUMINOUS WATERPROOFING MATERIAL TO ENSURE WATER TIGHTNESS.
4. INSTALL EXTERIOR CHIMNEY AND JOINT WRAPS PER MANUFACTURER'S INSTRUCTIONS.

B. REGRADING

1. RAISE OR LOWER EXISTING MANHOLES AND STRUCTURES FRAMES AND COVERS, CLEANOUT FRAMES AND COVERS AND VALVE BOXES IN REGRADED AREAS TO FINISH GRADE. CAREFULLY REMOVE, CLEAN AND SALVAGE CAST IRON FRAMES AND COVERS. ADJUST THE ELEVATION OF THE TOP OF THE MANHOLE OR STRUCTURE AS DETAILED ON THE DRAWINGS. ADJUST THE ELEVATION OF THE CLEANOUT PIPE RISER, AND REINSTALL THE CAP OR PLUG. RESET CAST IRON FRAME AND COVER, GROUTING BELOW AND AROUND THE FRAME. INSTALL CHIMNEY SEAL AROUND RESET FRAME AND COVER AS SPECIFIED FOR NEW CONSTRUCTION.
2. DURING PERIODS WHEN WORK IS PROGRESSING ON ADJUSTING MANHOLES OR STRUCTURES COVER ELEVATIONS, THE CONTRACTOR SHALL INSTALL A TEMPORARY COVER ABOVE THE BENCH OF THE STRUCTURE OR MANHOLE. THE TEMPORARY COVER SHALL BE INSTALLED ABOVE THE HIGH FLOW ELEVATION WITHIN THE STRUCTURE, AND SHALL PREVENT DEBRIS FROM ENTERING THE WASTEWATER STREAM.

3.8 APPURTENANCES

A. OIL AND GREASE INTERCEPTOR AND GREASE REMOVAL PIT INSTALLATION

1. PIPE AND FITTINGS SHALL BE PVC, PIPING SHALL BE USED INSIDE OF TRAP, BETWEEN TRAP AND BUILDINGS, AND BETWEEN TRAP AND MANHOLE.
2. MANWAYS AND ACCESS MANHOLES SHALL BE SET TO FINISH GRADE PROVIDING ADEQUATE ACCESS TO THE UNIT. SLOPE PAVEMENT AROUND THE ACCESS-WAY TO PREVENT STORMWATER FROM ENTERING THE UNIT.

B. CLEANOUT INSTALLATION

1. INSTALL CLEANOUTS AND RISER EXTENSIONS FROM SEWER PIPES TO CLEANOUTS AT GRADE. INSTALL CLEANOUT SHUT-OFF VALVE (SEWUR VALVE BY KODIAK CONTROLS, INC. OR APPROVED EQUAL). CLEANOUTS SHALL MATCH DETAIL. INSTALL PIPING SO CLEANOUTS OPEN IN DIRECTION OF FLOW IN SEWER PIPE.
2. SET CLEANOUT FRAMES AND COVERS IN EARTH IN CAST-IN-PLACE-CONCRETE, 18 BY 12 INCHES 1 INCH ABOVE SURROUNDING GRADE.
3. SET CLEANOUT FRAMES AND COVERS IN CONCRETE PAVEMENT AND ROADS WITH TOPS FLUSH WITH PAVEMENT SURFACE.
4. THE TOP OF THE CLEANOUT ASSEMBLY SHALL BE 2 INCHES BELOW THE BOTTOM OF THE COVER TO PREVENT LOADS BEING TRANSFERRED FROM THE FRAME AND COVER TO THE PIPING.

C. BUILDING SERVICE LINES

1. INSTALL SANITARY SEWER SERVICE LINES TO POINT OF CONNECTION WITHIN 3 FEET OUTSIDE OF BUILDING(S) WHERE SERVICE IS REQUIRED AND MAKE CONNECTIONS.

D. SAMPLING MANHOLE

1. INSTALL SAMPLING MANHOLE PRIOR TO CONNECTION TO THE UTILITY SEWER IN A LOCATION ACCESSIBLE TO THE UTILITY AND AQUA INDIANA PERSONNEL.
2. THE SAMPLING MANHOLE SHALL HAVE A THREE (3) FOOT STRAIGHT LATERAL RUN ON BOTH SIDES OF THE MANHOLE.

PART 4 - TESTING

A. FIELD QUALITY CONTROL

B. ALL SYSTEMS SHALL BE INSPECTED AND TESTED. A UTILITY REPRESENTATIVE MUST BE PRESENT FOR ALL TESTING. AQUA INDIANA SHALL BE CONTACTED 48 HOURS PRIOR TO ANY TESTING. PRIOR TO FINAL ACCEPTANCE, PROVIDE A VIDEO RECORD OF ALL PIPING FOR SANITARY SEWER MAIN EXTENSIONS TO SHOW THE LINES ARE FREE FROM OBSTRUCTIONS, PROPERLY SLOPED AND JOINED.

C. GRAVITY SANITARY SEWERS

1. ONCE CONSTRUCTED, ALL SANITARY SEWERS AND MANHOLES SHALL BE WATERTIGHT AND FREE FROM LEAKAGE. THE CONTRACTOR SHALL BE REQUIRED TO REPAIR ALL VISIBLE LEAKS. THE RATE OF INFILTRATION INTO THE SANITARY SEWER SYSTEM BETWEEN ANY TWO ADJACENT MANHOLES SHALL NOT BE IN EXCESS OF 100 GALLONS PER INCH OF PIPE DIAMETER PER MILE PER DAY.
2. ALL GRAVITY SANITARY SEWERS CONSTRUCTED OF FLEXIBLE PIPE SHALL BE DEFLECTION TESTED NO SOONER THAN THIRTY (30) DAYS AFTER INSTALLATION AND COMPLETE BACKFILL. THE DIAMETER OF THE RIGID BALL OR MANDREL USED FOR A DEFLECTION TEST SHALL BE NO LESS THAN NINETY-FIVE PERCENT (95%) OF THE BASE INSIDE DIAMETER OF THE PIPE TO BE TESTED DEPENDENT ON WHAT IS SPECIFIED IN THE CORRESPONDING ASTM STANDARD. THE TEST SHALL NOT BE PERFORMED WITH THE AID OF A MECHANICAL PULLING DEVICE.
3. 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. SEE TABLE 1 FOR TIME REQUIREMENTS. THE LINE SHALL BE ACCEPTED IF THE TIME SHOWN IN TABLE 1 FOR THE DESIGNATED PIPE SIZE AND LENGTH ELAPSES BEFORE THE AIR PRESSURE DROPS 1 PSIG BELOW THE STABLE INTERNAL AIR PRESSURE, AT WHICH TIME THE TEST CAN BE DISCONTINUED FOR THE ACCEPTED LINE.
4. 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.
5. THE CONTRACTOR SHALL SUPPLY ALL EQUIPMENT NECESSARY TO PERFORM THE TESTS REQUIRED.
6. ALL TESTS SHALL BE CONDUCTED UNDER THE OBSERVATION OF A REPRESENTATIVE OF THE UTILITY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SCHEDULE TESTING.
7. ANY LEAKAGE FOUND DURING THE INFILTRATION TEST SHALL BE CORRECTED PRIOR TO ACCEPTANCE. GROUTING OF THE JOINT OR CRACK TO REPAIR THE LEAKAGE SHALL NOT BE PERMITTED FOR FLEXIBLE PIPE. IF THE DEFECTIVE PORTION OF THE SANITARY SEWER CANNOT BE LOCATED, THE CONTRACTOR SHALL REMOVE AND RECONSTRUCT AS MUCH OF THE WORK AS IS NECESSARY TO OBTAIN A SYSTEM THAT PASSES INFILTRATION REQUIREMENTS.
8. ALL SEWER MAIN EXTENSIONS SHALL BE TELEVISED PRIOR TO ACCEPTANCE OF SEWER BY THE DISTRICT.

D. PRESSURE PIPE

1. AFTER THE PIPE HAS BEEN LAID AND BACKFILLED, ALL NEWLY LAID PRESSURE PIPE OR ANY VALVED SECTIONS OF IT SHALL, UNLESS OTHERWISE EXPRESSLY SPECIFIED, BE SUBJECTED TO A HYDROSTATIC PRESSURE TESTS. THE DURATION OF EACH PRESSURE TEST SHALL BE FOR A PERIOD OF NOT LESS THAN TWO HOURS AND NOT MORE THAN SIX HOURS. THE BASIC PROVISIONS OF AWWA C 600 (DI PIPE), C 605 (PVC PIPE), SHALL BE FOLLOWED FOR ALL PRESSURE TESTING.
2. THE TEST PRESSURE SHALL NOT EXCEED PIPE AND/OR THRUST RESISTANT DESIGN PRESSURES. THE TEST PRESSURE SHALL NOT VARY BY MORE THAN PLUS OR MINUS 5 PSI FOR THE DURATION OF THE TEST.
3. ALL NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE OF AT LEAST 1.5 TIMES THE MAXIMUM WORKING PRESSURE AT THE LOWEST ELEVATION IN THE LINE OR 1.25 TIMES THE MAXIMUM WORKING PRESSURE AT THE HIGHEST ELEVATION IN THE LINE. IN NO CASE SHALL THE TEST PRESSURE BE LESS THAN 50 PSI.
4. PRESSURIZATION
   a. EACH VALVED SECTION OF PIPE SHALL BE SLOWLY FILLED WITH WATER AND THE SPECIFIED TEST PRESSURE, BASED ON THE ELEVATION OF THE LOWEST POINT OF THE LINE OR SECTION UNDER TEST AND CORRECTED TO THE ELEVATION OF THE TEST GAUGE SHALL BE APPLIED BY MEANS OF A PUMP CONNECTED TO THE PIPE. THE PUMP PIPE CONNECTION AND ALL NECESSARY APPARATUS, INCLUDING GAUGES AND METERS SHALL BE FURNISHED BY THE CONTRACTOR. BEFORE APPLYING THE SPECIFIED TEST PRESSURE, AIR SHALL BE EXPELLED COMPLETELY FROM THE TEST SECTION. IF PERMANENT AIR RELEASE VALVES ARE NOT LOCATED AT ALL HIGH POINTS, THE CONTRACTOR SHALL INSTALL CORPORATION COCKS AT ALL POINTS SO THAT THE AIR CAN BE EXPELLED AS THE SECTION IS FILLED WITH WATER. AFTER ALL THE AIR HAS BEEN EXPELLED, THE CORPORATION COCKS SHALL BE CLOSED AND THE TEST PRESSURE APPLIED. AT THE CONCLUSION OF THE PRESSURE TEST THE CORPORATION COCKS SHALL BE REMOVED AND PLUGGED.
   b. ANY EXPOSED PIPE, FITTINGS, VALVES, AND JOINTS SHALL BE EXAMINED CAREFULLY DURING THE TEST. ANY DAMAGED OR DEFECTIVE PIPE, FITTINGS, VALVES, OR JOINTS THAT ARE DISCOVERED FOLLOWING THE PRESSURE TEST SHALL BE REPAIRED OR REPLACED WITH SOUND MATERIAL AND THE TEST SHALL BE REPEATED UNTIL IT PASSES.
   c. PRESSURE TEST SHALL BE MAINTAINED FOR A MINIMUM OF 2 HOURS.
5. LEAKAGE TEST
   a. AFTER THE COMPLETION OF THE PRESSURE TEST, A LEAKAGE TEST SHALL BE CONDUCTED TO DETERMINE THE QUANTITY OF WATER LOST BY LEAKAGE UNDER THE SPECIFIED TEST PRESSURE. LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE OR ANY VALVED SECTION THEREOF TO MAINTAIN PRESSURE WITHIN 5 PSI OF THE SPECIFIED TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR HAS BEEN EXPELLED.
   b. LEAKAGE SHALL NOT BE MEASURED BY A DROP IN PRESSURE IN A TEST SECTION OVER A PERIOD OF TIME.
6. TEST ALL TRACER WIRES TO CONFIRM CONTINUITY.
7. HDPE PRESSURE PIPELINES-PRESSURE TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH REQUIREMENTS AND RECOMMENDATIONS OF ASTM F 2164 (FIELD LEAK TESTING OF POLYETHYLENE PRESSURE PIPING SYSTEMS USING HYDROSTATIC PRESSURE), AWWA MANUAL OF PRACTICE M55 CHAPTER 9, AND PPI HANDBOOK OF POLYETHYLENE PIPE CHAPTER 2 (2ND EDITION). PNEUMATIC (COMPRESSED AIR) LEAKAGE TESTING OF HDPE PRESSURE PIPING IS PROHIBITED FOR SAFETY REASONS.
   a. THE SECTION OF PIPE TO BE TESTED SHALL BE FILLED WITH POTABLE OR GENERALLY CLEAN WATER (UNCONTAMINATED RIVER/LAKE WATER) APPROVED BY THE OWNER/ENGINEER. WHILE THE SYSTEM IS BEING FILLED WITH WATER, AIR SHALL BE CAREFULLY AND COMPLETELY EXHAUSTED. IF PERMANENT AIR VENTS ARE NOT LOCATED AT ALL HIGH POINTS, THE CONTRACTOR SHALL INSTALL FITTINGS AND VALVES AT SUCH POINTS SO THE AIR CAN BE EXPELLED AS THE PIPE SYSTEM IS SLOWLY FILLED WITH WATER.
   b. IF THE CONTRACTOR ELECTS TO PERFORM HYDROSTATIC TESTING AGAINST VALVES IN AN EXISTING DISTRIBUTION SYSTEM, IT DOES SO AT HIS OWN RISK AND WILL BEAR THE COST OF ANY DAMAGES TO THE EXISTING VALVE, PIPING SYSTEM, PRIVATE OR PUBLIC PROPERTY, OR THE NEW PIPELINE UNDER TEST.
   c. THE TEST PROCEDURE FOR HDPE PIPE CONSISTS OF TWO STEPS: 1) THE INITIAL PHASE OR EXPANSION PHASE AND 2) THE TEST PHASE. DURING THE INITIAL/EXPANSION PHASE, SUFFICIENT MAKE-UP WATER SHALL BE ADDED HOURLY FOR 3 HOURS TO RETURN TO THE TEST PRESSURE. DURING THE TEST PHASE, THE EXPANSION PHASE PRESSURE IS REDUCED BY 10 PSI TO TEST PHASE PRESSURE AND MONITORED FOR AT LEAST ONE HOUR (3 HOURS MAXIMUM).
   d. UNDER NO CIRCUMSTANCES SHALL THE TOTAL TIME UNDER TEST EXCEED EIGHT (8) HOURS. IF THE TEST IS NOT COMPLETED DUE TO LEAKAGE, EQUIPMENT FAILURE OR ANY OTHER REASON, DEPRESSURIZE THE TEST SECTION AND PERMIT THE SYSTEM TO "RELAX" FOR EIGHT (8) HOURS PRIOR TO THE NEXT TESTING SEQUENCE.
   e. THE TEST PRESSURE SHOULD BE RELATED TO THE LOWEST POINT IN ELEVATION ALONG THE TEST SECTION'S VERTICAL PIPELINE PROFILE.
   f. THE TEST PRESSURE SHALL BE 1.5 TIMES THE OPERATING PRESSURE AT THE LOWEST POINT IN THE SYSTEM. IN ACCORDANCE WITH SECTION 9.8 OF ASTM F 2164, THE PIPE SHALL PASS IF THE FINAL PRESSURE IS WITHIN 5% OF THE TEST PHASE PRESSURE FOR THE TESTING PERIOD (3 HOURS MAXIMUM). IF THE TEST SECTION FAILS THIS TEST, THE CONTRACTOR SHALL REPAIR OR REPLACE ALL DEFECTIVE MATERIALS AND/OR WORKMANSHIP AT NO ADDITIONAL COST TO THE OWNER.

E. MANHOLES

1. ALL MANHOLE VACUUM TESTS SHALL BE CONDUCTED IN THE PRESENCE OF A REPRESENTATIVE OF THE UTILITY AND IN ACCORDANCE WITH ASTM C1244, STANDARD TEST METHOD FOR CONCRETE SEWER MANHOLES BY NEGATIVE AIR PRESSURE (VACUUM) TEST.
2. 100% OF ALL MANHOLES SHALL BE TESTED.
3. THE VACUUM TEST EQUIPMENT SHALL CONSIST OF: INFLATABLE PLUGS FOR ALL INCOMING AND OUTGOING SEWER LINES; AN INFLATABLE TEST COLLAR TO SEAL THE MANHOLE AT THE MANHOLE FRAME; AND A VACUUM PUMP. A VACUUM LIQUID FILLED GAUGE SHALL BE LOCATED IN-LINE BETWEEN THE TEST COLLAR AND THE PUMP TO ACCURATELY INDICATE THE VACUUM IN INCHES OF MERCURY WITHIN THE MANHOLE. THE VACUUM GAUGE SHALL HAVE A MINIMUM OF 3.5 INCH DIAMETER FACE AND A RANGE TO NO MORE THAN THIRTY (30) INCHES OF MERCURY, WITH SCALE MARKINGS OF NO GREATER THAN ONE-HALF (1/2) INCH OF MERCURY VACUUM AND AN ACCURACY TO WITHIN ± TWO PERCENT (2%) OF TRUE VACUUM.
4. PREPARATION
   a. MANHOLES SHALL BE TESTED AFTER INSTALLATION WITH ALL CONNECTIONS IN PLACE.
   b. LIFT HOLES SHALL BE FILLED WITH NON-SHRINK GROUT, SEALED AND CURED.
   c. MANHOLE VACUUM TESTING SHALL BE PERFORMED AFTER ALL ADJACENT UNDERGROUND UTILITIES HAVE BEEN INSTALLED AND ALL MANHOLES HAVE BEEN COMPLETELY BACKFILLED AND FINISHED TO GRADE. VACUUM TESTING PRIOR TO INSTALLATION OF ALL UTILITIES MAY BE CONSIDERED UPON REQUEST TO THE UTILITY PRIOR TO INSTALLATION OF ALL UTILITIES IF THE MANHOLES ARE COMPLETELY BACKFILLED AND SEWER LEAKAGE

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

SANITARY SEWER SPECIFICATIONS

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AND DEFLECTION TESTING IS COMPLETE. IF VACUUM TESTING IS PERFORMED PRIOR TO ALL UTILITIES BEING INSTALLED AND ANY MANHOLES ARE FOUND TO HAVE BEEN DISTURBED OR DAMAGED DURING INSPECTION DURING THE WARRANTY PERIOD, THE MANHOLES SHALL BE REPAIRED AND VACUUM TESTED AGAIN TO ENSURE THAT THERE IS NO LEAKAGE.

d. IF A COATING OR LINING IS TO BE APPLIED TO THE INTERIOR OF THE MANHOLE, THE TEST MUST NOT BE PERFORMED UNTIL THE COATING IS CURED PER MANUFACTURER'S RECOMMENDATION.

5. CONTRACTOR SHALL SUBMIT TO THE UTILITY THE RESULTS OF EACH MANHOLE VACUUM TEST. SUCH REPORTS SHALL INCLUDE A DESCRIPTION OF THE LOCATION OF THE MANHOLE, THE TIME, DATE AND WEATHER OF THE TEST, A LIST OF ALL PERSONS PRESENT, THE DIAMETER AND DEPTH OF THE MANHOLE AND THE ALLOWABLE TEST RESULTS, AND THE ACTUAL TEST RESULTS.

6. ALL MANHOLES SHALL BE REPAIRED BY CONTRACTOR AND RETESTED AS DESCRIBED ABOVE UNTIL A SUCCESSFUL TEST IS MADE. AFTER EACH TEST, THE TEMPORARY PLUGS SHALL BE REMOVED.

F. LATERALS

1. ALL LATERALS SHALL BE VISUALLY INSPECTED BY A UTILITY REPRESENTATIVE.

TABLE 1: SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

1 PIPE DIAMETER (IN.)	2 MINIMUM TIME (MIN:SEC)	3 LENGTH FOR MINIMUM TIME	4 TIME FOR LONGER LENGTH (SEC.)	SPECIFICATION TIME OF LENGTH (L) SHOWN (MIN.:SEC.)							
				100 FT.	150 FT.	200 FT.	250 FT.	300 FT.	350 FT.	400 FT.	450 FT.
6	5:40	398	.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

NOTE: FOR MORE EFFICIENT TESTING OF LONG TEST SECTIONS AND/OR SECTIONS OF LARGER DIAMETER PIPES, A TIMED PRESSURE DROP OF 0.5 PSIG MAY BE USED IN LIEU OF THE 1.0 PSIG TIMED PRESSURE DROP. IF A 0.5 PSIG PRESSURE DROP IS USED, THE REQUIRED TEST TIME SHALL BE EXACTLY HALF AS LONG AS THOSE SHOWN ABOVE.

END

AQUA INDIANA STATE STANDARDS

LIFT STATION CONSTRUCTION

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PART 1 - GENERAL

1.1 SCOPE OF WORK

A. THE PURPOSE OF THESE SPECIFICATIONS IS TO PROVIDE THE MAIN FRAMEWORK FOR THE CONSTRUCTION OF SANITARY SEWAGE LIFT STATIONS FOR AQUA INDIANA (AQUA-OWNER), AND TO OUTLINE THE REQUIREMENTS FOR THE DESIGN AND CONSTRUCTION OF SANITARY SEWAGE LIFT STATIONS BY A PERSON OR ENTITY (APPLICANT) SEEKING TO CONSTRUCT A LIFT STATION FOR INCLUSION IN, OR CONNECTION TO, THE AQUA SANITARY SEWER SYSTEM. THE CONTENT OF THIS DOCUMENT IS THEREFORE BY NECESSITY OF A GENERAL NATURE WHICH APPLIES TO ALL PROJECTS.

1. THE TERM "OWNER", WHERE USED IN THESE SPECIFICATIONS, REFERS TO AQUA OR THE AUTHORIZED REPRESENTATIVE OF AQUA.
2. THE TERM "APPLICANT", WHERE USED IN THESE SPECIFICATIONS, REFERS TO A PERSON OR ENTITY SEEKING PERMISSION TO CONNECT, CONSTRUCT, ALTER OR DISTURB, OR CAUSE TO BE CONNECTED, CONSTRUCTED, ALTERED OR DISTURBED, ANY SANITARY SEWAGE LIFT STATION DIRECTLY OR INDIRECTLY TRIBUTARY TO THE OWNER'S SEWER SYSTEM.
3. THE TERM "CONTRACTOR", WHERE USED IN THESE SPECIFICATIONS, REFERS TO A PERSON OR ENTITY ENGAGED BY AQUA OR APPLICANT TO CONSTRUCT A SANITARY SEWAGE LIFT STATION.

1.2 WORK AND MATERIALS TO BE PROVIDED BY THE CONTRACTOR

A. UNLESS OTHERWISE INDICATED, ALL WORK, EQUIPMENT AND MATERIALS DESCRIBED IN THESE SPECIFICATIONS SHALL BE PROVIDED BY THE CONTRACTOR.

B. THE CONTRACTOR SHALL WARRANT WORK AND MATERIALS FOR A PERIOD OF ONE YEAR FROM THE DATE OF PUTTING THE FACILITIES IN SERVICE. CONTRACTOR SHALL BE RESPONSIBLE FOR FULL COST OF REPAIRS MADE UNDER WARRANTY.

C. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AND EQUIPMENT NECESSARY TO CLEAN AND TEST THE LIFT STATION PRIOR TO PLACING IT INTO SERVICE.

D. THE OWNER IS EXEMPT FROM SALES TAX FOR THE MATERIALS USED FOR LIFT STATION CONSTRUCTION. HOWEVER, IF LIFT STATION IS CONSTRUCTED BY AND FOR APPLICANT, APPLICANT AND CONTRACTOR SHALL PAY ALL REQUIRED SALES TAX.

E. WHEN TIE-INS TO THE EXISTING SYSTEM ARE MADE, THE CONTRACTOR SHALL ADVISE THE OWNER AT LEAST ONE WEEK IN ADVANCE OF WHEN THE CONNECTION WILL BE NEEDED. THE CONTRACTOR SHALL ASSERT NO CLAIMS DUE TO DELAYS ALLEGEDLY CAUSED BY THE OWNER.

F. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL TEMPORARY OFFICE FACILITIES, UTILITIES, AND MATERIAL OR EQUIPMENT STORAGE AREAS WHICH THE CONTRACTOR DESIRES AND THAT ARE NOT SHOWN ON THE DRAWINGS AS "TO BE PROVIDED BY THE OWNER".

1.3 REFERENCE STANDARDS AND SPECIFICATIONS

A. THESE SPECIFICATIONS REFER AND INCORPORATE OTHER STANDARD SPECIFICATIONS. THE REFERENCED SPECIFICATIONS INCLUDE THE LATEST VERSION OF:

1. INDIANA ADMINISTRATIVE CODE, SECTION 327-3
2. "NATIONAL ELECTRICAL SAFETY CODE" (NESC)
3. "AMERICAN NATIONAL STANDARDS INSTITUTE STANDARDS" (ANSI)
4. "INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS STANDARDS" (IEEE)
5. "INSULATED POWER CABLE ENGINEERS ASSOCIATION STANDARDS" (IPCEA)
6. "NATIONAL BUREAU OF STANDARDS" (NEB)
7. "NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION STANDARDS" (NEMA)
8. "NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION STANDARD OF INSTALLATION" (NECA)
9. "NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS" (NFPA)
10. "UNDERWRITERS LABORATORIES PUBLICATIONS" (U.L.)

B. ALL CONTRACTORS ARE ADVISED TO OBTAIN A COPY OF EACH SPECIFICATION FOR THEIR REVIEW DURING BIDDING AND CONSTRUCTION.

C. IN CASE OF A CONFLICT BETWEEN THESE SPECIFICATIONS AND THE REFERENCE SPECIFICATIONS, AQUA SPECIFICATIONS SHALL RULE. CONTRACTOR SHALL NOTIFY OWNER OF DISCREPANCIES BETWEEN SPECIFICATIONS.

D. WHEN REFERENCE IS MADE TO A REFERENCE SPECIFICATION, THAT SPECIFICATION SHALL BE FOLLOWED AS IF IT WERE AN INTEGRAL PART OF THE AQUA SPECIFICATIONS.

1.4 SAFETY

A. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF PERSONS FROM INJURY AND PREVENTION OF PROPERTY DAMAGE AT THE PROJECT SITE.

1. ALL OSHA REGULATIONS REGARDING PROPER WORKING PRACTICES SHALL BE USED.
2. ALL INDOT SAFETY REQUIREMENTS ON THE MARKING AND PERFORMANCE OF CONSTRUCTION IN ROADWAYS SHALL APPLY WHETHER THE CONSTRUCTION IS ALONG INDOT ROADWAYS OR NOT.
3. THE CONTRACTOR SHALL TAKE WHATEVER STEPS NECESSARY TO PROTECT THE PUBLIC FROM OPEN TRENCHES, MATERIAL PILES, AND ALL OTHER SITE OBSTRUCTIONS.
4. CONTRACTOR SHALL ADHERE TO ALL REQUIREMENTS LISTED IN 29 CFR 1910 – OCCUPATIONAL SAFETY AND HEALTH STANDARDS.
5. THE ELECTRICAL CONTRACTOR OR CONTROL PANEL MANUFACTURER SHALL PERFORM AN ARC FLASH STUDY FOR THE PROJECT IF REQUESTED BY OWNER.

1.5 COORDINATION OF WORK

A. THE CONTRACTOR SHALL COORDINATE ALL SUBCONTRACTORS, AFFECTED UTILITIES, AND GOVERNMENTAL AGENCIES THAT HAVE AN INVOLVEMENT IN THE CONSTRUCTION OF THE PROJECT.

1. ROADWAYS SHALL REMAIN OPEN TO THE DEGREE SATISFACTORY WITH THE AFFECTED GOVERNMENTAL AGENCY.
2. UTILITY SERVICE SHALL REMAIN IN NEAR CONTINUOUS OPERATION TO THE SATISFACTION OF THE UTILITY. DURING BIDDING, AND PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL DETERMINE IF NIGHTTIME OR OTHER OFF-TIME WORK WILL BE NECESSARY TO MAINTAIN THE DESIRED LEVEL OF SERVICE.
3. ALL SUBCONTRACTORS SHALL COORDINATE THEIR WORK AND ARRANGEMENTS DIRECTLY THROUGH THE CONTRACTOR.

1.6 SCOPE OF WORK

A. FURNISH AND INSTALL SANITARY SEWAGE LIFT STATION AS SHOWN ON THE PLANS, INCLUDING SUBMERSIBLE PUMPING EQUIPMENT WITH POWER AND SENSOR CABLE, WET WELL WITH WET WELL LEVEL DEVICE WITH CABLE AND WET WELL STANDBY FLOAT CONTROL SWITCHES WITH CABLES, VALVE VAULT WITH MAGNETIC FLOW METER/FLOW TUBE (IF REQUESTED), SECONDARY ELECTRICAL SERVICE CONDUCTORS AND CONDUITS, ELECTRICAL SERVICE METER AND SUMP PUMP, MAIN FUSED DISCONNECT, PETERSON BOX/GENERATOR CONNECTION CAPABLE OF ACCEPTING PORTABLE GENERATOR WIRES, LIFT STATION CONTROLS AND ENCLOSURE WITH OMNI-SITE EQUIPMENT OR SCADA MONITORING AND ELECTRONIC FLOW RECORDER (ONLY IF REQUESTED BY OWNER), POWER AND CONTROL JUNCTION BOXES LOCATED PRIOR TO THE CONTROL PANEL, CONDUIT CABLE SEALS, EXPLOSION PROOF CONDUIT SEAL-OFF FITTINGS, CONCRETE EQUIPMENT PADS, ELECTRICAL SERVICE GROUNDING TRIANGLE, ALL CONDUITS, CONDUCTORS AND ELECTRICAL CONNECTIONS, EQUIPMENT STRUCTURAL SUPPORTS, AND APPURTENANCES AS A FULLY OPERABLE SYSTEM COMPATIBLE WITH THE CURRENT AQUA SPECIFICATIONS, AS INDICATED ON THE APPROVED PLANS.

1.7 ADDITIONAL REQUIREMENTS

A. LIFT STATION SHALL BE LOCATED WITHIN A FENCED AREA WITH MANUALLY OPERATED GATES HAVING A TOTAL MINIMUM OPENING WIDTH OF 16-FT. THE GATES SHALL BE CAPABLE OF BEING PADLOCKED. THE FENCE SHALL BE 7 -FT TALL (MINIMUM HEIGHT) CHAIN LINK FENCE. THE FENCE SHALL BE HEAVY GAUGE PVC COATED, AND THE POLES SHALL BE HEAVY GAUGE PVC COATED. THE FENCE SHALL ALSO HAVE VINYL SLATS THAT ARE GREEN OR BLACK MATCHING FENCE AND POST. THE COMPLETED FENCE ASSEMBLY SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL SAFETY CODE.

B. A SINGLE EXTERIOR SITE LIGHT SHALL BE MOUNTED 12 FT ABOVE GROUND ON AN ALUMINUM POLE SET IN A CONCRETE BASE. FLOODLIGHT SHALL BE A HEAVY-DUTY ALUMINUM FIXTURE WITH MANUAL ACTIVATION SWITCH, IMPACT RESISTANT GLASS AND A 500-WATT LED LAMP. LIGHT SHALL BE EQUIPPED WITH A MANUALLY OPERATED TOGGLE SWITCH. LAMP SHALL BE INSTALLED IN A METAL CAGE TO PROTECT IT FROM IMPACT. EXTERIOR SITE LIGHT SHALL BE LITHONIA DSXF1 LED P1 40K WFL MVOLT THK DDBXD, OR OWNER APPROVED EQUAL.

C. EACH LIFT STATION SHALL BE ACCESSED BY A PAVED DRIVEWAY AND BE PROVIDED WITH A PAVED PARKING AREA. DRIVEWAY SHALL BE HEAVY DUTY RATED BITUMINOUS OR CONCRETE SURFACE, MINIMUM 16-FOOT WIDE PROVIDING ACCESS DIRECTLY ADJACENT TO THE WET

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
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SANITARY SEWER SPECIFICATIONS

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WELL, VALVE VAULT, AND METER VAULT. PROVIDE ENOUGH TURNAROUND AND PARKING AREA FOR ONE VEHICLE IF REQUESTED.

D. CONTRACTOR SHALL PROVIDE A PERMANENT BYPASS PUMP IF REQUESTED BY OWNER.

E. MINIMUM PUMP SUCTION AND DISCHARGE DIAMETER SHALL BE 4-IN.

F. NO GRINDER PUMPS ARE ALLOWED UNLESS OTHERWISE APPROVED BY THE OWNER.

G. MINIMUM FORCE MAIN DIAMETER SHALL BE 4-IN.

H. CONTRACTOR SHALL PROVIDE A MAGNETIC FLOW METER WITH DATA LOGGING WITH ELECTRONIC FLOW RECORDER IF REQUESTED BY OWNER.

I. EACH LIFT STATION SHALL HAVE, AS A MINIMUM, TWO PUMPS. STATION SHALL BE DESIGNED TO PROVIDE THE DESIGN PEAK HOUR FLOW WITH THE LARGEST PUMP OUT OF SERVICE (FIRM CAPACITY).

J. ELECTRICAL REQUIREMENTS:

1. THE SERVICE ENTRANCES AND ALL EQUIPMENT SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE UTILIZING A GROUND TRIANGLE.
2. THE CONTRACTOR SHALL INSTALL THE ELECTRICAL METER (PROVIDED BY THE POWER COMPANY) ON A PEDESTAL BASE APPROVED BY THE ELECTRICAL UTILITY COMPANY.
3. ELECTRICAL SERVICE TO THE LIFT STATION SHALL BE THREE PHASE CONFIGURATION. IF ONLY SINGLE-PHASE POWER IS AVAILABLE, CONTRACTOR SHALL UTILIZE A VFD FOR EACH PUMP TO MAKE THREE PHASE CONFIGURATION FROM SINGLE PHASE POWER. IN THIS CASE, THE VFD WILL NOT BE USED FOR PUMP SPEED VARIATION.
4. ELECTRICAL SERVICE VOLTAGES MAY BE:
   a. 120/240 VAC, SINGLE PHASE, THREE WIRE
   b. 240 VAC, THREE PHASE, THREE WIRE
   c. 240/120 VAC, THREE PHASE, FOUR WIRE
   d. 208Y/120 VAC, THREE PHASE, FOUR WIRE
   e. 480 VAC, THREE PHASE, THREE WIRE (PREFERRED)
   f. 408Y/277 VAC, THREE PHASE, FOUR WIRE
5. ALL CONDUCTORS SHALL BE ROUTED IN CONDUIT. IN APPLICATIONS WHERE THERE IS ANTICIPATED POPULATION GROWTH AND THE POTENTIAL FOR INCREASES IN PUMP HORSEPOWER, ONE SPARE POWER AND CONTROL CONDUIT SHALL BE PROVIDED FROM THE WET WELL TO THE PUMPS POWER AND WET WELL CONTROL JUNCTION BOXES, AND FROM THE ELECTRICAL SERVICE SOURCE (TRANSFORMER) TO THE MAIN FUSED DISCONNECT.
6. THE JUNCTION BOXES SHALL HAVE EPOXY CONDUIT SEALS BETWEEN THE JUNCTION BOX AND CONTROL PANEL.
7. THE CONDUITS BETWEEN THE WET WELL AND THE JUNCTION BOX FOR THE PUMPS SHALL BE A MINIMUM OF 4-INCH.
8. THE LIFT STATION CONTROLS ENCLOSURE SHALL BE MOUNTED A MINIMUM OF EIGHTEEN INCHES ABOVE THE WET WELL VENT OUTLET AND FIVE FEET HORIZONTALLY FROM ALL OPENINGS.
9. THE LIFT STATION PUMPS POWER, WET WELL LEVEL DEVICE, AND FLOAT SWITCHES CONTROL JUNCTION BOXES SHALL BE MOUNTED A MINIMUM OF EIGHTEEN INCHES ABOVE THE WET WELL VENT OUTLET.
10. THE LIFT STATION MAIN FUSED DISCONNECT SWITCH ENCLOSURE SHALL BE MOUNTED A MINIMUM OF EIGHTEEN INCHES ABOVE THE WET WELL VENT OUTLET.

K. APPLICANT SHALL PROVIDE THE FOLLOWING:

1. BUOYANCY CALCULATIONS DEMONSTRATING THAT THE WET WELL AND VALVE VAULT WILL REMAIN SUBMERGED GIVEN SATURATED SOIL CONDITIONS AND USING A SAFETY FACTOR OF 1.5.
2. PUMP SIZING CALCULATIONS, INCLUDING DESIGN AVERAGE AND PEAK FLOW RATES, TOTAL DYNAMIC HEAD, PUMP CYCLE TIMES, AND WET WELL DETENTION TIME. CALCULATIONS SHALL INDICATE THE SERVICE AREA TRIBUTARY TO THE LIFT STATION, INCLUDING THE NUMBER AND NATURE OF EXISTING, PLANNED AND FUTURE UNITS TO BE SERVED BY THE LIFT STATION.
3. PUMP SELECTION DOCUMENTATION TO INCLUDE PUMP EFFICIENCY, IMPELLER DIAMETER, DESIGN PEAK FLOW RATE (IN GALLONS PER MINUTE), HORSEPOWER, AND DESIGN RPM'S. PROVIDE PUMP AND SYSTEM CURVES.
4. FOR DEVELOPMENTS THAT ARE PLANNED TO BE CONSTRUCTED IN PHASES, THE CALCULATIONS AND DOCUMENTATION SHALL ADDRESS THE ULTIMATE DEMANDS ON THE STATION AS WELL AS THE DEMANDS FOR EACH PHASE OF THE DEVELOPMENT.
5. DESIGN DRAWINGS AND STRUCTURAL CALCULATIONS FOR CONCRETE SLABS USED TO SUPPORT THE STANDBY GENERATOR AND OTHER EXTERIOR EQUIPMENT.
6. ELECTRICAL SIZING CALCULATIONS TO INCLUDE ELECTRICAL SERVICE SIZE LOAD CALCULATIONS, AND STANDBY GENERATOR SIZING CALCULATIONS

L. AFTER PLAN APPROVAL, AND PRIOR TO CONSTRUCTION, APPLICANT SHALL PROVIDE SHOP DRAWINGS TO AQUA INDIANA AND OWNER'S ENGINEER FOR THE FOLLOWING:

1. WET WELL TOP SLAB, BOTTOM SLAB AND RISERS, INCLUDING REINFORCING STEEL.
2. VALVE AND METER VAULTS.
3. SELECTED LIFT STATION EQUIPMENT INCLUDING PUMPS, PUMPS POWER AND SENSOR CABLES, WET WELL LEVEL DEVICE AND CABLE, WET WELL STANDBY FLOAT CONTROL SWITCHES AND CABLES, FLOAT SWITCHES SUSPENSION METHOD, VALVE VAULT SUMP PUMP, MAGNETIC FLOW METER / FLOW TUBE, ELECTRICAL SERVICE METER PEDESTAL, MAIN FUSED DISCONNECT, MANUAL TRANSFER SWITCH, LIFT STATION CONTROLS ENCLOSURE AND COMPONENTS TO INCLUDE SCADA EQUIPMENT AND ELECTRONIC FLOW RECORDER, PUMPS POWER AND WET WELL CONTROLS JUNCTION BOXES, CONDUIT CABLE SEALS, EXPLOSION PROOF CONDUIT SEAL-OFF FITTINGS, ELECTRIC SERVICE GROUNDING TRIANGLE, GROUND RODS, WIRE AND CABLE, EMT AND PVC CONDUITS, WATERPROOF ELECTRICAL CONNECTIONS, EQUIPMENT STRUCTURAL SUPPORTS, SITE LIGHTING TO INCLUDE FIXTURE, POLE, LAMP, AND POLE FOUNDATION AND GROUNDING DETAILS, SITE FENCING AND FENCE GROUNDING DETAILS.
4. LIFT STATION CONTROLS ELECTRICAL POWER AND CONTROL DIAGRAMS INDICATING ALL CONTROL COMPONENTS, COMPONENT SIZES, RATINGS, AND FUNCTIONS.

M. OPERATION AND MAINTENANCE MANUALS: CONTRACTOR SHALL SUBMIT TWO (2) OPERATION AND MAINTENANCE MANUALS TO OWNER. MANUALS SHALL INCLUDE, AT A MINIMUM, THE FOLLOWING:

1. WARRANTY STATEMENT;
2. PUMP DOWN TEST PROCEDURES AND RESULTS FROM THE START-UP TESTS;
3. OPERATION INSTRUCTIONS;
4. MAINTENANCE INSTRUCTIONS;
5. RECOMMENDED SPARE PARTS LIST;
6. LUBRICATION SCHEDULES;
7. STRUCTURAL DIAGRAMS;
8. AS-BUILT WIRING DIAGRAMS;
9. PIPING AND INSTRUMENTATION DRAWINGS (P&ID); AND
10. BILL OF MATERIALS.

N. FACTORY TESTS

1. EACH PUMP TO BE DELIVERED UNDER THIS SECTION SHALL BE TESTED FOR PERFORMANCE AT THE PUMP MANUFACTURER'S FACTORY TO DETERMINE HEAD VERSUS CAPACITY, EFFICIENCIES, AND KILOWATT DRAW REQUIRED FOR THE OPERATING POINTS THAT ARE SPECIFIED. ALL TESTS SHALL BE RUN IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN HYDRAULIC INSTITUTE STANDARDS AND SUBMERSIBLE WASTEWATER PUMP ASSOCIATION AND AT THE APPROPRIATE VOLTAGE AND FREQUENCY. TESTING SHALL ALSO INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
2. HEAD VS. FLOW WITH FIVE (5) EQUALLY SPACED POINTS INCLUDING SHUTOFF AND MAXIMUM FLOW SHALL BE CERTIFIED.
3. THE INPUT KW, SPEED, POWER FACTOR, NO LOAD CURRENT, AND TORQUE CHARACTERISTICS SHALL BE CERTIFIED.
4. IMPELLER, MOTOR RATING, AND ELECTRICAL CONNECTIONS SHALL FIRST BE CHECKED FOR COMPLIANCE TO THE SPECIFICATIONS.
5. INSULATION TEST: A MOTOR AND CABLE INSULATION TEST FOR MOISTURE CONTENT OR INSULATION DEFECTS SHALL BE MADE.
6. PRIOR TO SUBMERGENCE, THE PUMP SHALL BE RUN DRY TO ESTABLISH CORRECT ROTATION AND MECHANICAL INTEGRITY.
7. OPERATIONAL TEST: THE PUMP SHALL BE RUN FOR 30 MINUTES SUBMERGED, UNDER A MINIMUM OF SIX FEET OF WATER.
8. AFTER THE OPERATIONAL TEST HAS BEEN CONDUCTED, THE INSULATION TEST SHALL BE PERFORMED AGAIN.
9. AFTER TESTING, THE PUMP SHALL BE INSPECTED TO ENSURE THAT THE PUMP MAINTAINS FULL WATERTIGHT INTEGRITY.
10. A WRITTEN REPORT STATING THE TESTS HAVE SUCCESSFULLY BEEN COMPLETED AND PROVIDING THE RESULTS OF THE TEST SHALL BE PROVIDED FOR EACH PUMP. THE PUMP MANUFACTURER SHALL ALSO CERTIFY THAT SIMILAR TESTS HAVE BEEN CONDUCTED ON PUMPS OF A SIMILAR SIZE FOR A PERIOD OF NOT LESS THAN FIVE (5) YEARS.

PART 2 - PRODUCTS

2.1 MANUFACTURING REQUIREMENTS

A. FOR MOST PRODUCTS, OWNER HAS LIMITED THE NUMBER OF MANUFACTURERS APPROVED FOR USE IN ITS SYSTEMS. CONTRACTOR SHALL PROVIDE THE LISTED MANUFACTURER(S) UNLESS WRITTEN APPROVAL IS GIVEN BY OWNER PRIOR TO BIDDING. "OWNER APPROVED EQUAL" MEANS THAT FOR A SPECIFIC PROJECT, OWNER HAS GIVEN WRITTEN APPROVAL THAT A DIFFERENT MANUFACTURER OR MODEL MAY BE USED.

B. ELECTRICAL SYSTEM AND COMPONENTS IN THE RAW SEWAGE WET WELL MUST COMPLY WITH NEC REQUIREMENTS FOR CLASS I, GROUP D, DIVISION 1 LOCATIONS.

2.2 SIZES OF MATERIAL AND ADDITIONAL MATERIAL REQUIREMENTS

A. WHERE SPECIFIC SIZES OF MATERIALS ARE NOT LISTED IN PARAGRAPHS BELOW, SIZES WILL BE SHOWN ON THE DRAWINGS.

B. CONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS.

C. REFER TO AQUA STANDARD DETAILS FOR ADDITIONAL DIMENSION AND MATERIAL REQUIREMENTS.

2.3 SEWAGE PUMPS

A. FURNISH AND INSTALL SUBMERSIBLE NON-CLOG SEWAGE PUMPS CAPABLE OF PASSING A 3 IN. DIAMETER SPHERICAL SOLID. PUMP SUCTION AND DISCHARGE OPENINGS SHALL BE 4 IN. OR GREATER IN DIAMETER. PUMPS SHALL BE MYERS, HYDROMATIC, FLYGT, GRUNDFOS, OR OWNER APPROVED EQUAL.

B. PUMP CONSTRUCTION:

1. SUBMERSIBLE PUMPS AND MOTORS SHALL BE DESIGNED SPECIFICALLY FOR RAW SEWAGE USE, INCLUDING TOTALLY SUBMERGED OPERATION DURING A PORTION OF EACH PUMPING CYCLE AND SHALL MEET THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) FOR SUCH UNITS. IF PUMP AND MOTOR ARE NOT FULLY SUBMERGED AT SHUT OFF LEVEL, EXPLOSION PROOF MOTORS SHALL BE PROVIDED.
2. THE PUMP BODY, SEAL PLATES, IMPELLER, AND MOTOR HOUSING SHALL BE CONSTRUCTED OF HIGH-QUALITY ASTM CLASS 30 CAST IRON OR BETTER. A COAT OF AIR DRY ENAMEL SHALL BE APPLIED BEFORE AND AFTER ASSEMBLY. ALL EXPOSED HARDWARE SHALL BE 300 SERIES STAINLESS STEEL.
3. THE IMPELLER SHALL BE OF THE TWO-VANE, NON-CLOG DESIGN WITH PRESSURE VANES ON THE BACK SIDE AND OF THE KEY DRIVE DESIGN. THE IMPELLER SHALL BE DYNAMICALLY BALANCED AND SHALL BE CAPABLE OF HANDLING SOLIDS, FIBROUS MATERIALS, AND OTHER MATTER FOUND IN NORMAL SEWAGE APPLICATIONS. A WEAR RING SYSTEM SHALL BE USED TO PROVIDE EFFICIENT SEALING BETWEEN THE VOLUTE AND SUCTION INLET OF THE IMPELLER.
4. EACH PUMP SHALL BE PROVIDED WITH A TANDEM MECHANICAL SHAFT SEAL CONSISTING OF TWO INDEPENDENT SEAL ASSEMBLIES OPERATING IN AN OIL-FILLED SEAL CAVITY. THE MATERIALS OF CONSTRUCTION SHALL BE CARBON AND CERAMIC LAPPED AND POLISHED TO A TOLERANCE OF ONE LIGHT BAND, STAINLESS STEEL HARDWARE, AND WITH ALL RUBBER PARTS OF BUNA-N. A MOISTURE SENSOR DETECTION SYSTEM SHALL BE INCLUDED WITHIN THE OIL-FILLED SEAL CHAMBER.
5. THE MOTOR SHALL BE A PREMIUM EFFICIENCY MOTOR THAT IS THE STANDARD PRODUCT OF AN ESTABLISHED AMERICAN MOTOR MANUFACTURER. THE MOTOR SHALL BE DESIGNED TO BE NON-OVERLOADING OVER THE ENTIRE PUMP CURVE. THE ROTOR AND STATOR ASSEMBLY SHALL BE OF THE STANDARD FRAME DESIGN. THE MOTOR HOUSING SHALL BE OF SUBMERSIBLE CONSTRUCTION AND SHALL BE FILLED WITH HIGH DIELECTRIC OIL. THE MOTOR WINDINGS SHALL BE OF CLASS F INSULATION RATED AT 155 DEGREES C. THE COMBINED SERVICE FACTOR SHALL BE A MINIMUM OF 1.15. THE MOTOR SHALL BE ABLE TO OPERATE DRY WITHOUT DAMAGE WHILE PUMPING UNDER LOAD. THE MOTOR SHALL MEET THE STANDARD FOR ENCLOSURE, TYPE OF MOUNTING AND BASIC ELECTRIC DESIGN FOR NEMA DESIGN B. THE MOTOR SHAFT SHALL BE OF 416 STAINLESS STEEL, OR CARBON STEEL WITH A REPLACEABLE TYPE 420 STAINLESS STEEL SHAFT SLEEVE. THE THRUST BEARING SHALL BE OF THE DOUBLE ROW BALL TYPE WITH THE UPPER RADIAL BEARING OF THE SINGLE ROW BALL TYPE.
6. THERMAL SENSORS SHALL BE USED TO MONITOR STATOR TEMPERATURES. THE STATOR SHALL BE EQUIPPED WITH A THERMAL SWITCH EMBEDDED IN THE END COIL OF THE STATOR WINDING. THIS SHALL BE USED IN CONJUNCTION WITH AND SUPPLEMENTAL TO EXTERNAL MOTOR OVERLOAD PROTECTION AND WIRED TO THE CONTROL PANEL.
7. THE PUMP SHALL BE EQUIPPED WITH ADEQUATE POWER CORD AND SENSOR CORD TO CONNECT THE PUMPS TO THE CONTROL PANEL. PUMP MOTOR CORDS SHALL BE DESIGNED FOR FLEXIBILITY AND SERVICEABILITY UNDER CONDITIONS OF EXTRA HARD USAGE AND SHALL MEET THE REQUIREMENTS OF THE NEC FOR FLEXIBLE CORDS AND CABLES IN SEWAGE PUMPING STATIONS. EACH FLEXIBLE CABLE, OR CORD, SHALL BE PROVIDED WITH A WATERTIGHT SEAL AND SEPARATE STRAIN RELIEF AT THE MOTOR.
8. THE CABLE ENTRY DESIGN SHALL BE SUCH THAT IT INSURES A WATERTIGHT AND SUBMERSIBLE SEAL. ALL INCOMING LEAD WIRES SHALL BE SPLICED IN THE MOTOR TERMINAL HOUSING. AFTER SPLICING, THE TERMINAL HOUSING SHALL BE FILLED WITH EPOXY TO SEAL THE OUTER CABLE JACKET AND THE INDIVIDUAL STRANDS TO PREVENT WATER FROM ENTERING THE MOTOR HOUSING. IN LIEU OF THE EPOXY SEAL, A TERMINAL BOARD SHALL SEPARATE THE JUNCTION CHAMBER AND MOTOR. A SECONDARY RUBBER PRESSURE GROMMET SHALL BE PROVIDED AS AN ADDITIONAL SEALING POINT AND STRAIN RELIEF AT THE POINT OF CABLE ENTRY.

C. PUMP LIFT-OUT ASSEMBLY: FOR EACH PUMP, THE DISCHARGE CONNECTION ELBOW SHALL BE PERMANENTLY INSTALLED IN THE WET WELL ALONG WITH THE DISCHARGE PIPING. THE PUMP(S) SHALL BE AUTOMATICALLY CONNECTED TO THE DISCHARGE CONNECTION ELBOW WHEN LOWERED INTO PLACE AND SHALL BE EASILY REMOVED FOR INSPECTION AND SERVICE. THERE SHALL BE NO NEED FOR PERSONNEL TO ENTER THE WET WELL. A SIMPLE LINEAR DOWNWARD MOTION OF THE PUMP SHALL ACCOMPLISH SEALING OF THE PUMPING UNIT TO THE DISCHARGE CONNECTION. A STAINLESS-STEEL SLIDING GUIDE BRACKET SHALL BE AN INTEGRAL PART OF THE PUMP UNIT. TWO STAINLESS STEEL GUIDE RAILS SHALL GUIDE THE ENTIRE WEIGHT OF THE PUMPING UNIT. PROVIDE STAINLESS STEEL LIFTING CHAIN OF APPROPRIATE DIAMETER FOR PUMP SIZE, LENGTH AS REQUIRED FOR THE INSTALLATION (MINIMUM OF 50 FEET), FOR EACH PUMP. PROVIDE A STAINLESS-STEEL HOOK UNDERNEATH THE ACCESS COVER FOR ATTACHING THE CABLES.

2.4 ACCESS COVERS

A. ACCESS COVERS SHALL BE ALUMINUM, DESIGNED AND CONSTRUCTED TO WITHSTAND WATER INTRUSION.

B. THE DOORS SHALL BE MINIMUM 1/4" ALUMINUM TREAD PLATE REINFORCED AS REQUIRED AND ATTACHED TO THE FRAME WITH STAINLESS STEEL HINGES. A LOCK TAB FOR PAD LOCKING SHALL BE PROVIDED FOR SECURING THE DOOR CLOSED. A POSITIVE GUIDED OPEN-DOOR LATCH SHALL ENGAGE AUTOMATICALLY WHEN DOOR IS FULLY OPENED TO 90 DEGREES. THE OPEN-DOOR LATCH MUST BE RELEASED FOR CLOSING. A RETRACTABLE HANDLE SHALL BE PROVIDED ON THE OUTSIDE OF THE DOOR TO ASSIST OPENING AND CLOSING. ACCESS HATCHES ARE TO BE HALLIDAY MODEL W1S SINGLE LEAF OR W2S MULTI-LEAF OR OWNER APPROVED EQUAL. WET WELL ACCESS SHALL BE MULTI-LEAF TO PROVIDE ADEQUATE ACCESS FOR PUMPS.

C. ALL WET WELL HATCHES SHALL BE PROVIDED WITH A SAFETY GRATE WHICH ALLOWS VISUAL INSPECTION OF THE WET WELL WITH THE GRATE IN PLACE. THE GRATE SHALL HAVE A SEPARATE HOLD OPEN DOOR LATCH THAT ENGAGES WHEN FULLY OPENED TO 90 DEGREES. THE DOOR LATCH SHALL HAVE A RELEASE MECHANISM. SAFETY GRATE AND LATCHES SHALL BE MADE FROM STAINLESS STEEL OR ALUMINUM AND BE RESISTANT TO SEWAGE, SEWER GASSES AND MOISTURE.

D. ACCESS DIMENSIONS SHALL BE ADEQUATE FOR MAINTENANCE OF EQUIPMENT, ACCOMMODATING REMOVAL OF EQUIPMENT WHEN NECESSARY.

2.5 WET WELLS, VALVE VAULTS AND METER VAULTS

A. CONSTRUCT WET WELLS OF PRECAST REINFORCED CONCRETE SECTIONS. WET WELLS CONSTRUCTED OF STEEL ARE NOT ALLOWED.

1. BASES SHALL BE ONE-PIECE PRECAST BASE OR CAST-IN-PLACE CONCRETE BASE SECTION CONSTRUCTED TO THE DIMENSIONS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH ASTM STANDARDS. STEEL REINFORCEMENT SHALL BE AS DELINEATED ON THE DRAWINGS AND IN ACCORDANCE WITH ASTM STANDARDS.
2. RISERS SHALL BE PRECAST REINFORCED CONCRETE RISER SECTIONS IN ACCORDANCE WITH ASTM C478, CONSTRUCTED TO THE DIMENSIONS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH ASTM STANDARDS. RISER SHALL BE THE SAME DIMENSIONS AS THE BASE. RISER STEEL REINFORCEMENT SHALL BE DESIGNED FOR THE DESIGNATED DEPTH OF THE STRUCTURE PER ASTM STANDARDS. AT EACH JOINT BETWEEN PRECAST MANHOLE SECTIONS, PROVIDE A PERMANENT, FLEXIBLE, WATERTIGHT, FULL PERIMETER EXTERNAL JOINT WRAP IN ACCORDANCE WITH ASTM C-877, TYPE II AND PASSING ASTM C-1244 VACUUM TEST. WRAP SHALL BE AS MANUFACTURED BY MAR MAC CONSTRUCTION PRODUCTS, INC. OR OWNER APPROVED EQUAL.
3. GASKETS FOR SEATING PRECAST SECTIONS SHALL BE PREFORMED GASKETS JOINT STRAPS CONFORMING TO FEDERAL SPECIFICATIONS SS-S00210, TYPE I ROPE FORM, OR KENT SEAL MASTIC.
4. RESILIENT GASKET PIPE-TO-MANHOLE CONNECTORS, MANUFACTURED IN ACCORDANCE WITH ASTM C-923, SHALL BE PROVIDED.
5. RISERS SHALL NOT HAVE THROUGH-WALL LIFT HOLES. ALL LIFT HOLES IN PRECAST SECTIONS SHALL BE WETTED AND COMPLETELY FILLED WITH NON-SHRINK GROUT, SMOOTHED.

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AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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6. TOP SLABS SHALL BE ONE-PIECE PRECAST CONCRETE, CONSTRUCTED TO THE DIMENSIONS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH ASTM STANDARDS. TOP SLAB STEEL REINFORCEMENT SHALL BE DESIGNED FOR THE DESIGNATED SURFACE LOAD OF THE STRUCTURE PER ASTM STANDARDS.
7. MANHOLES EXTERIOR SHALL BE COATED WITH BITUMINOUS WATERPROOFING MATERIAL TO ENSURE WATER TIGHTNESS.
8. FURNISH AND INSTALL MANHOLE STEPS AT 16 INCHES ON CENTER IN THE VALVE VAULT. PROVIDE PLASTIC STEPS WITH STEEL BAR REINFORCEMENT, AS MANUFACTURED BY M.A. INDUSTRIES, OR OWNER APPROVED EQUAL.
9. PROVIDE A 2-INCH MINIMUM PVC DRAIN FROM THE VALVE VAULT TO THE WET WELL. EQUIP THE DRAIN WITH A CHECK VALVE IN THE WET WELL TO PREVENT BACKFLOW INTO THE VALVE VAULT. SLOPE THE FLOOR OF THE VALVE VAULT TO DRAIN.
10. WET WELL CONCRETE SHALL HAVE AN ANTIMICROBIAL ADMIXTURE.
    a. ANTIMICROBIAL ADMIXTURE: 1 GALLON PER CUBIC YARD OF CONCRETE OF CONMICSHIELD® BY CONSHIELD TECHNOLOGIES INC OR OWNER APPROVED EQUAL. ADDITIVE SHALL BE INCLUDED IN THE CONCRETE MIX DESIGN AS PART OF THE TOTAL WATER CONTENT. THE ADDITIVE SHALL BE ADDED TO THE CONCRETE MIX WATER TO ENSURE EVEN DISTRIBUTION THROUGHOUT THE CONCRETE MIXTURE.

2.6 CHECK VALVES

A. CHECK VALVES SHALL BE SWING-FLEX CHECK VALVE OR OWNER APPROVED EQUAL. VALVE SHALL BE EQUIPPED WITH A MANUAL BACKFLOW ACTUATOR FOR MANUAL BACKFLOW OPERATION.
   1. MANUFACTURERS: VAL-MATIC, MUELLER, CLOW, OR OWNER APPROVED EQUAL.

2.7 RESILIENT WEDGE GATE VALVES

A. VALVES SHALL CONFORM TO THE LATEST REVISION OF AWWA STANDARD C515 COVERING RESILIENT SEATED GATE VALVES FOR WATER SUPPLY SERVICE.

B. THE VALVES SHALL HAVE A DUCTILE IRON BODY, BONNET, AND O-RING PLATE. THE WEDGE SHALL BE TOTALLY ENCAPSULATED WITH RUBBER.

C. THE SEALING RUBBER SHALL BE PERMANENTLY BONDED TO THE WEDGE PER ASTM D-429.

D. VALVES SHALL BE SUPPLIED WITH O-RING SEALS AT ALL PRESSURE RETAINING JOINTS. NO FLAT GASKETS SHALL BE ALLOWED.

E. THE VALVES SHALL BE NON-RISING STEM OPENING BY TURNING LEFT AND PROVIDED WITH 2" SQUARE OPERATING NUT OR A HANDWHEEL WITH THE WORD "OPEN" AND AN ARROW TO INDICATE THE DIRECTION TO OPEN.

F. STEMS SHALL BE CAST COPPER ALLOY WITH INTEGRAL COLLARS IN FULL COMPLIANCE WITH AWWA. ALL STEMS SHALL OPERATE WITH COPPER ALLOY STEM NUTS INDEPENDENT OF WEDGE AND OF STEM (IN NRS VALVES).

G. ALL STEMS SHALL HAVE TWO O-RINGS LOCATED ABOVE THE THRUST COLLAR AND ONE O-RING BELOW. STEM O-RINGS SHALL BE REPLACEABLE WITH VALVE FULLY OPENED AND SUBJECTED TO FULL PRESSURE.

H. THE STEMS ON 4"-20" SHALL HAVE A LOW TORQUE THRUST BEARING LOCATED ABOVE AND BELOW THE STEM COLLAR TO REDUCE FRICTION DURING OPERATION.

I. WATERWAY SHALL BE SMOOTH, UNOBSTRUCTED AND FREE OF ALL POCKETS, CAVITIES AND DEPRESSIONS IN THE SEAT AREA. VALVES 4" AND LARGER SHALL ACCEPT A FULL SIZE TAPPING CUTTER.

J. THE BODY, BONNET AND O-RING PLATE SHALL BE FUSION-BONDED EPOXY COATED, BOTH INTERIOR AND EXTERIOR ON BODY AND BONNET. EPOXY SHALL BE APPLIED IN ACCORDANCE WITH AWWA C550 AND BE NSF 61 CERTIFIED.

K. EACH GATE VALVE SHALL BE INSTALLED IN A VERTICAL POSITION WITH A ROADWAY TYPE VALVE BOX. GATE VALVES SET WITH VALVE BOXES SHALL BE PROVIDED WITH A 2-INCH SQUARE OPERATING NUT AND SHALL BE OPENED BY TURNING TO THE LEFT (COUNTER-CLOCKWISE). THERE SHALL BE A MAXIMUM 48" DEPTH OF VALVE OPERATING NUT. CONTRACTOR MUST USE EXTENSION STEMS, IF NECESSARY, TO RAISE OPERATOR NUT WITHIN 48" OF FINAL GRADE.

L. ALL BURIED GATE VALVES SHALL HAVE MECHANICAL JOINT ENDS.

M. PRIOR TO SHIPMENT FROM THE FACTORY, EACH VALVE SHALL BE TESTED BY HYDROSTATIC PRESSURE EQUAL TO THE REQUIREMENTS OF AWWA C515 (AND UL/FM WHERE APPLICABLE).

N. VALVES SHALL BE AS MANUFACTURED BY MUELLER, M&H, CLOW, AMERICAN VALVE & HYDRANT, KENNEDY, OR APPROVED EQUAL.

2.8 PRESSURE GAUGES:

A. PROVIDE A 2-INCH SADDLE TAP DOWNSTREAM OF WHERE THE PUMP FORCE MAINS JOIN. INSTALL A 2-INCH STAINLESS STEEL BALL VALVE AND A 2-INCH X 1-INCH STAINLESS STEEL BUSHING WITH A 1-INCH STAINLESS STEEL PIPE NIPPLE AND A 4 1/2 IN. DIAMETER, 0 TO 60 PSI, BOURDON TUBE TYPE PRESSURE GAUGE WITH SHUT-OFF COCKS, AS SHOWN ON THE PLANS.

2.9 ELECTROMAGNETIC FLOW METER

A. THE FOLLOWING DETAILS APPLY TO THE FLOW METER, IF REQUESTED.
   1. APPROVED MANUFACTURERS ABB – MAGMASTER MFE SERIES MODEL, KROHNE – AQUAFLUX MODEL, OWNER APPROVED EQUAL

B. FURNISH AND INSTALL A PULSED DC ELECTROMAGNETIC FLOW METER FOR FLOW MEASUREMENT. THE FLOW METER SHALL CONSIST OF A FLOW TUBE AND A CONVERTER, WHICH SHALL INDICATE, TOTALIZE AND TRANSMIT FLOW TO A DIGITAL RECORDER. THE FLOW TUBE SHALL USE A SPOOL PIECE CONFIGURATION WITH FIELD-INTERCHANGEABLE SENSORS CONTAINING COILS AND ELECTRODES. THE FLOW TUBE SHALL NOT REQUIRE REMOVAL FROM SERVICE IN ORDER TO REPAIR/REPLACE LINERS OR REPAIR/REPLACE COILS. MAGNETIC FLOW METERS REQUIRING LINERS WILL NOT BE ACCEPTABLE.

C. PROVIDE AND INSTALL FLANGE ADAPTER IN THE MAIN LINE AND PROVIDE SPOOL PIECE (LEFT IN THE METER VAULT) THE LENGTH AND DIAMETER OF THE MAGNETIC FLOW METER.

D. THE MAGNETIC FLOW TRANSMITTER SHALL BE FURNISHED WITH A DIGITAL LCD DISPLAY FOR FLOW RATE, A SIX DIGIT TOTALIZER, ALARM RELAYS AND 4 TO 20 MA ANALOG OUTPUT. THE METER SHALL INCLUDE DIGITAL DATA LOGGING FOR A MINIMUM OF 60 DAYS.

E. THE FLOW TUBE SHALL BE EMCO UNIMAG M CARBON STEEL FLANGED FLOW TUBE, FURNISHED WITH TWO UNIMAG SENSORS FOR 0.5% ACCURACY. THE FLOW TUBE CONSTRUCTION SHALL BE SUITABLE FOR SUBMERSIBLE OPERATION WITH A REMOTE TRANSMITTER INSTALLATION. EACH FLOW SENSOR SHALL CONTAIN A COIL, A PAIR OF SENSING ELECTRODES, AND AN INTEGRAL GROUNDING ELECTRODE. THE SENSORS SHALL USE PULSED DC EXCITATION.

F. THE FLOW TUBE SHALL BE INSTALLED IN A METER VAULT AS SHOWN ON THE PLANS. THE TRANSMITTER AND DIGITAL RECORDER SHALL BE INSTALLED IN THE ELECTRIC CONTROL PANEL SPECIFIED IN THESE SPECIFICATIONS.

G. PROVIDE A MINIMUM 1/3 HORSEPOWER, 115 VAC SUMP PUMP IN THE METER VAULT IF IT CANNOT BE DRAINED BY GRAVITY. PROVIDE A WATER IN VAULT ALARM.

2.10 PORTABLE PUMP CONNECTIONS

A. THE VALVE VAULT SHALL CONTAIN A 6-INCH BYPASS DUCTILE IRON RISER THAT EXTENDS ABOVE THE PAD ON THE VALVE VAULT WITH A CAM LOK FITTING. ISOLATION VALVES FOR BYPASS PUMPING SHOULD BE ACCESSIBLE FROM ON TOP OF THE PAD.

B. A 6-INCH DUCTILE IRON SUCTION PIPE SHALL BE INSTALLED IN THE WET WELL FOR USE IN EMERGENCY PUMPING SITUATIONS. THE SUCTION PIPE SHALL BE SUPPORTED OFF THE WALL OF THE LIFT STATION AND TERMINATE ABOVE THE PAD WITH A CAM-LOK FITTING.

2.11 PERMANENT MOUNTED BYPASS PUMP (IF REQUIRED BY OWNER)

A. PERMANENT PUMP REQUIRED IF LIFT STATION HAS A CAPACITY OF 250 GPM OR GREATER.
   1. MANUFACTURER TO BE GODWIN, THOMPSON OR OWNER APPROVED EQUAL.

B. PUMP SHALL START AUTOMATICALLY VIA THE REDUNDANT FLOAT BACKUP.

2.12 CONTROL PANEL

A. THE CONTROL PANEL(S) SHALL BE CONSTRUCTED IN COMPLIANCE WITH UNDERWRITER'S LABORATORIES CATEGORIES 698A AND 913 STANDARDS – "ENCLOSED INDUSTRIAL CONTROL PANEL RELATING TO HAZARDOUS LOCATIONS WITH INTRINSICALLY SAFE CIRCUIT EXTENSIONS".

B. WHILE THE USE OF U.L. LISTED COMPONENTS IS ENCOURAGED, THEIR USE ALONE AND/OR THE ALTERNATE USE OF A U.L. 508A – "ENCLOSED INDUSTRIAL CONTROL PANEL" SERIALIZED LABEL WILL NOT BE CONSIDERED AN ACCEPTABLE OR SATISFACTORY ALTERNATE TO THE "ENCLOSED INDUSTRIAL CONTROL PANEL RELATING TO HAZARDOUS LOCATIONS WITH INTRINSICALLY SAFE CIRCUIT EXTENSIONS" SERIALIZED LABEL SPECIFIED ABOVE.

C. UPON REQUEST FROM THE OWNER, THE CONTRACTOR SHALL SUPPLY DOCUMENTATION FROM THE CONTROL PANEL MANUFACTURER TO THE OWNER DEMONSTRATING THAT THE MANUFACTURER IS A U.L. RECOGNIZED MANUFACTURING FACILITY FOR THE TYPE OF EQUIPMENT REQUIRED. ONLY THE LABELED PRODUCTS OF U.L.698A AND 913 "ENCLOSED INDUSTRIAL CONTROL PANEL RELATING TO HAZARDOUS LOCATIONS WITH INTRINSICALLY SAFE CIRCUIT EXTENSIONS" RECOGNIZED PANEL MANUFACTURER SHALL BE CONSIDERED ACCEPTABLE.

D. PROVIDE A NEMA 4X, 14-GAUGE, STAINLESS STEEL ENCLOSURE WITH DEAD FRONT DOOR. ENCLOSURE SHALL BE OF APPROPRIATE DIMENSIONS FOR THE EQUIPMENT PROVIDED. ALL HARDWARE AND HINGES SHALL BE STAINLESS STEEL. CHASSIS PLATES SHALL BE .125" GRADE 6061-T6 ALUMINUM. EACH DOOR SHALL HAVE A DRIP SHIELD, CONTINUOUS HINGE DOOR WITH 3-POINT LATCHING MECHANISM. THE LATCHING MECHANISM SHALL BE A LEVER TYPE LOCKING DEVICE (LOCKABLE EXTERIOR DOOR), NO SCREW DOWN CLAMPS SHALL BE ALLOWED TO SECURE DOOR. THE ENCLOSURE SHALL HAVE A SEPARATE SECTION FOR CONTROLS AS DESCRIBED BELOW. RESERVE 12 INCHES BELOW EACH ENCLOSURE FOR CONDUIT ENTRANCE. THE PANEL SHALL BE SUPPLIED BY PUMP MANUFACTURER, OR OWNER APPROVED EQUAL.

E. PROVIDE THE FOLLOWING EQUIPMENT IN THE POWER SECTION OF THE ENCLOSURE:
   1. MAIN CIRCUIT BREAKER OR DISCONNECT.
   2. BRANCH CIRCUIT BREAKERS FOR EACH PUMP MOTOR.
   3. NEMA SIZE MOTOR STARTERS WITH TYPE 10 OVERLOAD RELAYS FOR EACH PUMP MOTOR.
   4. LOW VOLTAGE RELAY FOR SINGLE PHASE ELECTRICAL SERVICE APPLICATIONS OR PHASE FAILURE RELAY FOR THREE PHASE ELECTRICAL SERVICE APPLICATIONS, EACH WITH INTEGRAL SURGE PROTECTION, TO PROVIDE MOTOR AND CONTROL EQUIPMENT PROTECTION IN THE EVENT OF LOW VOLTAGE, VOLTAGE UNBALANCE, PHASE LOSS, OR PHASE REVERSAL.
   5. PHASE/VOLTAGE MONITOR.
   6. LIGHTNING ARRESTOR.
   7. INCOMING POWER TERMINAL BLOCK.
   8. GROUND FAULT INTERRUPTION PROTECTION SHALL BE PROVIDED TO DE-ENERGIZE THE CIRCUIT IN THE EVENT OF ANY FAILURE IN THE ELECTRICAL INTEGRITY OF THE CABLE TO EACH MOTOR.
   9. LED PANEL LIGHT
   10. SITE LIGHTING CIRCUIT BREAKER
   11. CONTROL POWER TRANSFORMER WITH PRIMARY FUSES.
   12. CONTROL POWER CIRCUIT BREAKER AND FUSE.
   13. MOTOR HEAT SENSOR CIRCUITS.
   14. INDIVIDUAL PUMP AMMETER.

F. PROVIDE THE FOLLOWING EQUIPMENT IN THE CONTROL SECTION OF THE ENCLOSURE:
   1. TELEMETRY CIRCUIT, 15A, SINGLE POLE CIRCUIT BREAKER 120V GFI
   2. SPARE CIRCUIT 20A, SINGLE POLE CIRCUIT BREAKER AND 20A, 120V GFI DUPLEX RECEPTACLE.
   3. CONTROL CIRCUIT, 15A, SINGLE POLE CIRCUIT BREAKER FOR CONTROLS.
   4. CIRCUIT BREAKERS AS REQUIRED FOR ALL OTHER POWER NEEDS.
   5. LEVEL CONTROLLER WITH ISOLATION TRANSFORMER.
   6. HAND-OFF-AUTOMATIC (H-O-A) SWITCHES FOR EACH PUMP.
   7. RUN LIGHTS (GREEN) PUSH-TO-TEST FOR EACH PUMP.
   8. RUN FAILURE LIGHTS (RED) PUSH-TO-TEST FOR EACH PUMP.
   9. SEAL FAILURE LIGHTS (AMBER) PUSH-TO-TEST FOR EACH PUMP.
   10. ELAPSED TIME METERS (99999.9 HOURS) FOR EACH PUMP.
   11. PRIMARY TRANSDUCER, INTRINSICALLY SAFE, 4-20 MA OUTPUT
   12. BACK-UP FLOAT CONTROL RELAY INTRINSICALLY SAFE, TO AUTOMATICALLY OPERATE THE PUMPS IN THE EVENT OF LEVEL CONTROLLER FAILURE. THIS RELAY SHALL ALSO ACTIVATE THE HIGH-WATER ALARM AND ALARM LIGHT.
   13. PANEL HEATER WITH THERMOSTAT.
   14. OMNI-SITE CRYSTAL BALL MICRO RTU, WIRELESS ALARM MONITOR, WITH 12V DC POWER SUPPLY AND BATTERY BACKUP, IF REQUESTED BY OWNER.
   15. A DIGITAL DATA LOGGER SHALL BE INSTALLED IN THE CONTROL CABINET, IF REQUESTED BY OWNER.
   16. MAGNETIC FLOW METER TRANSMITTER FOR USE WITH REMOTELY MOUNTED MAGNETIC FLOW TUBE, IF REQUESTED BY OWNER. PROVIDE 120 VAC, 1 POLE, 15-AMP CIRCUIT BREAKERS FOR THE FLOW TRANSMITTER, IF REQUESTED BY OWNER.
   17. RED ALARM LIGHT, TEST PUSH BUTTON (NO HORN).
   18. 22 MM LED INDICATING LIGHTS, NEMA TYPE 4/4X/13 IP66 SUITABLE FOR WASH DOWN ENVIRONMENTS.
   19. 22MM OIL TIGHT LENSES.
   20. ETM'S (ELAPSED TIME METERS)

G. SOLDERLESS, MARKED TERMINALS SHALL BE USED FOR CONTROL WIRING. MOUNT CONTROL DEVICES ON THE INNER DOOR WITHIN THE ENCLOSURE. THE SEAL FAILURE SENSOR SHALL BE WIRED TO RELAYS TO ACTIVATE SEAL FAILURE LIGHTS. THE HEAT SENSING THERMOSTAT IN THE MOTOR WINDINGS SHALL BE WIRED IN SERIES TO THE MOTOR STARTERS.

H. ON THE OUTSIDE OF THE ENCLOSURE MOUNT THE FOLLOWING:
   1. HIGH WATER ALARM LED LIGHT, RED IN COLOR.

2.13 PUMP STATION CONTROLLER

A. FURNISH A NE250 (VFD PUMP CONTROLLER) OR NE152 (NON-VFD PUMP CONTROLLER) GENERAL-PURPOSE PUMP CONTROLLER DESIGNED TO CONTROL UP TO 2 PUMPS IN PUMP DOWN APPLICATIONS. THE CONTROLLER SHALL HAVE AN INTEGRAL PROGRAMMABLE LOGIC CONTROLLER (PLC) AND HUMAN MACHINE INTERFACE (HMI) UNIT IN ONE. IT SEQUENCES PUMPS ON AND OFF IN RESPONSE TO CHANGES IN LEVEL, PRESSURE, OR FLOW. THE PRIMARY SENSOR INPUT IS A 4 TO 20 MA. CURRENT LOOP WHICH CAN BE CONNECTED TO ANY SENSOR WHICH HAS A 4 TO 20 MA OUTPUT CONNECTED TO A PRESSURE TRANSDUCER. THE CONTROLLER ALSO ALLOWS FOR A FLOAT BACKUP SYSTEM. IT IS THE INTENTION OF THIS SPECIFICATION THAT A STANDARD CONTROLLER BE PROVIDED, WITH ALL THE CONTROL AND COMMUNICATIONS FEATURES DESCRIBED AS A FULLY INTEGRATED ASSEMBLY. THE CONTROLLER SHALL BE MANUFACTURED BY N.E. CONTROLS LLC (315) 299-5161 HTTPS://WWW.NECONTROLS.COM/ (7048 INTERSTATE ISLAND RD SYRACUSE, NY 13209) OR OWNER APPROVED EQUAL.

B. THE PUMP CONTROLLER SHALL BE A STANDARD, CATALOGUED PRODUCT OF A WATER AND WASTEWATER PUMPING AUTOMATION EQUIPMENT MANUFACTURER REGULARLY ENGAGED IN THE DESIGN AND MANUFACTURE OF SUCH EQUIPMENT. THE PUMP CONTROLLER SHALL BE SPECIFICALLY DESIGNED FOR WASTEWATER PUMPING AUTOMATION UTILIZING BUILT-IN PRECONFIGURED CONTROL AND TELEMETRY STRATEGIES ALLOWING PUMP UP OR DOWN MODE PUMP CONTROL OF 1 TO 2 PUMPS. "ONE OF A KIND" SYSTEMS USING CUSTOM SOFTWARE WITH A GENERIC PROGRAMMABLE CONTROLLER WILL NOT BE ACCEPTABLE.

C. THE PUMP CONTROLLER SHALL BE ABLE TO OPERATE ON EITHER 120 AC OR 10–30 VDC POWER SOURCES. THE UNIT SHALL BE BATTERY BACKED TO PROVIDE CONTINUED SYSTEM MONITORING AND ALARM ANNUNCIATION IN THE EVENT OF PRIMARY POWER FAILURE. UNIT SHALL HAVE BUILT IN BATTERY CHARGING CIRCUITRY TO MAINTAIN AND CHARGE BATTERY. BATTERY SHALL BE SIZED TO PROVIDE A MINIMUM OF 4 HOURS OF BACKUP POWER. BACK UP BATTERY POWER WILL EXTEND TO NECESSARY PROCESS SENSORS, LOCAL ALARM LIGHTS, HORNS AND TELEMETRY EQUIPMENT. A POWER ON LED SHALL BE BUILT ON BOARD PROVIDING LOCAL INDICATION THAT POWER IS AVAILABLE TO THE UNIT.

D. THE PUMP CONTROLLER SHALL BE FURNISHED WITH A USER-FRIENDLY TOUCHSCREEN OPERATOR INTERFACE ALLOWING ADJUSTMENT AND VIEWING OF ALL SYSTEM PARAMETERS AND STATUS. THE OPERATOR INTERFACE SHALL BE NEMA 4X RATED SUITABLE FOR FRONT DOOR MOUNTING INCLUDING LOCATIONS REQUIRING WASH-DOWN AND MOISTURE PROTECTION.
   1. THE PROCESS VARIABLE SIGNAL, PUMP 1, 2 ON/OFF AND HIGH & LOW SET POINTS, SHALL BE DISPLAYED SIMULTANEOUSLY VIA FRONT PANEL MOUNTED LONG LASTING ULTRA BRIGHT LED BAR GRAPHS. THESE BAR GRAPHS SHALL BE VERTICALLY MOUNTED IN PARALLEL FASHION TO PROVIDE RELATIONAL VIEWING OF ALL SET POINTS VS. THE MEASURED PROCESS. EACH DISPLAY COLUMN SHALL HAVE A MINIMUM OF 40 SEGMENTS OF RESOLUTION. EACH SET POINT COLUMN SHALL HAVE A STATUS LED MOUNTED ON TOP OF THE ASSOCIATED SET POINT PROVIDING INDICATION OF SET POINT ACTIVATION STATUS. UNITS THAT REQUIRE OPERATOR ACTION TO VIEW THE ABOVE PARAMETERS ARE NOT ACCEPTABLE.
   2. TO ASSURE THE HIGHEST RESOLUTION AND ACCURACY, THE PROCESS DISPLAY SHALL BE CONFIGURED TO DISPLAY THE FULL RANGE OF THE ACTUAL MEASURED PROCESS. RANGE CAN ALSO BE OFFSET ALLOWING DISPLAY OF A PRESSURE OR LEVEL RANGE THAT DOES NOT START AT ZERO. THE DISPLAY RANGES SHALL BE FIELD CONFIGURABLE.
   3. SYSTEM PUMP ON/OFF AND ALARM SET POINT PARAMETERS SHALL BE EASILY ADJUSTABLE VIA INDIVIDUAL UP AND DOWN PUSHBUTTON ARROWS LOCATED NEXT TO THE ASSOCIATED SET POINT DISPLAY COLUMN(S).
   4. THE UNIT SHALL HAVE A BUILT-IN PROCESS SIMULATION CAPABILITY ALLOWING THE OPERATOR TO VERIFY SYSTEM OPERATION BY FORCING THE PROCESS VARIABLE UP OR DOWN VIA PUSHBUTTON ARROWS LOCATED NEXT TO THE PROCESS DISPLAY. TO PREVENT ACCIDENTALLY LEAVING THE UNIT IN SIMULATION MODE, THE PUMP CONTROLLER SHALL BE CONFIGURED TO AUTOMATICALLY RESTORE MONITORED PROCESS DISPLAY WITHIN 2 MINUTES AFTER LAST KEYPAD USAGE OR IMMEDIATELY UPON OPERATOR INITIATED RESTORE.

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

LIFT STATION SPECIFICATIONS

16

PLOT SCALE: 1:2.5849 EDIT DATE: 10/26/16 – 11:29 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20160196\4.0\DS.01(R4).DWG

5. THE DISPLAY UNIT SHALL INCORPORATE A HIGH CONTRAST LCD PANEL ALLOWING FOR VIEWING OF HIGHER-LEVEL FUNCTIONS INCLUDING THE FOLLOWING:
   a. PROCESS DISPLAY TO XX.X OF THE FULL SCALE PROCESS RANGE.
   b. TIME AND DATE STAMPED ALARMS & EVENTS
   c. PUMP STATISTICS (INCLUDING RUN TIME, NUMBER OF STARTS, DAILY AVERAGE NUMBER OF STARTS)
   d. SYSTEM DIAGNOSTICS
   e. CONTROLLER SECURITY
   f. UNAUTHORIZED STATION ENTRY DETECTION

E. THE PUMP CONTROLLER SHALL PROVIDE ON BOARD 24 VDC LOOP POWER OUTPUT FOR EXTERNAL LOOP POWERED SENSOR. A BUILT-IN ANALOG SUPPLY VOLTAGE STATUS LED SHALL INDICATE AVAILABILITY OF LOOP POWER. UNIT SHALL BE ABLE TO MONITOR A USER SELECTABLE – 4-20 MA OR 0-10 VOLT ANALOG INPUT REPRESENTING THE PROCESS TO BE CONTROLLED. THE ANALOG DIGITAL CONVERSION SHALL NOT BE LESS THAN 16 BIT TO ALLOW ACCURATE MEASUREMENT OF THE PROCESS VARIABLE. THE ANALOG INPUT CIRCUITRY SHALL PROVIDE OPTICAL ISOLATION FROM THE MAIN BOARD TO THE FIELD DEVICE. A MINIMUM OF 1000 VOLTS ELECTRICAL ISOLATION SHALL BE REQUIRED. THE ANALOG PROCESS SIGNAL SHALL BE DISPLAYED LOCALLY VIA 40 SEGMENT VERTICAL LED DISPLAY AND THE LCD DIGITAL DISPLAY AS SPECIFIED ABOVE. THIS SIGNAL SHALL ALSO BE AVAILABLE FOR TELEMETRY TRANSMISSION.

F. THE PUMP CONTROLLER SHALL HAVE THE ABILITY TO MONITOR UP TO 16 DIGITAL INPUTS TO BE USED TO PROVIDE MONITORING OF LOCAL STATION STATUS. EACH DISCRETE INPUT SHALL PROVIDE OPTICAL ISOLATION FROM THE MAIN BOARD TO THE FIELD DEVICE. A MINIMUM OF 1500 VOLTS ELECTRICAL ISOLATION SHALL BE REQUIRED. AN ON BOARD LED SHALL BE PROVIDED INDICATING THAT DIGITAL INPUT ISOLATION IS NOT COMPROMISED. ALL DISCRETE INPUTS SHALL BE AVAILABLE FOR TELEMETRY TRANSMISSION. THE FOLLOWING INPUTS SHALL BE MONITORED:
1. PUMP 1, 2 RUN – THIS SIGNAL SHALL BE USED TO PROVIDE LOCAL DISPLAY OF PUMP RUN STATUS, PUMP TOTAL RUN TIME, AND PUMP AVERAGE DAILY STARTS FOR EACH PUMP.
2. PUMP 1, 2 IN AUTO – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO DETERMINE PUMP AVAILABILITY. A PUMP IN THIS MODE CANNOT BE CALLED INTO OPERATION.
3. PUMP 1, 2 HIGH TEMPERATURE/SEAL FAILURE – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO DISABLE THE PUMP REQUIRED WHEN A HIGH TEMPERATURE IS THE CAUSE OF THE FAILURE AND PROVIDE LOCAL ALARM DISPLAY. CONTROLLER SHALL BE ABLE TO DIFFERENTIATE ALARM. A SEAL FAILURE SHALL NOT DISABLE PUMP OPERATION.
4. HIGH & LOW FLOAT/PRESSURE – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO PROVIDE BACK UP CONTROL OF THE PUMPS IN THE EVENT OF PRIMARY (ANALOG) SENSOR FAILURE.
5. PUMP INHIBIT – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO INHIBIT PUMPS FROM OPERATING.
6. POWER QUALITY – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO DISABLE PUMPS IN THE EVENT INCOMING STATION POWER IS UNSUITABLE FOR USE AS DETERMINED BY AN OPTIONAL EXTERNAL POWER MONITORING DEVICE.
7. ALARM SILENCE – THIS SIGNAL SHALL BE USED BY THE CONTROLLER TO MONITOR AN OPTIONAL EXTERNAL SILENCE PUSH BUTTON AND WILL TEMPORARILY DISABLE THE ALARM HORN OUTPUT.

G. THE PUMP CONTROLLER LCD SHALL OPERATE IN A MANUAL SCROLLING MENU MODE WITH THE VARIOUS DISPLAYS SHOWN IN SEQUENCE AS SELECTED BY THE KEYPAD'S UP/DOWN ARROW KEYS. THE DISPLAY SHALL INDICATE THE SPECIFIC FUNCTION ENTERED ON THE KEYPAD TO CONFIRM THAT SELECTION OF A PARTICULAR OUTPUT OR OTHER FUNCTION FROM THE KEYPAD DURING ADJUSTMENT OR REVIEW ROUTINES.

H. THE PUMP CONTROLLER SHALL PROVIDE OUTPUTS FOR INTERFACE TO LOCAL PUMPS AND ALARM ANNUNCIATION EQUIPMENT. RELAY ISOLATED CONTACT OUTPUTS FOR ACTIVATION OF PUMP 1, PUMP 2, COMMON ALARM SHALL BE PROVIDED. EACH CONTACT SHALL BE RATED FOR A MINIMUM OF 10 AMPS AT 120 VAC OR 5 AMPS AT 240 VAC. OPEN COLLECTOR OUTPUTS FOR LOW AND HIGH LEVEL ALARM SHALL BE PROVIDED FOR INTERFACE TO OFF BOARD MONITORING EQUIPMENT. OPEN COLLECTOR OUTPUTS SHALL HAVE A MINIMUM OPERATING RANGE OF 5-30 VDC @ 100 MA.

I. THE PUMP CONTROLLER SHALL PROVIDE 4-20 MA OUTPUT SIGNAL FOR INTERFACE TO EXTERNAL EQUIPMENT INCLUDING VFDS, FLOW METER OR OTHER MONITORING DEVICES. ANALOG OUTPUT CAN BE CONFIGURED TO PROVIDE OUTPUT REPRESENTING PROCESS VARIABLE FOR RETRANSMISSION OR AS A PROCESS CONTROL OUTPUT FOR INTERFACE TO VFDS, VALVES, OR OTHER PROCESS-CONTROLLED DEVICE.

J. THE PUMP CONTROLLER SHALL SUPPORT CONTACT CLOSURE INPUTS FROM FLOAT OR PRESSURE SWITCHES REPRESENTING HIGH AND LOW (LEVEL/PRESSURE). THE PUMP CONTROLLER SHALL ANNUNCIATE THESE INPUTS AS ALARMS AND USE THEM TO PROVIDE BACK UP CONTROL IN THE EVENT THE PRIMARY (ANALOG) SENSOR FAILS. UNIT WILL PROVIDE LOCAL ALARM INDICATION AND UTILIZE THE INPUTS TO CYCLE PUMPS ON AND OFF TO MAINTAIN SYSTEM OPERATION.

K. THE PUMP CONTROLLER SHALL INCLUDE BUILT-IN PUMP FAILURE DETECTION LOGIC. IN THE EVENT THE PUMP HAS BEEN CALLED INTO OPERATION AND THE PUMP RUN SIGNAL IS NOT RECEIVED WITHIN A PRE-ADJUSTABLE TIME PERIOD. A MOTOR FAILURE SHALL BE PRODUCED. THE FAILED MOTOR SHALL BE DISABLED, AN ALARM SHALL BE DISPLAYED AND THE NEXT AVAILABLE PUMP BASED ON THE SELECTED ALTERNATION SEQUENCE SHALL BE REQUESTED TO START.

L. PUMP CONTROLLER SHALL PROVIDE PUMP PERFORMANCE RELATED INFORMATION. PUMP STATION PERFORMANCE DATA SHALL BE VIEWABLE LOCALLY THROUGH BUILT IN LCD OR AVAILABLE FOR TELEMETRY TRANSMISSION TO MASTER STATION. THE FOLLOWING INFORMATION IS TO BE PROVIDED:
1. PUMP 1, 2 LOW FLOW RATE ALARM (SET POINT) – EACH PUMP
2. PUMP 1, 2 RUN TIME – EACH PUMP
3. PUMP 1, 2 NUMBER OF STARTS – EACH PUMP
4. PUMP 1, 2 AVERAGE NUMBER OF STARTS – EACH PUMP

M. ALL CONNECTIONS SHALL BE MADE VIA PLUG-IN TERMINAL BLOCKS WITH A MINIMAL RATING OF 10 AMPS, 300 VOLTS AND CAPABLE OF ACCEPTING 30-12 AWG WIRE.

2.14 LEVEL DEVICE SYSTEM

A. THE LIQUID LEVEL OF THE WET WELL SHALL BE SENSED BY A SUBMERSIBLE LEVEL PRESSURE TRANSDUCER DEVICE. THE LEVEL DEVICE SHALL BE DWYER INSTRUMENTS, INC. PBLTX-5-50-PU OR OWNER APPROVED EQUAL.

B. THE LEVEL DEVICE SHALL BE PROVIDED WITH A 50-FOOT CORD.

C. THE LEVEL DEVICE ASSEMBLY SHALL BE INSTALLED WHERE DIRECTED BY THE ENGINEER AND CONNECTED WITH OTHER SYSTEM ELEMENTS AND PLACED IN SUCCESSFUL OPERATION.

D. THE CONTROL PANEL SHALL INCLUDE A UL LISTED INTRINSIC SAFETY BARRIER THAT HAS BEEN UL TESTED WITH THE SPECIFIC SUBMERSIBLE LEVEL DEVICE FURNISHED FOR THIS APPLICATION TO RENDER THE LEVEL DEVICE SUITABLE FOR USE IN CLASS 1, DIVISION 1 OR 2, GROUPS A, B, C AND D; CLASS II, DIVISION 1 OR 2, GROUPS E, F AND G; AND CLASS III, HAZARDOUS LOCATIONS (WHICH INCLUDES A SEWAGE WET WELL).

2.15 REDUNDANT FLOAT BACK-UP

A. AN INDEPENDENT HIGH-LEVEL ALARM AND REDUNDANT PUMP CONTROL CAPABILITY WITH FEATURES AS HEREINAFTER LISTED SHALL BE PROVIDED IN ADDITION TO THE SPECIFIED PRIMARY CONTROL SYSTEM. IT SHALL BE POWERED BY A 120 VAC CIRCUIT BREAKER.

B. THE HIGH-LEVEL ALARM SHALL BE A FLOAT SYSTEM THAT ACTIVATES WHEN THE FLOAT RISES 45-DEGREES.

C. THE INDEPENDENT ALARM/CONTROL PANEL EQUIPMENT SHALL BE DESIGNED TO UL INDUSTRIAL CONTROL PANEL STANDARDS AND SHALL INCORPORATE 120 VAC INPUT POWER TRANSIENT PROTECTION, A FUSED PRIMARY AND A DC POWER SUPPLY WITH LIMITED 12 VDC TO POWER THE INTRINSIC SAFETY BARRIER LEVEL SENSING FLOAT CIRCUIT(S). THE FRONT FACE OF THE CONTROLLER ACCESSIBLE THROUGH THE OPERATOR'S DOOR AND SHALL INCORPORATE FOUR RED LED INDICATORS; A "CONTROL HOLD" LED, A REDUNDANT CONTROL "TURN ON" LED, A HIGH LEVEL ALARM/MONITOR LED, A "CONTROL CONTACTS" ENERGIZED LED AND A PUMP "OFF DELAY" TIME CONTROL ADJUSTMENT WITH A 0-5 MINUTE RANGE.

D. THE CONTROLLER SHALL OPERATE IN CONJUNCTION WITH NECESSARY DIRECT-ACTING FLOAT SWITCHES (AS SPECIFIED ELSEWHERE) TO PROVIDE BACK UP CONTROL OF LIFT PUMPS, DETECTION OF HIGH LEVEL AND TO PROTECT THE PUMPS FROM DAMAGE THAT MAY RESULT FROM LOW WET WELL LEVELS. THE SYSTEM SHALL MONITOR THE FLOAT SWITCH INPUTS AND PROVIDE LOCAL INDICATION OF SYSTEM OPERATION VIA LEDS. BUILT IN RELAY CONTACTS SHALL BE INTERFACED TO ALARM CIRCUITRY AND PUMP MOTOR STARTER PILOT CIRCUITRY. THE BACKUP SYSTEM SHALL NOT INTERFERE WITH PRIMARY CONTROLLER OPERATION WHEN WET WELL LEVELS ARE WITHIN NORMAL OPERATING RANGE. THE BACKUP SYSTEM WILL ONLY BECOME ACTIVE AND BYPASS THE PRIMARY CONTROL AND SENSOR SYSTEM AND ASSUME FULL CONTROL, IN THE EVENT WET WELL LEVELS GO OUTSIDE OF NORMAL OPERATING RANGE. BACK UP SENSORS SHALL BE MOUNTED AND CONFIGURED TO OPERATE OUTSIDE PRIMARY CONTROLLER SET POINT SETTINGS.

E. UPON DETECTION OF ABNORMALLY HIGH WET WELL LEVEL THE BACKUP SYSTEM SHALL PROVIDE INDEPENDENT DEDICATED HIGH-LEVEL ALARM INDICATION AND CONTACT CLOSURE OUTPUT FOR ACTIVATION OF COMMON ALARM SYSTEM. THE BACKUP SYSTEM SHALL ALSO PROVIDE INDEPENDENT DEDICATED CONTROL OUTPUT ACTIVE INDICATION AND DUAL ISOLATED OUTPUTS SUITABLE FOR DIRECT INTERFACE TO MOTOR STARTER PILOT CIRCUITS TO ACTIVATE BOTH LIFT PUMPS. THE HIGH-LEVEL ALARM SIGNAL SHALL BE DEACTIVATED UPON LOWERING OF WET WELL LEVEL BELOW THE HIGH ALARM SENSOR. THE PUMPS WILL REMAIN ON UNTIL WET WELL LEVEL DROPS BELOW A SEPARATE PUMP OFF SENSOR. PUMP OFF SENSOR SHALL BE MOUNTED AT A LEVEL THAT IS BELOW THE NORMAL OPERATING RANGE OF THE PRIMARY CONTROLLER SET POINT SETTING.

F. THE CONTRACTOR SHALL FURNISH, INSTALL, AND WIRE THE FLOAT SWITCHES AS SHOWN ON THE DRAWINGS. EACH FLOAT SHALL HAVE MOLDED POLYETHYLENE BODY, INTERNAL REDUNDANT POLYURETHANE FOAM FLOTATION, POTTED SWITCH AND CABLE CONNECTIONS AND FINE-STRANDED AWG #18 CABLE WITH HEAVY-DUTY SYNTHETIC RUBBER JACKET IN LENGTHS AS REQUIRED TO RUN UNSPLICED TO THE CONTROL PANEL. THE FLOATS SHALL INCLUDE INTERNAL WEIGHT ALLOWING SUSPENDED OPERATION WITHOUT THE USE OF SPECIAL PIPE OR SUSPENSION MOUNTING SYSTEMS.

G. FLOAT SWITCHES SHALL BE PROVIDED BY THE CONTROL PANEL SUPPLIER. THEY ARE TO BE A CATALOGUED ITEM OF THE CONTROL PANEL MANUFACTURER. THE FLOAT BRACKET SHALL BE MADE OF STAINLESS STEEL.

2.16 ALARM/DATA MONITORING

A. A MICROPROCESSOR-BASED MONITOR UNIT SHALL BE PROVIDED FOR MONITORING AND CONTROL OF THE LIFT STATION BASED ON ALARM CONTACT CLOSURES, UNIVERSAL VOLTAGE INPUT SIGNALS, 4-20MA SIGNALS AND RELAY OUTPUTS.

B. THE MICROPROCESSOR-BASED MONITOR SHALL BE A STANDARD, CATALOGUED PRODUCT OF A WATER AND WASTEWATER EQUIPMENT MANUFACTURER REGULARLY ENGAGED IN THE DESIGN AND MANUFACTURE OF SUCH EQUIPMENT. THE PUMP/ALARM MONITOR SHALL BE SPECIFICALLY DESIGNED FOR WASTEWATER PUMPING AUTOMATION UTILIZING STANDARD HARDWARE AND SOFTWARE. "ONE OF A KIND" SYSTEMS USING CUSTOM SOFTWARE WITH A GENERIC PROGRAMMABLE CONTROLLER OR PIECES FROM MANY MANUFACTURERS THAT ARE "INTEGRATED" TOGETHER WILL NOT BE ACCEPTABLE. THE CONTROLLER SHALL BE CRYSTAL BALL ™ AS MFG. BY OMNI-SITE, INC. OR OWNER APPROVED EQUAL.

C. THE CONTROLLER SHALL ACCEPT (14) UNIVERSAL DI CONFIGURABLE TO MONITOR DRY CONTACTS OR ANY VOLTAGE RANGE BETWEEN 12VDC/VAC TO 120 VAC/VDC OR TO ACT AS PULSE COUNTERS; (4) 4-20 MA ISOLATED ANALOG INPUTS, (4) 20 AMP RELAY OUTPUTS, (1) RAIN GAUGE INPUT, AND (1) CREW ON-SITE INTELLIGENT KEY READER INPUT IN ITS BASE FORM, AND THE ABILITY TO MONITOR UP TO TWO IP ENABLED INFRARED CAMERAS. IT SHALL HAVE PHOENIX TYPE REMOVABLE TERMINAL BLOCKS. ONE ADDITIONAL EXPANSION I/O MODULE CAN BE ADDED PROVIDING AN ADDITIONAL (10) UNIVERSAL DI VOLTAGE INPUTS, AND (4) 4-20MA INPUTS.

D. GEL CELL BATTERY: ON-BOARD 12VDC, 800MAH GEL CELL BATTERY PROVIDES BACKUP FOR UP TO 24 HOURS IN THE EVENT OF POWER LOSS. BATTERY IS AUTOMATICALLY RECHARGED USING TEMPERATURE COMPENSATED FLOATING BATTERY CHARGING CIRCUIT.

E. THE CONTROLLER SHALL MONITOR AND TRANSMIT THE FOLLOWING POINTS:
1. POWER FAIL
2. HIGH WET WELL LEVEL
3. BYPASS PUMP RUN
4. BYPASS PUMP FAIL
5. PUMP 1 SEAL FAIL
6. PUMP 2 SEAL FAIL
7. PUMP 1 RUN
8. PUMP 2 RUN
9. PUMP 1 THERMAL FAULT
10. PUMP 2 THERMAL FAULT
11. PUMP 1 ELAPSED TIME
12. PUMP 2 ELAPSED TIME
13. FLOAT BACKUP MODE
14. PUMP 1 AMP DRAW
15. PUMP 2 AMP DRAW LEVEL
16. PUMP STATION FLOW
17. LEVEL DEVICE FAIL
18. ONE (1) YEAR CELLULAR SERVICE THRU OMNI-SITE/VERIZON SHALL BE INCLUDED WITH EACH UNIT.

2.17 ADDITIONAL ELECTRICAL MATERIALS

A. GROUNDING FOR CHAIN LINK FENCE SHALL CONSIST OF 3/4 INCH DIAMETER BY 10 FEET LONG COPPER CLAD STEEL GROUND RODS CONNECTED TO EACH CORNER POST WITH MINIMUM NO.6 COPPER BONDING JUMPERS, ALSO USED TO TIE EACH MESH FENCE SECTION TO ITS ADJACENT POST AND HORIZONTAL BOTTOM AND TOP SUPPORT POLE SECTION. EACH OF THE GATES MESH FENCE SECTIONS SHALL BE TIED TO ITS RESPECTIVE HORIZONTAL AND VERTICAL SUPPORT POLES. THE HINGED SIDE VERTICAL SUPPORT POLE OF EACH GATE SECTION SHALL BE TIED TO ITS ADJACENT FENCE POST WITH A FLEXIBLE NO.6 COPPER BONDING JUMPER. THE FENCE GROUNDING SYSTEM SHALL BE BONDED TO THE ELECTRICAL SERVICE GROUND TRIANGLE.

B. THE GROUND TRIANGLE FOR SERVICE ENTRANCES AND ALL EQUIPMENT SHALL BE CONSTRUCTED OF THREE 3/4 INCH DIAMETER X 10 FEET LONG COPPER CLAD STEEL GROUND RODS BONDED TOGETHER WITH A MINIMUM NO.6 BARE COPPER CONDUCTOR, (TYPICAL FOR 100 AMP SERVICE, LARGER SERVICES REQUIRE LARGER GROUNDING/BONDING CONDUCTORS) ATTACHED TO EACH GROUND ROD WITH UTILITY COMPANY APPROVED GROUND CLAMPS OR EXOTHERMIC WELD. RESISTANCE TO GROUND SHALL BE 10 OHMS OR LESS.

C. ELECTRICAL CONDUCTORS SHALL BE SOLID OR STRANDED COPPER, RATED FOR 600 VAC, WITH TYPE THHN-THWN OR XHHW INSULATION.

D. INSTRUMENTATION CABLE SHALL BE TWO CONDUCTOR NO. 16 AWG TWISTED PAIR, STRANDED COPPER CONDUCTORS WITH PVC INSULATION, ALUMINUM POLYESTER OR ALUMINUM MYLAR TAPE SHIELD, OR BRAIDED COPPER SHIELD, TINNED COPPER DRAIN WIRE, BLACK PVC OVERALL JACKET, 300 V WORKING CLASS.

E. THE LIFT STATION PUMPS POWER AND WET WELL LEVEL DEVICE AND FLOAT SWITCHES CONTROL JUNCTION BOXES SHALL BE ALUMINUM OR NON-METALLIC, NEMA 4X, SINGLE DOOR ENCLOSURES, CAPABLE OF BEING PADLOCKED. THE PUMPS POWER JUNCTION BOX SHALL HAVE AN ALUMINUM ISOLATION DIVIDER PROVIDING A SECTION OF THE JUNCTION BOX FOR CONTROL AND LOW VOLTAGE SENSOR CONTROL WIRING.

2.18 SITE REQUIREMENTS

A. CONCRETE PAD: CONTRACTOR SHALL INSTALL A CONCRETE PAD AROUND THE WET WELL AND VALVE VAULT AS SHOWN IN THE MOST RECENT AQUA STANDARD DETAIL.

B. FENCE: CONTRACTOR SHALL INSTALL A CHAIN-LINK FENCE AROUND THE LIFT STATION SITE WITH A VEHICLE-ACCESS GATE AS MANUFACTURED BY MERCHANTS METALS, WWW.MERCHANTSMETALS.COM OR OWNER APPROVED EQUAL.
1. STEEL CHAIN LINK FABRIC: 6-FEET HIGH. CLASS 2B FUSED AND ADHERED, 2" OR TIGHTER, 9-GAUGE CORE, GREEN, KNUCKLE/TWIST SELVAGE.
2. ROUND STEEL PIPE FENCE FRAMEWORK: ROUND STEEL PIPE AND RAIL: COLD-ROLLED ELECTRIC-RESISTANCE WELDED PIPE IN ACCORDANCE WITH ASTM F1043 MATERIALS DESIGN GROUP IC (LG-40), MINIMUM STEEL YIELD STRENGTH 50,000 PSI. TYPE B EXTERNAL COATING, HOT DIP GALVANIZED ZINC 0.9 OZ/ FT² WITH A CLEAR POLYMERIC OVERCOAT, TYPE D INTERIOR 90% ZINC-RICH COATING HAVING A MINIMUM THICKNESS OF 0.30 MILS).
   a. LINE POST: 1.900" MIN. – 2.375" MAX. LG-40
   b. END, CORNER, PULL POST: 2.875" MIN., LG-40
   c. TOP, BRACE, BOTTOM AND INTERMEDIATE RAILS, 1.660 IN. OD: LG-20 OR HEAVIER.
3. TENSION WIRE: COLORBOND® POLYMER COATED STEEL TENSION WIRE: 7-GAUGE CORE (0.177 IN.) WIRE COMPLYING WITH ASTM F1664. MATCH COLOR TO THAT OF THE CHAIN LINK FABRIC. CLASS 2B, FUSED AND ADHERED.
4. FITTINGS
   a. TENSION AND BRACE BANDS: GALVANIZED PRESSED STEEL COMPLYING WITH ASTM F626, MINIMUM STEEL THICKNESS OF 12 GAUGE (0.105 IN.), MINIMUM WIDTH OF 3/4 IN. AND MINIMUM ZINC COATING OF 1.20 OZ/FT² . SECURE BANDS WITH 5/16 IN. GALVANIZED STEEL CARRIAGE BOLTS.
   b. TERMINAL POST CAPS, LINE POST LOOP TOPS, RAIL AND BRACE ENDS, BOULEVARD CLAMPS, RAIL SLEEVES: IN COMPLIANCE TO ASTM F626, PRESSED STEEL GALVANIZED AFTER FABRICATION HAVING A MINIMUM ZINC COATING OF 1.20 OZ/FT².
   c. TENSION BARS: IN COMPLIANCE WITH ASTM F626. GALVANIZED STEEL ONE-PIECE LENGTH 2 IN. LESS THAN THE FABRIC HEIGHT. MINIMUM ZINC COATING 1.2 OZ. /FT . BARS FOR 2 IN. AND 1 ¾ IN. MESH SHALL HAVE A MINIMUM CROSS SECTION OF 3/16 IN. BY 3/4 IN.

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

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LIFT STATION SPECIFICATIONS

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5. TIE WIRE AND HOG RING: POLYMER COATED COLORBOND®, MATCH THE COATING, CLASS AND COLOR TO THAT OF THE CHAIN LINK FABRIC.
6. SWING GATES: GALVANIZED STEEL PIPE WELDED FABRICATION IN COMPLIANCE WITH ASTM F900. GATE FRAME MEMBERS 1.900 IN. OD LG-20 OR HEAVIER. FRAME MEMBERS SPACED NO GREATER THAN 8 FT. APART VERTICALLY AND HORIZONTALLY. WELDED JOINTS PROTECTED BY APPLYING ZINC-RICH PAINT IN ACCORDANCE WITH ASTM PRACTICE A780. DAC STRONG ARM GATE LATCH, PRESSED STEEL GALVANIZED AFTER FABRICATION. GALVANIZED MALLEABLE IRON OR HEAVY GAUGE PRESSED STEEL POST AND FRAME HINGES. GATE FABRIC IS TO MATCH THAT OF THE DESCRIBED FENCE SYSTEM. GATE POST, BOTH HINGE AND LATCH, ARE TO BE NO LESS THAN 2.375 IN. IN DIAMETER FOR GATE WIDTHS UP TO AND NOT EXCEEDING 48" IN WIDTH. HINGE POST FOR SINGLE GATES WIDER THAN 4' AND NOT EXCEEDING 5' IN WIDTH ARE TO BE NO LESS THAN 4IN. IN DIAMETER. ALL POST WEIGHT IS TO BE NO LESS THAN LG-40. COLORBOND® POLYMER COATED GATE FRAMES AND GATEPOSTS; MATCH THE COATING TYPE AND COLOR TO THAT SPECIFIED FOR THE FENCE FRAMEWORK.
7. CONCRETE: CONCRETE FOR POST FOOTINGS SHALL BE WET MIXED AND POURED. NO LESS THAN A 4,500 PSI MIX IS TO BE USED ON ALL POSTS.

PART 3 - EXECUTION OF THE WORK

3.1 GENERAL

A. REFER TO AQUA STANDARD SPECIFICATIONS FOR SANITARY SEWER FOR APPLICABLE REQUIREMENTS REGARDING SITE PREPARATION, SEWER AND WATER SEPARATION REQUIREMENTS, TRENCH EXCAVATION AND MAINTENANCE, BEDDING AND BACKFILL, PIPE LAYING AND SITE CLEANUP AND RESTORATION.

B. INSTALL LIFT STATION, ALARMS AND CONTROLS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND APPLICABLE STANDARDS. EQUIPMENT AND WIRING SHALL BE INSTALLED IN A NEAT, WORKMAN-LIKE MANNER BY SKILLED WORKERS. CONDUITS SHALL BE RIGIDLY SUPPORTED.

C. ALL WIRES SHALL BE LABELED.

3.2 ELECTRICAL WORK

A. PERFORM ALL ELECTRICAL WORK AS REQUIRED FOR THE INSTALLATION OF ALL ELECTRICAL AND PROCESS EQUIPMENT AS INDICATED IN THESE SPECIFICATIONS.

B. ALL ELECTRICAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMAN LIKE MANNER IN ACCORDANCE WITH THE PROVISIONS OF THE NATIONAL ELECTRICAL CODE (NEC), THE GUIDELINES OF THE NATIONAL ELECTRICAL SAFETY CODE (NESC), AND THE INSTALLATION STANDARDS OF THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA), AND APPLICABLE LOCAL CODES.

C. ALL CONDUIT ABOVE GROUND SHALL BE ALUMINUM ELECTRIC METALLIC TUBING (EMT) OR HEAVY WALL PVC CONDUIT. ALL CONDUIT BELOW GROUND SHALL BE PVC COATED RIGID GALVANIZED STEEL (RGS). MINIMUM CONDUIT DIAMETER SHALL BE 1/2 INCH.

D. JUNCTION BOXES

1. SEPARATE JUNCTION BOXES SHALL BE PROVIDED FOR PUMPS POWER/SENSOR CABLES AND FOR WET WELL LEVEL DEVICE AND FLOAT SWITCH CONTROL CABLES.
2. THE LIFT STATION CONTROL ENCLOSURE SHALL BE PROTECTED BY EXPLOSION PROOF EPOXY CONDUIT SEAL OFF FITTINGS LOCATED IN THE CONDUITS FROM THE PUMPS POWER/SENSOR JUNCTION BOX AND FROM THE CONTROLS JUNCTION BOX TO THE LIFT STATION CONTROL PANEL ENCLOSURE, TO PREVENT THE ATMOSPHERE OF THE WET WELL FROM GAINING ACCESS TO THE LIFT STATION CONTROL PANEL. THIS ALLOWS FOR THE DISCONNECTION AND REMOVAL OF ANY OF THE PUMPS, THE WET WELL LEVEL DEVICE OR ANY OF THE FLOAT SWITCHES WITHOUT DISTURBING THE SEAL. THE CONDUITS FROM THE PUMPS POWER/SENSOR CABLE JUNCTION BOX AND FROM THE WET WELL LEVEL DEVICE AND FLOAT SWITCHES JUNCTION BOX TO THE WET WELL SHALL BE SEALED WITH OZ-GEDNEY TYPE CSBG CONDUIT SEAL FITTINGS.
3. PUMP POWER/SENSOR CABLE IN CONDUIT SHALL BE INSTALLED FROM THE WET WELL TO THE PUMPS POWER/SENSOR CABLES JUNCTION BOX FOR EACH PUMP. PUMP POWER CONDUCTORS SHALL BE INSTALLED IN CONDUIT FROM THE POWER/SENSOR CABLES JUNCTION BOX TO THE LIFT STATION CONTROL ENCLOSURE FOR EACH PUMP. PUMP SENSOR CONDUCTORS SHALL BE INSTALLED IN CONDUIT FROM THE POWER/SENSOR CABLES JUNCTION BOX TO THE LIFT STATION CONTROL ENCLOSURE FOR EACH PUMP. CONDUITS SHALL BE A MINIMUM OF 4-INCH FOR POWER LINES TO THE PUMPS. ALL CONDUCTOR TO CABLE TERMINATIONS IN THE PUMPS POWER/SENSOR JUNCTION BOX SHALL BE MADE WITH WATERPROOF CONNECTIONS.
4. WET WELL LEVEL DEVICE CABLE IN CONDUIT SHALL BE INSTALLED FROM THE WET WELL TO THE CONTROLS JUNCTION BOX. WET WELL LEVEL DEVICE CONDUCTORS SHALL BE INSTALLED IN CONDUIT WITH EPOXY CONDUIT SEALS FROM THE CONTROLS JUNCTION BOX TO THE LIFT STATION CONTROL ENCLOSURE. FLOAT SWITCH CABLES (4) SHALL BE INSTALLED IN CONDUIT FROM THE WET WELL TO THE CONTROLS JUNCTION BOX. FLOAT SWITCH CONDUCTORS SHALL BE INSTALLED IN CONDUIT WITH EPOXY CONDUIT SEALS FROM THE CONTROLS JUNCTION BOX TO THE LIFT STATION CONTROL ENCLOSURE. ALL CONDUCTOR TO CABLE TERMINATIONS IN THE CONTROLS JUNCTION BOX SHALL BE MADE WITH WATERPROOF CONNECTIONS. ADDITIONAL FLOAT SWITCH CABLES FROM THE WET WELL TO THE CONTROLS JUNCTION BOX MAY BE INSTALLED IN THE SAME CONDUIT AS THE WET WELL LEVEL DEVICE CABLE.
5. INDIVIDUAL CONDUIT WITH SUMP PUMP POWER CONDUCTORS AND AN INDIVIDUAL CONDUIT WITH MANUFACTURER'S FLOW TRANSMITTER INTERCONNECTING CABLE SHALL BE INSTALLED FROM THE LIFT STATION CONTROL ENCLOSURE TO THE VALVE AND FLOW METER VAULT AS NEEDED. THESE CONDUITS SHALL BE EQUIPPED WITH EXPLOSION PROOF CONDUIT SEAL-OFF FITTINGS PRIOR TO ENTERING THE LIFT STATION CONTROL ENCLOSURE.
6. ALL EXPLOSION PROOF CONDUIT SEAL-OFF FITTINGS SHALL BE PROPERLY SEALED TO EXCLUDE THE WET WELL ATMOSPHERE FROM THE INTERIOR OF THE LIFT STATION CONTROL ENCLOSURE.

E. MANUAL TRANSFER SWITCH

1. THE CONDUIT BETWEEN THE MANUAL TRANSFER SWITCH AND THE LIFT STATION CONTROL ENCLOSURE SHALL BE ALUMINUM ELECTRIC METALLIC TUBING (EMT) CONDUIT.

F. MAIN DISCONNECT SWITCH

1. THE LIFT STATION MAIN FUSED DISCONNECT SHALL BE A HEAVY DUTY FUSED SWITCH IN A NEMA 4X ENCLOSURE.

G. INSTALL THE LIFT STATION CONTROL ENCLOSURE ON A CONTROL PANEL RACK PER DETAIL.

3.3 PUMPS

A. SET PUMP DISCHARGE ELBOWS LEVEL AND PLUMB FOR PROPER PUMP OPERATION. INSTALL GUIDE RAILS PLUMB TO PREVENT BINDING OF PUMP UPON REMOVAL.

B. INSTALL PIPING PLUMB AND LEVEL. SUPPORT VALVES AND PIPING IN WET WELL AND VALVE VAULT AS INDICATED IN THE STANDARD DETAILS.

3.4 FENCE

A. INSTALL FENCE PER MANUFACTURER'S INSTRUCTIONS.

3.5 LIFT STATION TESTING

A. THE FORCE MAIN AND ALL GRAVITY SANITARY SEWERS CONSTRUCTED AS PART OF THE PROJECT SHALL HAVE PASSED ALL REQUIRED TESTS PRIOR TO THE STARTUP AND FINAL ACCEPTANCE OF THE LIFT STATION.

B. WET WELL LEAKAGE TESTING ALL WET WELLS SHALL BE WATERTIGHT AND FREE FROM LEAKAGE. THE WET WELL SHALL BE VISUALLY INSPECTED FOR LEAKAGE BY THE OWNER AFTER ASSEMBLY AND BACKFILLING. ALL DEWATERING ACTIVITIES SHALL BE CEASED A MINIMUM OF EIGHT (8) HOURS PRIOR TO THE LEAK TESTING. IF THE WET WELL SHOWS SIGNS OF LEAKAGE, IT SHALL BE REPAIRED TO THE SATISFACTION OF THE OWNER AND RE-INSPECTED.

C. ALL EQUIPMENT TESTING SHALL BE OBSERVED BY THE OWNER DURING THE LIFT STATION'S FINAL INSPECTION. PARTIAL TESTING WILL NOT BE ACCEPTED. THE TESTING MUST BE DONE ON THE COMPLETE LIFT STATION. IT IS NOT THE OWNER'S RESPONSIBILITY TO ENGAGE IN ANY ACTIVITY OR SUPPLY ANY EQUIPMENT TO TEST AND/OR ACCEPT THE LIFT STATION. THE CONTRACTOR SHALL PROVIDE THE CLEAN WATER TO RUN THE PUMPS AND PERFORM ALL TESTS. THE STARTUP AND FINAL INSPECTION SHALL BE AS FOLLOWS:

1. THE WAITING PERIOD SHALL BE AFTER BOTH OF THE FOLLOWING:
   a. AFTER THE FORCE MAIN, GRAVITY SEWERS AND MANHOLES CONSTRUCTED AS PART OF THE PROJECT HAVE PASSED ALL REQUIRED TESTS
   b. AFTER ALL EQUIPMENT HAS BEEN INSTALLED, BEEN DETERMINED TO BE IN WORKING ORDER BY THE CONTRACTOR AND MANUFACTURER AND BEEN PREVIOUSLY TESTED BY THE MANUFACTURER.
2. EQUIPMENT: THE CONTRACTOR OR MANUFACTURER SHALL PROVIDE ALL NECESSARY EQUIPMENT TO SAFELY COMPLETE ALL THE TASKS NECESSARY TO TEST AND ACCEPT THE LIFT STATION.
3. TESTING PROCEDURES: A LIFT STATION CHECKLIST PROVIDED BY THE OWNER SHALL BE COMPLETED DURING THE START-UP AND FINAL INSPECTION. THE TEST SHALL VERIFY ALL EQUIPMENT PERFORMS IN ACCORDANCE WITH THE DESIGN AND THE REQUIREMENTS OF THIS SPECIFICATION. PROCEDURES FOR EACH COMPONENT SHALL BE DETERMINED BY THE OWNER AT THE TIME OF STARTUP. AT A MINIMUM, THE FOLLOWING SHALL BE TESTED:
   a. PUMPING RATE FOR ALL PUMPS IN GPM;
   b. COMMUNICATIONS EQUIPMENT;
   c. CONTROLLER;
   d. ALL ELECTRONIC EQUIPMENT;
   e. ALL MECHANICAL EQUIPMENT;
   f. ALL INSTRUMENTATION AND CONTROL EQUIPMENT;
   g. INCOMING POWER;
   h. THE OVERALL OPERATING CONDITION OF THE LIFT STATION; AND
   i. ANY OTHER TEST THE OWNER DEEMS NECESSARY.
4. CALIBRATION: ALL MEASURING EQUIPMENT SUPPLIED FOR THE LIFT STATION SHALL BE CALIBRATED PRIOR TO ACCEPTANCE. CALIBRATION TEST RESULTS SHALL BE MADE AVAILABLE UPON REQUEST. THE MEASURING EQUIPMENT SHALL INCLUDE AT A MINIMUM THE FOLLOWING:
   a. LEVEL DEVICES;
   b. FLOW METERS;
   c. GAUGES; AND
   d. OTHER EQUIPMENT AS DEEMED NECESSARY BY THE OWNER.
5. DETERMINATION OF LIFT STATION ACCEPTANCE IF THE STATION PERFORMS TO THE SATISFACTION OF THE OWNER, AS DESIGNED, AND PER THE REQUIREMENTS OF THIS SPECIFICATION, THE LIFT STATION SHALL HAVE PASSED THE TEST.
6. DETERMINATION OF LIFT STATION FAILURE IF THE STATION DOES NOT PERFORM TO THE SATISFACTION OF THE OWNER, AS DESIGNED, AND PER THE REQUIREMENTS OF THIS SPECIFICATION, THE LIFT STATION SHALL HAVE FAILED THE TEST. THE CONTRACTOR SHALL BE REQUIRED TO CORRECT ALL DEFICIENCIES AND RETEST.

3.6 PUMP WARRANTY

A. PUMP WARRANTY SHALL BE PROVIDED BY THE PUMP MANUFACTURER AND SHALL WARRANT THE UNITS AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF FIVE (5) YEARS UNDER NORMAL USE, OPERATION AND SERVICE. THE WARRANTY SHALL BE IN PRINTED FORM AND APPLY TO ALL SIMILAR UNITS. A COPY OF THE WARRANTY STATEMENT SHALL BE SUBMITTED WITH THE APPROVED SHOP DRAWINGS.

3.7 LIFT STATION WARRANTY

A. WARRANTIES FOR LIFT STATION AND ALL EQUIPMENT, EXCEPT FOR THE PUMPS, SHALL BE THREE (3) YEARS FROM THE DATE OF ACCEPTANCE.

3.8 POST CONSTRUCTION

A. REFER TO AQUA STANDARD SPECIFICATIONS FOR SANITARY SEWER CONSTRUCTION PART 1 PARAGRAPH 1.8 FOR CLOSE-OUT REQUIREMENTS, IN ADDITION TO THE FOLLOWING:

1. RECORD DRAWINGS TO INCLUDE FIELD LOCATION AND ELEVATION OF ALL ABOVE GROUND IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO WET WELL, VALVE VAULT AND METER VAULT RIMS, DRIVEWAY AND PARKING AREA, CONCRETE SLABS, BUILDINGS AND ENCLOSURES, FENCING AND OTHER ABOVE GROUND IMPROVEMENTS.
2. RECORD DRAWINGS TO INCLUDE ACTUAL FLOAT SWITCH ELEVATIONS.
3. RECORD DRAWINGS TO INCLUDE WET WELL, VALVE AND METER VAULT INSIDE DIAMETERS AND BOTTOM ELEVATIONS.
4. TESTING TO INCLUDE TESTING PUMPS, CONTROLS AND ALARMS IN ACCORDANCE WITH MANUFACTURER INSTRUCTIONS, TO INCLUDE ONE FULL PUMP CYCLE OF EACH PUMP AND EACH ALARM AS A MINIMUM.
5. SPARE PARTS AS RECOMMENDED BY MANUFACTURER(S).

END

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021
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LIFT STATION SPECIFICATIONS

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AQUA INDIANA STATE STANDARDS

LOW PRESSURE SEWER SYSTEM CONSTRUCTION

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FOREWORD

THE "AQUA INDIANA STATE STANDARDS" FOR AQUA INDIANA AND ITS SUBSIDIARIES (THE UTILITY) HAVE BEEN PREPARED TO SET FORTH AQUA INDIANA'S MINIMUM CRITERIA FOR CONSTRUCTION WITHIN THE UTILITY'S LIMITS.

ALL CONSTRUCTION PROJECTS WHICH ARE CONNECTED TO THE UTILITY SYSTEM SHALL CONFORM TO THESE STANDARDS. CONSTRUCTION DRAWINGS AND SPECIFICATIONS MUST BE APPROVED BY THE UTILITY AND A WRITTEN PERMIT OBTAINED FOR SEWER EXTENSIONS IN ACCORDANCE WITH EXISTING ORDINANCES BEFORE CONSTRUCTION BEGINS. IN ADDITION, SANITARY SEWER PROJECTS MUST BE SUBMITTED TO THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM) FOR APPROVAL AND ISSUANCE OF A CONSTRUCTION PERMIT. DEVELOPERS MAY NOT SUBMIT PROJECTS TO IDEM UNTIL THE UTILITY ISSUES A WASTELOAD ALLOCATION AND APPROVAL OF PLANS.

CONSTRUCTION OBSERVATION WILL BE PERFORMED BY THE UTILITY. A MINIMUM OF 48 HOURS' NOTICE SHALL BE GIVEN PRIOR TO STARTING CONSTRUCTION.

THESE STANDARDS WERE PREPARED WITH THE INTENT OF OBTAINING THE HIGHEST QUALITY OF CONSTRUCTION POSSIBLE, CONSISTENT WITH ACCEPTED INDUSTRY PRACTICES AND SPECIFICATIONS. AS NEW MATERIALS BECOME AVAILABLE AND ACCEPTABLE, THE STANDARDS MAY BE REVISED AND UPDATED.

CRITICAL DESIGN CRITERIA FOR LOW PRESSURE GRINDER PUMP SYSTEM CONSTRUCTION:

1. THE DESIGN ENGINEER SHALL SUBMIT A LOW PRESSURE SEWER SYSTEM (LPSS) SERVICE AREA MAP.
2. STATE UTILITY ENGINEER WILL MAKE THE DETERMINATION AS TO THE NEED FOR IMPROVEMENTS TO DOWNSTREAM SANITARY SEWER FACILITIES. EARLY COORDINATION IS RECOMMENDED TO ELIMINATE DELAYS DURING DESIGN.
3. STATE UTILITY ENGINEER WILL MAKE FINAL DETERMINATIONS AS TO THE ABILITY TO REASONABLY COMPLY WITH THESE DESIGN SPECIFICATIONS.
4. THESE DESIGN SPECIFICATIONS ARE INTENDED TO DEFINE THE DESIGN REQUIREMENTS OF SANITARY SEWER FACILITIES WHICH ARE CONSTRUCTED AND OPERATED UNDER TYPICAL CONDITIONS IN AQUA INDIANA SERVICE AREAS. DEPENDING ON FIELD CONDITIONS AND THE COMPOSITION AND CHARACTERISTICS OF THE SANITARY SEWER FLOW, DIFFERENT OR UNUSUAL CONDITIONS MAY OCCUR WHICH CANNOT BE ANTICIPATED IN A DOCUMENT OF THIS NATURE. CONSEQUENTLY, THE STATE UTILITY ENGINEER MAY IMPOSE ADDITIONAL OR SPECIAL DESIGN REQUIREMENTS UNDER SUCH CIRCUMSTANCES.
5. LOW PRESSURE SEWER SYSTEMS (LPSS) WILL ONLY BE CONSIDERED IN AREAS WHERE SANITARY SEWERS CURRENTLY SERVE THE SURROUNDING AREAS AND WHERE CONVENTIONAL SANITARY SEWER FACILITIES CANNOT BE CONSTRUCTED.
6. GRINDER PUMPS STATIONS SHALL BE OF SEMI-POSITIVE DISPLACEMENT PUMP DESIGN. USE OF CENTRIFUGAL GRINDER PUMPS STATIONS AND DESIGNS ARE DISCOURAGED.
7. DESIGN ENGINEER SHALL SUBMIT LPSS CALCULATIONS INCLUDING:
   a. CALCULATION WORKSHEET
   b. INDIVIDUAL PUMP CURVES
   c. MAKE AND MODEL NUMBER OF PUMPS FOR DESIGN
8. FORCE MAIN SHALL BE DESIGNED PER AQUA INDIANA STATE STANDARDS FOR SANITARY SEWER CONSTRUCTION.
9. THE UTILITY SHALL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF THE COMMON FORCE MAIN AND THE PORTION OF THE LATERAL FROM THE COMMON FORCE MAIN TO, AND INCLUDING, THE CURB STOP ASSEMBLY.
10. THE CUSTOMER/HOMEOWNER SHALL BE RESPONSIBLE FOR ALL PIPING, PUMPING EQUIPMENT, AND APPURTENANCES BETWEEN THE BUILDING AND THE CURB STOP ASSEMBLY.
11. MANUALS AND WARRANTY SHALL BE PROVIDED TO THE GRINDER PUMP OWNER (CUSTOMER).
12. CUSTOMER/GRINDER PUMP OWNER IS RESPONSIBLE FOR ALL FUTURE MAINTENANCE AND REPLACEMENT OF THE GRINDER PUMP AND CONTROL SYSTEM.

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. CUSTOMER SHALL FURNISH AND INSTALL A COMPLETE FACTORY-BUILT AND TESTED GRINDER PUMP STATION CONSISTING OF A GRINDER PUMP SUITABLY MOUNTED IN A BASIN CONSTRUCTED OF HIGH DENSITY POLYETHYLENE (HDPE) OR FIBERGLASS, ELECTRICAL QUICK DISCONNECT, PUMP REMOVAL SYSTEM, SHUT-OFF VALVE, ANTI-SIPHON VALVE, AND CHECK VALVE ASSEMBLED WITHIN THE BASINS, ELECTRICAL ALARM/DISCONNECT PANEL, AND ALL NECESSARY INTERNAL WIRING AND CONTROLS.

B. UTILITY SHALL OPERATE AND MAINTAIN THE LOW-PRESSURE SEWER SYSTEM COLLECTION LINE AND APPURTENANCES CONSTRUCTED.

1.2 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:

1. THE EQUIPMENT SPECIFIED SHALL BE A PRODUCT OF A COMPANY EXPERIENCE IN THE DESIGN AND MANUFACTURE OF GRINDER PUMPS FOR SPECIFIC USE IN LOW PRESSURE SEWAGE SYSTEMS. THE COMPANY SHALL SUBMIT DETAILED INSTALLATION AND USER INSTRUCTIONS FOR THIS PRODUCT; SUBMIT EVIDENCE OF AN ESTABLISHED SERVICE PROGRAM INCLUDING COMPLETE PARTS AND SERVICE MANUALS AND BE RESPONSIBLE FOR MAINTAINING A CONTINUING INVENTORY OF GRINDER PUMP REPLACEMENT PARTS.

1.3 SUBMITTALS

A. SUBMIT SHOP DRAWINGS FOR REVIEW BY THE UTILITY AND CUSTOMER SHOWING THE FOLLOWING:

1. COMPLETE DESCRIPTION IN SUFFICIENT DETAIL TO PERMIT AN ITEMIZED COMPARISON WITH THE SPECIFICATIONS.
2. DIMENSIONS AND INSTALLATION REQUIREMENTS.
3. DESCRIPTIVE INFORMATION INCLUDING MANUFACTURERS' CATALOG CUTS AND SPECIFICATIONS FOR ALL COMPONENTS.
4. ELECTRICAL SCHEMATICS AND LAYOUTS.
5. HYDRAULIC CALCULATIONS DEMONSTRATING COMPLIANCE WITH THE SPECIFIED HYDRAULIC CHARACTERISTICS.

PART 2 - PRODUCTS

2.1 GRINDER STATION

A. GRINDER PUMPS SHALL BE OF SEMI-POSITIVE DISPLACEMENT PUMP DESIGN. GRINDER PUMP STATIONS SHALL BE MANUFACTURED BY ENVIRONMENT ONE CORPORATION, ZOLLER PUMP COMPANY OR APPROVED EQUAL.

2.2 GENERAL GRINDER STATION REQUIREMENTS

A. PUMP:

1. THE PUMP SHALL BE CAPABLE OF DELIVERING 15 GPM AGAINST A RATED TOTAL DYNAMIC HEAD OF 0 FEET AND 9 GPM AGAINST A RATED TOTAL DYNAMIC HEAD OF 138 FEET. THE PUMP MUST ALSO BE CAPABLE OF OPERATING AT NEGATIVE TOTAL DYNAMIC HEAD WITHOUT OVERLOADING THE MOTOR. UNDER NO CONDITIONS SHALL IN-LINE PIPING OF VALVING BE ALLOWED TO CREATE A FALSE APPARENT HEAD. THE MATERIAL SHALL BE SUITABLE FOR DOMESTIC WASTEWATER SERVICE. ITS PHYSICAL PROPERTIES SHALL INCLUDE HIGH TEAR AND ABRASION RESISTANCE, GREASE RESISTANCE, WATER AND DETERGENT RESISTANCE, TEMPERATURE STABILITY, EXCELLENT AGING PROPERTIES, AND OUTSTANDING WEAR RESISTANCE.

B. GRINDER:

1. THE GRINDER SHALL BE PLACED IMMEDIATELY BELOW THE PUMPING ELEMENTS AND SHALL BE DIRECT DRIVEN BY A SINGLE, ONE-PIECE MOTOR SHAFT. THE GRINDER WILL BE OF THE ROTATING TYPE WITH A STATIONARY HARDENED AND GROUND STAINLESS STEEL SHREDDING RING SPACED IN CLOSE ANNULAR ALIGNMENT WITH THE DRIVEN IMPELLER ASSEMBLY, WHICH SHALL CARRY TWO HARDENED TYPE 400 SERIES STAINLESS STEEL CUTTER BARS.
   a. THIS ASSEMBLY SHALL BE DYNAMICALLY BALANCED AND OPERATE WITHOUT OBJECTIONABLE NOISE OR VIBRATION OVER THE ENTIRE RANGE OF RECOMMENDED OPERATING PRESSURES. THE GRINDER SHALL BE CONSTRUCTED SO AS TO ELIMINATE CLOGGING AND JAMMING UNDER ALL NORMAL OPERATING CONDITIONS INCLUDING STARTING. SUFFICIENT VORTEX ACTION SHALL BE CREATED TO SCOUR THE TANK FREE OF DEPOSITS OR SLUDGE BANKS WHICH WOULD IMPAIR THE OPERATION OF THE PUMP.
   b. THE GRINDER SHALL BE CAPABLE OF REDUCING ALL COMPONENTS IN NORMAL DOMESTIC SEWAGE, INCLUDING A REASONABLE AMOUNT OF "FOREIGN OBJECTS," SUCH AS PAPER, WOOD, PLASTIC, GLASS, RUBBER AND THE LIKE, TO FINELY-DIVIDED PARTICLES WHICH WILL PASS FREELY THROUGH THE PASSAGES OF THE PUMP AND THE 1-1/4" DIAMETER STAINLESS STEEL DISCHARGE PIPING.

C. ELECTRIC MOTOR:

1. AS A MAXIMUM, THE MOTOR SHALL BE A 1 HP, 1725 RPM, 240 VOLT 60 HERTZ, 1 PHASE, CAPACITOR START, BALL BEARING, AIR-COOLED INDUCTION TYPE WITH A LOW STARTING CURRENT NOT TO EXCEED 30 AMPERES AND HIGH STARTING TORQUE OF 8.4 FOOT POUNDS. INHERENT PROTECTION AGAINST RUNNING OVERLOADS OR LOCKED ROTOR CONDITIONS FOR THE PUMP MOTOR SHALL BE PROVIDED BY THE USE OF AN AUTOMATIC-RESET, INTEGRAL THERMAL OVERLOAD PROTECTOR INCORPORATED INTO THE MOTOR. THIS MOTOR PROTECTOR COMBINATION SHALL HAVE BEEN SPECIFICALLY INVESTIGATED AND LISTED BY UNDERWRITERS LABORATORIES, INC., FOR THE APPLICATION.

D. MECHANICAL SEAL:

1. THE PUMP/CORE SHALL BE PROVIDED WITH A MECHANICAL SHAFT SEAL TO PREVENT LEAKAGE BETWEEN THE MOTOR AND PUMP. THE SEAL SHALL HAVE A STATIONARY CERAMIC SEAT AND CARBON ROTATING SURFACE WITH FACES PRECISION LAPPED AND HELD IN POSITION BY A STAINLESS STEEL SPRING.

E. TANK AND INTEGRAL ACCESSWAY:

1. THE TANK SHALL BE MADE OF FIBERGLASS OR HIGH DENSITY POLYETHYLENE.
   a. CORRUGATED SECTIONS ARE TO BE MADE OF A DOUBLE WALL CONSTRUCTION WITH THE INTERNAL WALL BEING GENERALLY SMOOTH TO PROMOTE SCOURING. CORRUGATIONS OF THE OUTSIDE WALL ARE TO BE OF A MINIMUM AMPLITUDE OF 1 1/2" TO PROVIDE NECESSARY TRANSVERSE STIFFNESS. ANY INCIDENTAL SECTIONS OF A SINGLE WALL CONSTRUCTION ARE TO BE A MINIMUM .250 INCH THICK. ALL SEAMS CREATED DURING TANK CONSTRUCTION ARE TO BE THERMALLY WELDED AND FACTORY TESTED FOR LEAK TIGHTNESS. TANK WALL AND BOTTOM MUST WITHSTAND THE PRESSURE EXERTED BY SATURATED SOIL LOADING AT MAXIMUM BURIAL DEPTH. ALL STATION COMPONENTS MUST FUNCTION NORMALLY WHEN EXPOSED TO 150 PERCENT OF THE MAXIMUM EXTERNAL SOIL AND HYDROSTATIC PRESSURE.
   b. THE GRINDER PUMP STATION TANK SHALL HAVE AN OPTIMUM CAPACITY OF 70 GALLONS.
   c. THE ACCESSWAY SHALL BE AN INTEGRAL EXTENSION OF THE WET WELL ASSEMBLY AND INCLUDE A LOCKABLE COVER ASSEMBLY MOUNTING AND WATERTIGHT CAPABILITY. ACCESSWAY DESIGN AND CONSTRUCTION SHALL ENABLE FIELD ADJUSTMENT OF STATION HEIGHT IN INCREMENTS OF 4" OR LESS WITHOUT THE USE OF ANY ADHESIVES OR SEALANTS REQUIRING CURE TIME BEFORE INSTALLATION CAN BE COMPLETED.
   d. THE STATION SHALL HAVE ALL NECESSARY PENETRATIONS MOLDED IN AND FACTORY SEALED. TO ENSURE A LEAK FREE INSTALLATION NO FIELD PENETRATIONS SHALL BE ACCEPTABLE.
   e. ALL DISCHARGE PIPING SHALL BE CONSTRUCTED OF 304 SERIES STAINLESS STEEL AND TERMINATE OUTSIDE THE ACCESSWAY BULKHEAD WITH A STAINLESS STEEL, 1 1/4 INCH FEMALE NPT FITTING. THE DISCHARGE PIPING SHALL INCLUDE A STAINLESS STEEL BALL VALVE RATED FOR 200 PSI; PVC BALL VALVES WILL NOT BE ACCEPTED. THE BULKHEAD PENETRATION SHALL BE FACTORY INSTALLED AND WARRANTED BY THE MANUFACTURER TO BE WATERTIGHT.
   f. THE ACCESSWAY SHALL INCLUDE A SINGLE NEMA 6P ELECTRICAL QUICK DISCONNECT FOR ALL POWER AND CONTROL FUNCTIONS, FACTORY INSTALLED WITH ACCESSWAY PENETRATIONS WARRANTED BY THE MANUFACTURER TO BE WATERTIGHT. PLUG-TYPE CONNECTIONS OF THE POWER CABLE ONTO THE PUMP HOUSING WILL NOT BE ACCEPTABLE DUE TO THE POTENTIAL FOR LEAKS AND ELECTRICAL SHORTS. THE ACCESSWAY SHALL ALSO INCLUDE A 2-INCH PVC VENT TO PREVENT SEWAGE GASES FROM ACCUMULATING IN THE TANK.

F. CHECK VALVE:

1. THE PUMP DISCHARGE SHALL BE EQUIPPED WITH A FACTORY INSTALLED, GRAVITY OPERATED, FLAPPER-TYPE INTEGRAL CHECK VALVE BUILT INTO THE STAINLESS STEEL DISCHARGE PIPING. THE CHECK VALVE WILL PROVIDE A FULL-PORTED PASSAGEWAY WHEN OPEN, AND SHALL INTRODUCE A FRICTION LOSS OF LESS THAN 6 INCHES OF WATER AT MAXIMUM RATED FLOW. MOVING PARTS WILL BE MADE OF A 300 SERIES STAINLESS STEEL AND FABRIC REINFORCED SYNTHETIC ELASTOMER TO ENSURE CORROSION RESISTANCE, DIMENSIONAL STABILITY, AND FATIGUE STRENGTH. A NONMETALLIC HINGE SHALL BE AN INTEGRAL PART OF THE FLAPPER ASSEMBLY PROVIDING A MAXIMUM DEGREE OF FREEDOM TO ASSURE SEATING EVEN AT A VERY LOW BACK-PRESSURE.
   a. EACH GRINDER PUMP INSTALLATION SHALL ALSO INCLUDE ONE SEPARATE CURB STOP WITH CHECK VALVE IN THE 1 1/4" SERVICE LATERAL BETWEEN THE GRINDER PUMP STATION AND THE SEWER MAIN. SAID ASSEMBLY SHALL BE THE RESPONSIBILITY OF THE UTILITY TO INSTALL AND MAINTAIN.

G. ANTI-SIPHON VALVE:

1. THE PUMP DISCHARGE SHALL BE EQUIPPED WITH A FACTORY-INSTALLED, GRAVITY-OPERATED, FLAPPER-TYPE INTEGRAL ANTI-SIPHON VALVE BUILT INTO THE STAINLESS STEEL DISCHARGE PIPING. MOVING PARTS WILL BE MADE OF 300 SERIES STAINLESS STEEL AND FABRIC-REINFORCED SYNTHETIC ELASTOMER TO ENSURE CORROSION RESISTANCE, DIMENSIONAL STABILITY, AND FATIGUE STRENGTH. A NONMETALLIC HINGE SHALL BE AN INTEGRAL PART OF THE FLAPPER ASSEMBLY, PROVIDING A MAXIMUM DEGREE OF FREEDOM TO ENSURE PROPER OPERATION EVEN AT A VERY LOW PRESSURE. THE VALVE BODY SHALL BE INJECTION-MOLDED FROM A GLASS-FILLED THERMOPLASTIC RESIN. HOLES OR PORTS IN THE DISCHARGE PIPING ARE NOT ACCEPTABLE ANTI-SIPHON DEVICES, DUE TO THEIR TENDENCY TO CLOG FROM THE SOLIDS IN THE SLURRY BEING PUMPED.

H. CONTROLS:

1. ALL NECESSARY CONTROLS, INCLUDING MOTOR AND LEVEL CONTROLS, SHALL BE LOCATED IN THE TOP HOUSING OF THE CORE UNIT. THE TOP HOUSING WILL BE ATTACHED WITH STAINLESS STEEL FASTENERS.
   a. NON-FOULING WASTEWATER LEVEL CONTROLS FOR CONTROLLING PUMP OPERATION SHALL BE ACCOMPLISHED BY MONITORING THE PRESSURE CHANGES IN AN INTEGRAL AIR COLUMN CONNECTED TO A PRESSURE SWITCH. THE LEVEL DETECTION DEVICE SHALL HAVE NO MOVING PARTS IN DIRECT CONTACT WITH THE WASTEWATER. HIGH-LEVEL SENSING WILL BE ACCOMPLISHED IN THE MANNER DETAILED ABOVE BY A SEPARATE AIR-BELL SENSOR AND PRESSURE SWITCH OF THE SAME TYPE. CLOSURE OF THE HIGH-LEVEL SENSING DEVICE WILL ENERGIZE AN ALARM CIRCUIT AS WELL AS A REDUNDANT PUMP-ON CIRCUIT. FOR INCREASED RELIABILITY, PUMP ON/OFF AND HIGH-LEVEL ALARM FUNCTIONS SHALL NOT BE CONTROLLED BY THE SAME SWITCH. FLOAT SWITCHES OF ANY KIND, INCLUDING FLOAT TREES, WILL NOT BE ACCEPTED DUE TO THE PERIODIC NEED TO MAINTAIN (RINSING, CLEANING) SUCH DEVICES.
   b. TO ASSURE RELIABLE OPERATION OF THE PRESSURE SWITCHES, EACH CORE SHALL BE EQUIPPED WITH A BREATHER ASSEMBLY, COMPLETE WITH A SUITABLE MEANS TO PREVENT ACCIDENTAL ENTRY OF WATER INTO THE MOTOR COMPARTMENT.

I. ALARM PANEL:

1. EACH GRINDER PUMP STATION SHALL INCLUDE A NEMA 4X, UL LISTED ALARM PANEL SUITABLE FOR WALL MOUNTING. THE NEMA 4X ENCLOSURE SHALL BE MANUFACTURED OF THERMOPLASTIC TO ASSURE CORROSION RESISTANCE. THE ENCLOSURE SHALL INCLUDE A HINGED, LOCKABLE COVER, PADLOCK, AND SECURED DEAD FRONT.
   a. THE ALARM PANEL SHALL INCLUDE THE FOLLOWING FEATURES: AUDIO & VISUAL ALARM, PUSH-TO-RUN SWITCH, AND HIGH LEVEL (REDUNDANT) PUMP STARTING CONTROL. THE ALARM SEQUENCE IS TO BE AS FOLLOWS:
      1) WHEN LIQUID LEVEL IN THE SEWAGE WET-WELL RISES ABOVE THE ALARM LEVEL, VISUAL AND AUDIO ALARMS WILL BE ACTIVATED. THE CONTACTS ON THE ALARM PRESSURE SWITCH WILL CLOSE. THE REDUNDANT PUMP STARTING SYSTEM WILL BE ENERGIZED.
      2) THE AUDIO ALARM MAY BE SILENCED BY MEANS OF THE EXTERNALLY MOUNTED, PUSH-TO-SILENCE BUTTON.
      3) VISUAL ALARM REMAINS ILLUMINATED UNTIL THE SEWAGE LEVEL IN THE WET-WELL DROPS BELOW THE "OFF" SETTING OF THE ALARM PRESSURE SWITCH.
      4) THE ENTIRE ALARM PANEL AS MANUFACTURED, SHALL BE LISTED BY UNDERWRITERS LABORATORIES, INC.

J. SERVICEABILITY:

1. THE GRINDER PUMP CORE UNIT SHALL HAVE TWO LIFTING HOOKS COMPLETE WITH NYLON LIFT-OUT HARNESS CONNECTED TO ITS TOP HOUSING TO FACILITATE EASY CORE REMOVAL WHEN NECESSARY. ALL MECHANICAL AND ELECTRICAL CONNECTIONS MUST PROVIDE EASY DISCONNECT CAPABILITY FOR CORE UNIT REMOVAL AND INSTALLATION. A PUSH-TO-RUN FEATURE WILL BE PROVIDED FOR FIELD TROUBLE SHOOTING. ALL MOTOR CONTROL COMPONENTS SHALL BE MOUNTED ON A READILY REPLACEABLE BRACKET FOR EASE OF FIELD SERVICE.

K. OSHA CONFINED SPACE:

1. ALL MAINTENANCE TASKS FOR THE GRINDER PUMP STATION MUST BE POSSIBLE WITHOUT ENTRY INTO THE GRINDER PUMP STATION (AS

PLOT SCALE: 1:2.5849 EDIT DATE: 10/26/16 – 11:29 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20160196 4UI.DS.01(R4).DWG

AQUA Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021

CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

LIFT STATION SPECIFICATIONS

PER OSHA 1910.146, PERMIT-REQUIRED CONFINED SPACES). "ENTRY MEANS THE ACTION BY WHICH A PERSON PASSES THROUGH AN OPENING INTO A PERMIT-REQUIRED CONFINED SPACE. ENTRY INCLUDES ENSUING WORK ACTIVITIES IN THAT SPACE AND IS CONSIDERED TO HAVE OCCURRED AS SOON AS ANY PART OF THE ENTRANT'S BODY BREAKS THE PLANE OF AN OPENING INTO THE SPACE."

L. SAFETY:

1. THE GRINDER PUMP SHALL BE FREE FROM ELECTRICAL AND FIRE HAZARDS AS REQUIRED IN A RESIDENTIAL ENVIRONMENT. AS EVIDENCE OF COMPLIANCE WITH THIS REQUIREMENT, THE COMPLETELY ASSEMBLED AND WIRED GRINDER PUMP STATION SHALL BE LISTED BY UNDERWRITERS LABORATORIES, INC., TO BE SAFE AND APPROPRIATE FOR THE INTENDED USE. UL LISTING OF COMPONENTS OF THE STATION, OR THIRD-PARTY TESTING TO UL STANDARD WILL NOT BE ACCEPTABLE.
2. THE GRINDER PUMP SHALL MEET ACCEPTED STANDARDS FOR PLUMBING EQUIPMENT FOR USE IN OR NEAR RESIDENCES, SHALL BE FREE FROM NOISE, ODOR, OR HEALTH HAZARDS, AND SHALL HAVE BEEN TESTED BY AN INDEPENDENT LABORATORY TO CERTIFY ITS CAPABILITY TO PERFORM AS SPECIFIED IN EITHER INDIVIDUAL OR LOW PRESSURE SEWER SYSTEM APPLICATIONS. AS EVIDENCE OF COMPLIANCE WITH THIS REQUIREMENT, THE GRINDER PUMP SHALL BEAR THE SEAL OF NSF INTERNATIONAL. THIRD-PARTY TESTING TO NSF STANDARD WILL NOT BE ACCEPTABLE.

2.3 LOW PRESSURE SEWER SYSTEM PIPING

A. LOW PRESSURE SEWER SYSTEM (LPSS) SHALL BE CONSTRUCTED USING HIGH DENSITY POLYETHYLENE PIPE (HDPE). NO PVC LOW PRESSURE SEWER MAIN SHALL BE PERMITTED.

B. ALL PRESSURE SEWER LATERAL PIPE AND FITTINGS SHALL BE NOT LESS THAN 1-1/4 INCH INNER DIAMETER HDPE, BRASS OR STAINLESS STEEL.

C. REFER TO AQUA SANITARY SEWER CONSTRUCTION STANDARDS PART 2.3.E FOR HDPE PRESSURE PIPE SPECIFICATIONS.

D. REFER TO AQUA SANITARY SEWER CONSTRUCTION STANDARDS PART 4.1.C.7 FOR HDPE PRESSURE PIPE TESTING.

E. PIPE AND FITTINGS

1. SHALL BE EITHER DR-9 OR DR-11
2. ALL PIPE SHALL HAVE FUSED JOINTS
3. ELECTROFUSION FITTINGS OR BUTT FUSION CONNECTIONS ARE PREFERRED
4. POLYPROPYLENE (PP) COMPRESSION FITTINGS FOR POLYETHYLENE (PE) PRESSURE PIPING APPLICATIONS ARE PERMITTED
5. BRASS FITTINGS (PRE-APPROVAL BY AQUA REQUIRED)
6. STAINLESS STEEL (PRE-APPROVAL BY AQUA REQUIRED)
7. NO CLAMP ON STYLE SADDLES ARE PERMITTED ON PE PIPE. ELECTROFUSION SADDLES ARE REQUIRED FOR ALL LATERAL CONNECTIONS.

F. JOINTS:

1. ALL PIPE JOINTS SHALL BE FUSED
2. BRASS (PRE-APPROVAL BY AQUA REQUIRED)
3. STAINLESS STEEL (PRE-APPROVAL BY AQUA REQUIRED)
4. COMPRESS STYLE COUPLINGS WILL BE SUPPLIED WITH STAINLESS STEEL INSERTS OR APPROVED EQUIVALENT WHERE REQUIRED.

2.4 LOW PRESSURE SEWER SYSTEM COMPONENTS

A. ISOLATION VALVE

1. VALVE SHALL BE MANUFACTURED OF HIGH DENSITY POLYETHYLENE (PE). VALVE SHALL BE A BALL VALVE DESIGN WITH A FULL BORE OPENING. THE VALVE SHALL BE SUITABLE FOR OPERATION IN SYSTEMS WITH PRESSURE UP TO 200 PSIG. THE VALVE OPERATION SHALL BE ¼ TURN (CLOCKWISE OPEN) USING A 2" SQUARE DRIVE. VALVE SHALL BE SUITABLE FOR INSTALLATION BY BUTT FUSION, ELECTROFUSION OR MECHANICAL JOINTING. VALVE SHALL MEET REQUIREMENTS OF NSF/ANSI 61, AWWA C901/906, ASTM-D2513, ASTM D3261 AND ASME16.40.

B. FITTING AND CONNECTIONS

1. PE FITTINGS SHALL BE OF MOLDED HIGH DENSITY POLYETHYLENE (PE) DESIGN WITH NO INNER FUSION BEAD, FULLY PRESSURE RATED UP TO 200 PSIG AND A WALL THICKNESS THAT REMAINS CONSISTENT THROUGHOUT FITTING. ALL FITTINGS SHALL BE MANUFACTURED FROM THE HIGHEST QUALITY VIRGIN BLACK HIGH DENSITY RESIN DESIGNED FOR USE IN WASTEWATER APPLICATIONS. JOINTS SHALL BE MADE USING EITHER BUTT FUSION, ELECTROFUSION OR USE OF AN APPROVED TRANSITION FITTING. FITTINGS SHALL MEET REQUIREMENTS OF ASTM –D2513 AWWA C-901/C-906 AND MANUFACTURED WITH RESIN HAVING A MATERIAL DESIGNATION CODE OF PE 3408, PE 3608, PE 4710, AND PE 100.
2. CONNECTIONS MAY BE MADE USING COMPRESSION FITTING CONNECTIONS INCLUDING A BUNA-N O-RING FOR SEALING TO THE OUTSIDE DIAMETER OF THE PIPE. POLYPROPYLENE (PP) COMPRESSION FITTINGS FOR PE PRESSURE PIPING APPLICATIONS SHALL BE OF INJECTION MOLDING DESIGN USING PP MATERIAL. ALL FITTINGS SHALL BE DESIGNED FOR USE IN WASTEWATER APPLICATIONS. A SPLIT-COLLET LOCKING DEVICE SHALL BE INTEGRATED INTO ALL PIPE CONNECTION FITTINGS TO SECURELY RESTRAIN THE PIPE FROM HYDRAULIC PRESSURE AND EXTERNAL LOADING CAUSED BY SHIFTING AND SETTLING. FITTING SHALL BE FULL PORT AND WITH A PRESSURE RATED UP TO 200 PSIG. FITTINGS SHALL MEET REQUIREMENTS OF AWWA C-901/C-906.

C. CURB STOP CHECK VALVE ASSEMBLY

1. THE PRESSURE LATERAL SHALL HAVE A BALL VALVE CURB STOP AND 1-1/4 INCH REDUNDANT CHECK VALVE INSTALLED AT THE PROPERTY LINE OR PERMANENT EASEMENT BOUNDARY
2. A CURB BOX WITH ARCH PATTERN BASE SHALL BE INSTALLED OVER THE CURB STOP ASSEMBLY.
3. CURB STOP/CHECK VALVE ASSEMBLY: THE BALL VALVE ACTUATOR SHALL INCLUDE POSITION STOP FEATURES AT THE FULLY OPENED AND CLOSED POSITIONS AND SHALL BE OF STAINLESS STEEL MATERIAL. THE CURB STOP/CHECK VALVE ASSEMBLY SHALL BE DESIGNED TO WITHSTAND A WORKING PRESSURE OF 235 PSI.
4. THE STAINLESS STEEL CHECK VALVE SHALL BE INTEGRAL WITH THE CURB STOP VALVE. THE CHECK VALVE WILL PROVIDE A FULL-PORTED 1-1/4" PASSAGEWAY AND SHALL INTRODUCE MINIMAL FRICTION LOSS AT MAXIMUM RATED FLOW. THE FLAPPER HINGE DESIGN SHALL PROVIDE A MAXIMUM DEGREE OF FREEDOM AND ENSURE SEATING AT LOW BACK PRESSURE
5. CURB BOXES SHALL BE CONSTRUCTED OF CAST IRON OR ABS, CONFORMING TO ASTM-D 1788. ALL COMPONENTS SHALL BE HEAVILY COATED WITH ASPHALT PAINT TO ASSURE DURABILITY IN THE GROUND. CURB BOXES SHALL PROVIDE 12" OF HEIGHT ADJUSTMENT DOWNWARD (SHORTER) FROM THEIR EXTENDED HEIGHT. THE CURB BOX SHALL SAY SEWER ON ITS LID.
6. THE VALVE SHALL OPERATE THROUGH A COMPOUND LEVER SYSTEM THAT WILL SEAL BOTH THE PRESSURE ORIFICE AND THE AIR AND VACUUM ORIFICE SIMULTANEOUSLY.

D. FLUSHING STATION

1. FLUSHING STATIONS SHALL BE CONSTRUCTED USING A 20-INCH MINIMUM DIAMETER HDPE CORRUGATED METER PIT STYLE. FRAMES AND COVERS SHALL BE CAST IRON AND LABELED "SEWER" AND BE THE "DROP-IN" TYPE. LOCKING COVERS ARE NOT PERMITTED. FLUSHING STATIONS SHALL BE INSTALLED WITHIN THE RIGHT-OF-WAY OR EASEMENT LINE. EACH FLUSHING STATION SHALL BE FURNISHED WITH AN ISOLATION VALVE, 3-INCH MALE CAMLOCK COUPLER WITH FEMALE NPT THREADS AND CAMLOCK DUST PLUG. FLUSHING STATIONS SHALL BE INSTALLED VERTICALLY AND SHALL BE PERFECTLY CENTERED OVER THE 3-INCH CAMLOCK. FLUSHING STATIONS SHALL NEVER BE INSTALLED IN ANY SIDEWALK, OR IN A DRIVEWAY IN THE AREA WHERE THE PUBLIC SIDEWALK CROSSES THE DRIVEWAY. FLUSHING STATIONS SHALL BE INSTALLED SUCH THAT THE TOP OF THE BOX IS FLUSH WITH THE DIRT SURFACE. FLUSHING STATIONS SHALL NEVER POSE A TRIP HAZARD OR POSE A POTENTIAL THREAT OF DAMAGE TO LAWN MOWERS. THE CAST IRON FRAME SHALL BE CENTERED ON THE BOX.

PART 3 - EXECUTION

3.1 FACTORY TEST

A. EACH GRINDER PUMP SHALL BE SUBMERGED AND OPERATED FOR 5 MINUTES (MINIMUM). INCLUDED IN THIS PROCEDURE WILL BE THE TESTING OF ALL ANCILLARY COMPONENTS SUCH AS, THE ANTI-SIPHON VALVE, CHECK VALVE, DISCHARGE ASSEMBLY AND EACH UNIT'S DEDICATED LEVEL CONTROLS AND MOTOR CONTROLS. ALL FACTORY TESTS SHALL INCORPORATE EACH OF THE ABOVE LISTED ITEMS. ACTUAL APPURTENANCES AND CONTROLS WHICH WILL BE INSTALLED IN THE FIELD, SHALL BE PARTICULAR TO THE TESTED PUMP ONLY. A COMMON SET OF APPURTENANCES AND CONTROLS FOR ALL PUMPS WILL NOT BE ACCEPTABLE. CERTIFIED TEST RESULTS SHALL BE AVAILABLE UPON REQUEST SHOWING THE OPERATION OF EACH GRINDER PUMP AT TWO (2) DIFFERENT POINTS ON ITS CURVE, WITH THE MAXIMUM PRESSURE NO LESS THAN 60 PSI.

B. ALL COMPLETED STATIONS SHALL BE FACTORY LEAK TESTED TO ASSURE THE INTEGRITY OF ALL JOINTS, SEAMS AND PENETRATIONS. ALL NECESSARY PENETRATIONS SUCH AS INLETS, DISCHARGE FITTINGS AND CABLE CONNECTORS SHALL BE INCLUDED IN THIS TEST ALONG WITH THEIR RESPECTIVE SEALING MEANS (GROMMETS, GASKETS ETC.).

3.2 INSTALLATION

A. CONTRACTOR SHALL INSTALL GRINDER PUMP UNITS IN ACCORDANCE WITH THE MANUFACTURER'S DRAWINGS, SHOP DRAWINGS AND INSTRUCTIONS.

3.3 START-UP AND FIELD TESTING

A. THE MANUFACTURER SHALL PROVIDE THE SERVICES OF QUALIFIED FACTORY TRAINED TECHNICIAN(S) WHO SHALL INSPECT THE PLACEMENT AND WIRING OF EACH STATION, PERFORM FIELD TESTS, AND INSTRUCT THE PERSONNEL IN THE OPERATION AND MAINTENANCE OF THE EQUIPMENT BEFORE THE STATIONS ARE ACCEPTED BY THE OWNER (CUSTOMER).

B. ALL EQUIPMENT AND MATERIALS NECESSARY TO PERFORM TESTING SHALL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR. THIS WILL INCLUDE, AS A MINIMUM, A PORTABLE GENERATOR (IF TEMPORARY POWER IS REQUIRED) AND WATER IN EACH BASIN.

C. THE SERVICES OF A TRAINED FACTORY-AUTHORIZED TECHNICIAN SHALL BE PROVIDED.

D. UPON COMPLETION OF THE START-UP AND TESTING, THE CONTRACTOR/OWNER (CUSTOMER) SHALL SUBMIT TO THE UTILITY THE START-UP FORM DESCRIBING THE RESULTS OF THE TESTS PERFORMED FOR EACH GRINDER PUMP STATION.

END

AQUA. Indiana

AQUA INDIANA STATE SANITARY SEWER STANDARDS 2021

JAMES E. SHIELDS, JR. REGISTERED No. PE10201333 STATE OF INDIANA PROFESSIONAL ENGINEER

3/1/2021

CERTIFIED BY

ISSUANCE INDEX
DATE:
1/4/2021
SANITARY STANDARDS

REVISION SCHEDULE		
NO.	DESCRIPTION	DATE

Project Number 2021

LOW PRESSURE GRINDER PUMP SYSTEM SPECIFICATIONS

20

PLOT SCALE: 1:2.5849 EDIT DATE: 10/26/16 – 11:29 AM EDITED BY: JSHIELD DRAWING FILE: G:\ENGINEERING\ENG_STANDARDS\2021 AQUA STANDARDS\AUTOCAD\20160196 4\LIDS.01(R4).DWG

GENERAL: WHEREVER A CONFLICT OR DEFICIENCY OCCURS BETWEEN THE CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THIS IMMEDIATE PROJECT AND THE CONSTRUCTION STANDARDS AND SPECIFICATIONS ADOPTED BY THE LOCAL GOVERN AGENCIES, THE HIGHER OR MORE RESTRICTIVE STANDARD OR SPECIFICATION SHALL APPLY.

A. STANDARD CONDITIONS

1. The Contractor shall be responsible for obtaining or verifying that all permits and approvals are obtained from the respective city, county and state agencies prior in starting construction.
2. It shall be the responsibility of each utility, contractor and/or sub-contractor to obtain all permits and approvals to open cut any road from the appropriate department.
3. It shall be the Contractor's responsibility to determine the exact location of all existing utilities in the vicinity of the construction area prior to starting construction.
4. It shall be the Contractor's responsibility for notification and coordination of all construction with the respective utility companies.
5. It shall be the responsibility of the Developer and Contractor to maintain quality control throughout the project; failure to do so may result in removal and replacement of the defective work. It is recommended that the Developer have a qualified inspector on the job site at all times during construction.
6. It is essential that the work be done in conjunction with this project shall be installed according to these specifications. The engineer will be required to certify to certain portions of this project upon completion. Therefore, it is necessary to obtain approval and acceptance by the city, county, state or govern agency that construction was done in compliance with these plans and specifications.

B. CLEARING AND GRUBBING

1. Clearing and grubbing shall consist of cutting removal and satisfactory disposal of all trees, down timber, brush, projecting roots, stumps, rubbish, boulders, broken concrete, fencing (as designated) and other material on the project site and within the boundary as shown on the construction documents and/or as designed by "construction limits".
2. Special instructions shall be taken to insure that trees to be left remaining in the project area shall not receive limb, bark or root injuries. hen such injuries occur, all rough edges of scarred areas shall be removed in accordance with accepted horticultural practice and the scars coated thoroughly with an asphaltum base tree paint.
3. All "unsuitable material" from clearing operations stated in items B-1 shall be remove to disposal area(s) off of the project site; unless a "bury pit" shall be utilized in an area where it shall not be beneath building areas and/or pavement areas and shall not be located in an area where storm drainage structures shall be located or where impoundment of surface drainage may occur.
4. Material shall not be disposed of by burying unless approved by the local and state fire marshal.

C. TREE REMOVAL AND PROTECTION

1. Trees should only be cleared only where the area is to be occupied by road and surfaced areas in accordance with specifications of the city, county, state or govern agency.
2. Trees shall be removed from the project site or buried within the project as directed by the Developer and only in the areas designated.
3. Trees shall be removed from the project where they interfere directly with the placement of storm or sanitary sewers and that such excavation is or will be fatal to such adjacent trees.
4. The Contractor shall endeavor to save and protect trees of value and work which do not impair construction of improvements as designated. In the event cut or fill exceeds 0.5 foot over the root area, the Developer shall be consulted with respect to protective measures to be taken, if any, to preserve such trees.
5. The contractor shall be responsible for determining the method for protection of tops, trunks and roots of existing trees on the project site that are to remain. Existing trees subject to construction damage shall be boxed, fenced or otherwise protected before any adjacent work is started. Earth or material or equipment shall not be stockpiled or stored within the spread of branches. Branches which need to be removed or are broken shall be neatly trimmed and shall be covered with tree paint.

D. STRIPPING OF TOPSOIL

1. The contractor shall verify that all topsoil has been removed in the areas to be occupied by roads, walks and designated building areas. Topsoil shall be removed to a depth of six (6) inches or deeper, if necessary, to remove vegetable matter where required.
2. Topsoil shall be kept separated from suitable fill materials and shall not be used to fill under pavement and/or building areas.
   Operations. Excess topsoil shall be spoiled on the site as directed by Owner or Engineer.
3. Topsoil placed on the lot shall be reasonably free from subsoil debris and stones.

E. GRADING

1. The contractor shall perform all grading operations to bring subgrades, after final compaction, to the required grades and sections of site improvements.
2. Subgrade shall be proofrolled with suitable equipment and all spongy and otherwise unsuitable material shall be removed and replaced with suitable material.
3. Subgrade shall be prepared in compliance with I.N.D.O.T. Standard Specifications, latest Edition , Section 207, as revised, with the city, state or govern agencies approving the subgrade before paving.
4. All fill materials shall be formed from soil free of deleterious material. Prior to placement of fill a sample of the proposed fill material should be submitted to the soils Engineer for his approval.
5. All fill material in areas outside of building and pavement areas shall be compacted lightly and protected from erosion by one or more of the methods of item O. areas for building and pavement construction shall not have unsuitable material placed in the location and fill shall be compacted to 95% Standard Proctor. These areas shall be determined by the Developer's representative.

F. SANITARY SEWERS

1. GENERAL
   a. Current city, state or govern agencies specifications shall prevail as to materials and methods of construction.
   b. The contractor shall be responsible for obtaining or verifying all permits for all of portions of this project prior to starting construction.
   c. Sanitary sewers shall be installed in accordance with the Indiana Department of Environmental Management (Division of Water Management).
   d. None of the sanitary sewers are to be constructed until a letter of approval from the Department of Environmental Management has been received by the Engineer. The Engineer will then contact the Developer or Contractor of the said approval.
2. GRAVITY SANITARY SEWERS
   a. The Department of public works currently allows the use of the following pipe materials meeting or exceeding the minimum requirements/specifications set forth herein for the construction of gravity sanitary sewers:
      – Polyvinyl Chloride Pipe (PVC)
      – Ductile Iron Pipe (DIP)

      Vitrified Clay Pipe (VCP) is NOT an approved material for the construction of sanitary sewers.

F. (CONTINUED)

   b. In general, all gravity sanitary sewer pipe shall be the bell and spigot type with elastomeric seal joints and smooth interior walls meeting or exceeding all requirements set forth in the latest ASTM standard reference herein.
   c. THE DEPARTMENT DOES NOT ALLOW THE USE OF SOLVENT CEMENT JOINT FOR GRAVITY SANITARY SEWERS EIGHT (8) INCHES IN DIAMETER OR LARGER.
   d. Each length of pipe shall be marked per the requirements of the respective ASTM Standards.
3. GRAVITY SANITARY SEWERS MATERIALS
   a. Polyvinyl Chloride Pipe
      1. Pipe: Polyvinyl Chloride (PVC) gravity sanitary sewer pipe shall be the integral wall bell and spigot type with elastomeric seal joints and smooth inner walls meeting or exceeding all the requirements set forth on ASTM F-679 for pipe diameters greater than 15 inches.
      2. For diameters 15 inches or less, the pipe shall have a minimum cell classification of 12454-B or 12454-C and for diameters greater that 15 inches, the pipe shall have a minimum cell classification 12454-C: with all pipe having a minimum tensile strength of 3450 MPA as defined in ASTM D-1784.
      3. PVC sanitary sewer pipe shall have a minimum stiffness of 46 PSI for each diameter when measured at 5% vertical ring deflection and tested in accordance with ASTM D-2412.
      4. Polyvinyl Chloride (PVC) ribbed sewer pipe meeting or exceeding requirements set forth in ASTM F-949-86a or ASTM F-794 is acceptable. The minimum cell classification acceptable shall be 12454-B or 12454-C as defined in ASTM D-1784. PVC ribbed sewer pipe shall have a minimum pipe stiffness of 50 psi when measured in accordance with ASTM D-2412.
      5. Design: The minimum wall thickness for PVC sewer pipe and lateral sewer pipe 15– inches or less in diameter shall conform to SDR-35 Type PSM as specified in ASTM D-3034. The minimum wall thickness for PVC sewer pipe greater than 15– inches in diameter shall conform to T-1 as specified in ASTM F-679.
      6. Marking: the date of manufacture, class of pipe, specification destination, size of pipe, name or trademark of manufacturer, and identification of plant location shall be legible marked on the outside of each pipe section in accordance with the ASTM D-3034.
      7. Certification: The contractor upon request shall furnish the Department with manufacturer's certification stating that the pipe supplied meets or exceeds all requirements of the applicable ASTM standards and these standards.
      a. Joints
         1. 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. The assembly of joints shall be in accordance with pipe manufacturer's recommendations and ASTM D-3212. The gasket sealing the joint shall be made of rubber: of special composition having a texture to assure a watertight and permanent seal, and shall be the product of a manufacturer having at least (5) five years experience in the manufacture of rubber gaskets for pipe joints. The gasket shall be a continuous ring of flexible joint rubber of a composition and texture which is resistant to common ingredients of sewage, industrial wastes and groundwater, and which endure permanently under the conditions likely to be imposed by this service. The gasket shall conform the requirements of ASTM F-477.
         2. NO SOLVENT CEMENT JOINTS SHALL BE ALLOWED.
      b. Fittings
         1. Only manufactured fittings made of PVC plastic having a cell classification of 12454-B or 12454-C as defined in ASTM D-1784 shall be used.
         2. Saddle connections shall not be allowed for new construction.
   b. DUCTILE IRON PIPE
      1. Material: Ductile iron pipe in diameters from eight (8) inches through thirty six inches (36) shall be centrifugally cast and shall conform to ANSI Specifications A-21.51 and AWWA C-151 latest revision. Ductile iron pipe shall be class 50, 51, 52 or 54 wall thickness dependent upon site conditions and provided in minimum laying lengths of eighteen (18) feet. Ductile iron pipe larger than thirty six (36) feet in diameter shall be approved on a case by case basis by the department.
      2. Fittings: Fittings shall be standardized for type the pipe of pipe and joint specified and shall comply with ANSI A-21.10, AWWA C-110.
      3. Joints: Mechanical joints, slip or flanged joints shall be provided.
      4. Weights and Marking: Weights of pipe fittings shall conform strictly to requirements of ANSI Specifications. The class designations for the various classes of pipe and fittings shall be cast onto fittings in raised numerals, and cast or stamped on the outside of each joint of pipe. Weights shall be plainly and conspicuously painted in white on the outside of each joint of pipe and each fitting after the exterior coating has hardened.
4. Bedding and Backfill–Sanitary Sewers
   The following section provides the minimum requirements for the bedding of pipe and the backfilling of the trench.
   a. Bedding–Sanitary Sewers
      1. Trenching where the bottom of the trench is of undesirable material, an additional six(6) inches of trench bottom shall be excavated and a stable foundation shall be constructed using compacted No. 2 crushed stone.
      2. All sanitary sewer pipe shall be laid to the lines and grade shown on the approved design plans unless otherwise approved by the department.
      3. Bedding material shall be compacted No. 8 crushed stone or No. 8 fractured face aggregate and shall be placed the trench bottom such that after the pipe has been in placed thereon, imbedded to grade and aligned, there remains a 4–inch minimum depth of material below the pipe barrel and a minimum of 3–inches below the bell.
      4. The bell holes shall be excavated so that the entire pipe barred rests on the bedding. The following presents the bedding requirements for each pipe classification:
   b. Flexible Pipe: PVC Pipe
      1. No. 8 crushed stone or No. 8 fractured face aggregate shall be placed around the sides of the pipe up to the sides of the pipe to the springline(1/2 the outside diameter). The material shall be shovel sliced or otherwise carefully placed and "walked" or hand tamped in to ensure compaction of the haunch area and complete filling of all voids. From the springline to twelve(12) inches above the crown of the pipe, bedding shall be added in six(6) lifts "walked" in for compaction. Backfilling of the remainder of the trench shall be as specified in the section
   c. Semi-Rigid Pipe: Ductile Iron Pipe
      1. No. 8 crushed stone or No. 8 fractured face aggregate shall be placed around the sides of the pipe up to the springline (1/2 the outside diameter). This material shall be shovel sliced or otherwise carefully place and "walked" or hand tamped in to ensure compaction of the haunch area and complete filling of all voids.
      2. From springline to six(6) inches, of 1/2 the outside diameter above the top of the pipe, whichever is larger, bedding shall be added in six(6) inch lifts "walked" in for compaction.
      3. Backfilling of the remainder of the trench shall be a specified later in the section.
   d. Backfilling Sanitary Sewers
      1. Backfill Materials
         a. The following materials shall be used to backfill the trenches in accordance with and in the manner indicated by the requirements specified herein:

F. (CONTINUED)

      Class 1 Angular, six(6) to forty(40) millimeters(1/4 to 1 1/2 inch) graded stone such as crushed stone.

      Class 2 Course sands and gravel with maximum particle size forth (40) millimeters (1 1/2 inch), including variously graded sands and gravel containing small percentage of fines, generally granular and non–cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

      Class 3 Fine sand and clay gravel, including fine sands, sand–clay mixtures and gravel–clay mixtures. Soil types GM, GC, SM and SC are included in this class.

      Class 4 Silt, silty clays and clays, including silts of medium to high plasticity and liquid limits. Soil types MH, ML, CH, and CL are included in this class. These materials are not recommended for bedding.

      b. Backfill Around Pipe (bedding): Bedding and backfill materials shall be agreed upon prior to construction by the Engineer and the Contractor. Sample will be obtained and kept at the Engineer's office. No significant deviation from this material will be permitted for use without authorization by the Engineer and the Department.
      c. The term "select fill" shall mean the use of Class 2 or 3 backfill materials as described above.
   e. Areas Subject to Vehicular Traffic
      1. In areas under proposed or existing paved roads or within five feet of pavement, sidewalks, curbs, gutters or similar structures, granular backfill material complying with the requirements of the Indiana Department of Transportation Standard Specifications, latest Edition, as revised, shall be used.
      2. The material shall be placed in uniform layers not six(6) inches, loose measurement. Within three(3) feet of the sanitary sewer pipe the backfill material shall be thoroughly and uniformly compacted with hand held mechanical tampers. The remaining backfill material shall be compacted with mechanical tampers. A minimum compaction of 95% percent Standard Proctor Density shall be achieved within the backfill material.
      3. Jetting or flooding of the backfill or other alternative compaction methods and materials shall not be used without the approval of the city Department of Sanitation or Indiana Department of Transportation, dependent upon jurisdictional authority.
5. Workmanship
   a. Laying of Pipe in Cold Weather
      1. The Engineer reserves the right to order pipe installation discontinued whenever, in our opinion. There is danger of the quality of work being impaired because of cold weather. The Contractor shall be responsible for heating the pipe jointing material so as to prevent freezing of joints.
      2. Do not lay any pipe on frozen ground. No flexible or semi–rigid pipe shall be laid when the air temperature is less than 32 F unless proper precautions per the manufacturer's recommendations are taken by the Contractor and the method is approved by the Engineer and Department.
      3. When pipes with rubber gaskets or resilient–type are to be laid in cold weather, sufficiently warm the gasket or joint material so as to facilitate making a proper joint.
   b. Abandoned Sewers
      1. Sewers and storm water drains which are to be abandoned shall be bulkheaded with mortar and an eight(8) inch thick brick wall. Sewers, storm water drains, and sewer structures which are to be abandoned in place shall be filled with Sand or Cellular Concrete and plugged, unless otherwise indicated on the Plans.
      2. Service shall be maintained is such sewers and drains until the Department shall order bulkheads placed. No timber bulkheads shall be allowed. All castings on such abandoned structures are the property of the Department and shall be salvaged by the Contractor and delivered as directed. 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 grade or existing street grade, whichever is lower.
   c. Dewatering and Control of Surface Water:
      1. Where groundwater is encountered, the Contractor shall make every effort necessary to secure a dry trench bottom before laying pipe. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, wellpoints, etc., necessary to depress and maintain the groundwater level below the base of the excavation. If the Contractor is unable to remove the standing water in the trench, the Contractor shall over–excavate the proposed bottom grade of the sewer bedding,and place not less than three(3) inches of class No. 2 crushed stone (Indiana Department of Transportation aggregate classification) in the over–excavated area.
      2. The Contractor and/or Owner shall be liable for all lawsuits which may arise as a result of the Contractor's dewatering efforts.
      3. The Contractor shall keep the site free of surface water at all times and shall install drainage ditches, dikes, pumps and perform other work necessary to divert or remove rainfall and other accumulation of surface water and/or groundwater shall be performed in a manner which will prevent the accumulation of water within the construction area.
      4. UNDER NO CIRCUMSTANCES SHALL SURFACE WATER AND/OR GROUNDWATER BE DISCHARGED TO, DISPOSED OF OR ALLOWED TO FLOW INTO THE CITY'S SANITARY SEWER SYSTEM.
   d. Trenching
      1. The width of the trench at and below the top of the sanitary sewer shall be only as wide as is necessary for proper installation and backfilling, and consistent with safety requirements. The minimum width of trench for sanitary sewers, including force mains, 42–inches in diameter and less shall be 1.25 times the outside diameter (O.D.) plus 12–inches:

         Minimum Trench Width (inches)= 1.25 (O.D.)+12

      1. The minimum trench width for sanitary sewers larger than 42–inches in diameter shall be determined on a case by case basis by the Engineer and approved by the department.
      2. The design plans and specifications submitted to the Department for review, approval and issuance of a construction permit shall include a detailed trench drawing.
      3. The design of the sewer pipe and structures is predicated upon the width of trench indicated above and, should these limits be exceeded, the Contractor shall be responsible for the provision and installation of such remedial measures as may be required by the Engineer and/or the Department.
      4. Bell holes shall be excavated for bell and spigot pipe mechanical joint pipe, so that the entire barrel of the pipe shall rest on the bedding.
      5. The pipe trench shall not be excavated more than one hundred(100) feet in advance of pipe laying.
      6. Whenever pipe trenches are excavated below the designed bedding bottom, the Contractor shall fill the over–excavated with mechanically compacted No. 8 (1/4) inch to 3/4 inch) crushed stone or No. 8 fractured face aggregate.
      7. All rock, boulders and stones 6–inches in diameter and larger encountered in trenches shall be removed. Boulders or rocks are not to be used for trench backfill.
      8. In cases where material is deposited along open trenches, the material shall be placed so that no damage will result to the work or adjacent property as a result of rain or other surface wash.

F. (CONTINUED)

      9. If the bottom of the trench is of undesirable material, an additional six(6) inches of trench bottom shall be excavated and filled with Class "2" crushed stone and compacted using a hand held mechanical tamper. Where the distance to stable ground is excessive, the Engineer shall order in writing other types of foundation as he deems necessary subject to the approval of the Department.
      10. Remove any rock(s) encountered within six(6) inches below the barrel surface of the pipe, replace with No. 8 crushed stone or No. 8 fractured face aggregate and compact.
   e. Trench Box Pulling and Sheeting
      1. When required by the Occupational Safety and Health Act (OSHA) to protect life, property, or the work, sheet and brace all open cut trenches in accordance with CFR 1926. Upon completion of the work, all temporary forms, shores, and bracing shall be removed. All vacancies or voids by the sheeting while being withdrawn, shall be carefully filled with bedding material.
      2. The Contractor shall employ adequate safeguards to prevent movement of the pipe joint. If any movement should occur, the Contractor shall reinstall the pipe.
      3. Any damage to pavement or other structures due to sheeting , shoring, or bracing shall be repaired by the Contractor at his own expense.
      4. Sheeting and bracing which is to remain place shall be cut off at the elevation of 1.5 feet above the top of the sewer pipe.
   f. Line and Grade
      1. The Contractor shall furnish and set all line and grade stakes (HUB) and stakes for bench marks. The bench marks shall be set in strategic locations of the project in order to facilitate the Contractor's installation of the line and grade stakes (HUB) for each pipeline. Only the laser method shall be used to set the grade of the pipeline. Any other method must first be approved in writing by the Department. The Contractor shall constantly check line and grade of the laser beam and the pipe.
      2. Installation of Sanitary Sewers: Suitable tools and equipment shall be used for the safe and convenient handling and laying of pipe. Great care shall be taken to prevent pipe coating or wrappings from being damaged. Carefully examine all pipe for cracks and other defects.
      3. No pipe or fittings shall be laid which are know to be defective. If pipe or fittings are discovered to be cracked, broken or defective after being laid, they shall be removed and replaced with ground material.
      4. Thoroughly clean all pipe and fittings before installation. All pipe and appurtenances should be kept clean until accepted and completed work.
      5. All field–cutting 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 the pipe wall thickness. Field cut pipe will only be allowed to be installed at manholes, at prefabricated trees and wyes, and at the connection of new sanitary sewer to existing sanitary sewer.
      6. NOTE: Only smooth exterior pipe shall be used at manhole connections.
   g. Point of Commencement and Direction of Laying
      1. The point of commencement for laying of sewer pipe shall be the lowest point in the proposed sewer line. Lay the pipe with the bell end of bell and spigot pipe or with the receiving groove end of tongue and groove pipe pointing upgrade. Any other procedure shall be followed only with permission of the Department.
      2. Lay each pipe on an even firm bed as specified so that no uneven strain will come to any part of the pipe. Particular care shall be exercised to prevent the pipes from bearing on the sockets. Dig all bell holes for bell and spigot pipe.
      3. Completely shove home all pipe (to the assembly mark.) On pipe of the tongue prove type thirty(30) inches and larger in diameter, pressure must be applied to the center of each pipe as it is laid by a winch and cable orother mechanical means.
      4. All connection fittings shall be sealed with watertight stopper.
      5. The Contractor shall extend the building wye lateral to the right–of–way and shall place a one(1) inch cast ironlocator rod or magnetic locator tape above the end of the pipe to within three(3) feet of the ground surface. The purpose is to provide for case of location of the wye stub.
   h. Construction Bulkheads
      1. Before extending a sanitary sewer, the Contractor shall provide a watertight bulkhead in the existing sewer immediately downstream of the point of connection. This bulkhead shall be left in place until the new sanitary sewer has been cleaned of all accumulated water and debris and accepted by the Department.
      2. During all intermissions in construction of the sanitary sewer pipe, the open face of the last pipe laid shalbe plugged, covered or bulkhead so as to prevent sand, water, earth or other materials from entering the pipe.
      3. Whenever pipe and special castings are required to be cut, the cutting shall be done by skilled workmen inmuch manner as to leave a smooth end at right angles to the axis of the pipe without damage to the pipe costing or cement lining. CUTTING TORCHES SHALL NOT BE USED.
   i. RELATIONSHIP TO WATER MAINS
      1. Horizontal Separation
         a. Sewers shall be laid at least 10 feet (3.0 m) horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the appropriate reviewing agency may allow deviation on a case–by–case basis, if supported by data from the design engineer such deviation may allow installation of the sewer closest to the water main, provided that the water that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches (46 cm) above the top of the sewer.
      2. Crossings
         a. Sewer crossing water mains shall be laid to provide a minimum vertical distance of 18 inches (46 cm) between the outside of the water main and the outside of the sewer. This shall be the case where water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.
      3. Special Conditions
         a. when it is impossible to obtain proper horizontal and vertical separation is stipulated above, the sewer shall be designed and constructed equal to water pipe, and shall be pressure tested to assure watertightness prior to backfilling.
   j. Testing Gravity Sanitary Sewers
      1. General
         a. The contractor shall bear the complete cost and supply all equipment necessary to preform the test required.
         b. All test shall be conducted under the observation of the Department's Observer. It shall be the Contractor's resonsibility to schedule testing with the Observer.
         c. Certifications: The Contractor upon request shall furnish the department with certified reports stating that inspection and specified test have been made and that the results thereof comply with the applicable ANSI Specifications and these standards for each.

F. (CONTINUED)

      2. Infiltration/Exfiltration Test
         a. Once constructed, all sanitary sewers and manholes watertight and free from leakage. The rate of infiltration into the sanitary sewr system between any two adjacent manholes or the entric system shall not be in excess of 100 gallons per inch of pipe diameter per mile per day (100 gpd/in/mi). The Contractor shall be required to repair all visible leaks to satisfaction of the Department, even if the infiltration requirements are met.
         b. Any leakage found during the infiltration test shall be corrected by the Contractor at his expense. The method of repair shall be per the approval of the Department; however, grouting of the joint or crack to repair the leakage shall not be permitted. If the defective potion of the sanitary sewer cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary to obtain a system that passes infiltration requirements.
      3. Deflection Test
         a. All gravity sanitary sewers constructed of flexible pipe (PVC) shall be mandrel tested no sooner than thirty (30) days after installation. The deflection limit is 5% of the inside diameter of the pipe. Mandrel must be pulled through by hand with no mechanical device. Any failed section of pipe shall be reinstalled by the Contractor at no cost to the owner.
      4. Low Presure Air Test (Gravity Sewer)
         a. All gravity sanitary sewers shall be tested for infiltration by means of a low pressure air test. A minimum of 5 p.s.i. must be maintained in the pipe for a period of no less than 5 minutes

REVISION

VERSATILE CONSTRUCTION GROUP, LLC.
570 East Tracy Road, Suite 610
New Whiteland, Indiana 46184
Ph: 317.535.3579 Fax: 317.535.3581

Beeson Trust / 300 Plaza
6088, 6084, 6080, and 6072 W. 300 N.
Mt. Comfort, Indiana 46140

General Notes

Job No.:	Date Stamped:	
21081	03/31/2022	
Drawn By: caw	Checked By: tab	Scale:

CAD FILE:
G:\21081\c800 general notes.dwg

TRENT A. BAXTER REGISTERED No. 19700309 STATE OF INDIANA PROFESSIONAL ENGINEER
Trent A Baxter
CERTIFIED BY:

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