1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lots 10, 11, 12 & 13

Storm Water Technical Report
August 2025

Prepared for:

CV BDG A LLC
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

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1.0 Project Description

Centennial Village is proposing to develop a grocery store, as the next phase of the ongoing Centennial Village Subdivision PUD project. The site is located northeast of the intersection Calumet Avenue and 45th Avenue in Munster, Indiana. Lot 11 contains approximately 2.36 acres and the proposed building is approximately 23,299 sf. Lots 10, 12 and 13 are 2.02 ac, 1.17ac and 0.93 ac respectively.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards. When Lots 10, 12 & 13 are developed, it shall provide an updated stormwater report including their proposed drainage and storm sewer design for each site.

See **Exhibit 1 ALTA Survey** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 10, 11 (future Sprouts), 12 & 13 (future Chase Bank). The proposed storm sewer system connects to the existing 36" RCP stub located at the southeast corner of the 45th Avenue entrance. The connection will convey flows into the major storm sewer system south of 45th Avenue, which ultimately discharges to the Centennial Village regional detention facility, Clayhole Lake. The pipe capacity and the major existing storm sewer system being connected to were previously studied by Robinson Engineering in their stormwater report dated October 2, 2017. As shown in **Exhibit 4,** *Centennial Village – Lot 9 – Building M Stormwater Report* (June 2023), the storm sewer system was designed to accommodate Lot C, which is now being subdivided into Lots 10, 11, 12, and 13.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow.
See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of Lot 11. When Lot 10 is developed, it shall provide an overland flood route for the site. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 3 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

ALTA Survey

ALTA/NSPS LAND TITLE SURVEY

PARCEL DESCRIPTION (PER EXHIBIT "A" IN TITLE COMMITMENT REFERENCED HEREON):

CENTENNIAL VILLAGE LOT C AS PER PLAT THEREOF SHOWN IN PLAT BOOK 110, PAGE 11 RECORDED AS DOCUMENT NUMBER 2017024636 ON APRIL 21, 2017 IN THE OFFICE OF THE RECORDER OF LAKE COUNTY, INDIANA.

PARCEL INFORMATION:

TAX ID. NO. 45-07-30-351-006.000-027
OWNER: CV BDG A, LLC
QUIT CLAIM DEED DEED
DOC. NO. 2021-029213
REC. MARCH 31, 2021

PARCEL AREA:

282,441 SQ. FT.±
6.48 ACRES±

SURVEY REFERENCES:

1.) RECORDED DEEDS AS REFERENCED HEREON.
2.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE, PLAT BOOK 110, PAGE 11, DOCUMENT NUMBER 2017 024636, APRIL 21, 2017.
3.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE FIRST RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 53, DOCUMENT NUMBER 2018 042432, JULY 9, 2018.
4.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE SECOND RESUBDIVISION OF LOT "A", PLAT BOOK 111, PAGE 87, DOCUMENT NUMBER 2018 070571, OCTOBER 15, 2018.
5.) RECORDED SUBDIVISION PLAT OF CENTENNIAL VILLAGE THIRD RESUBDIVISION OF LOT "A", PLAT BOOK 117, PAGE 60, DOCUMENT NUMBER 2023 028515, OCTOBER 13, 2023.
6.) RECORDED A.L.T.A./A.C.S.M. LAND TITLE SURVEY BY PLUMB TUCKETT AND ASSOCIATES, JOB NUMBER S15644, SURVEY BOOK 29, PAGE 76, DOCUMENT NUMBER 2017 015652, MARCH 9, 2017.
7.) PLAT OF SURVEY BY DVG TEAM, INC. JOB NUMBER 22-2073 DATED JANUARY 5, 2023 (LOT A & B IN SURVEY REFERENCE 2).
8.) ALTA/NSPS LAND TITLE SURVEY OF SUBJECT PARCEL BY DVG TEAM INC., JOB NUMBER 23-1073 DATED NOVEMBER 29, 2023.

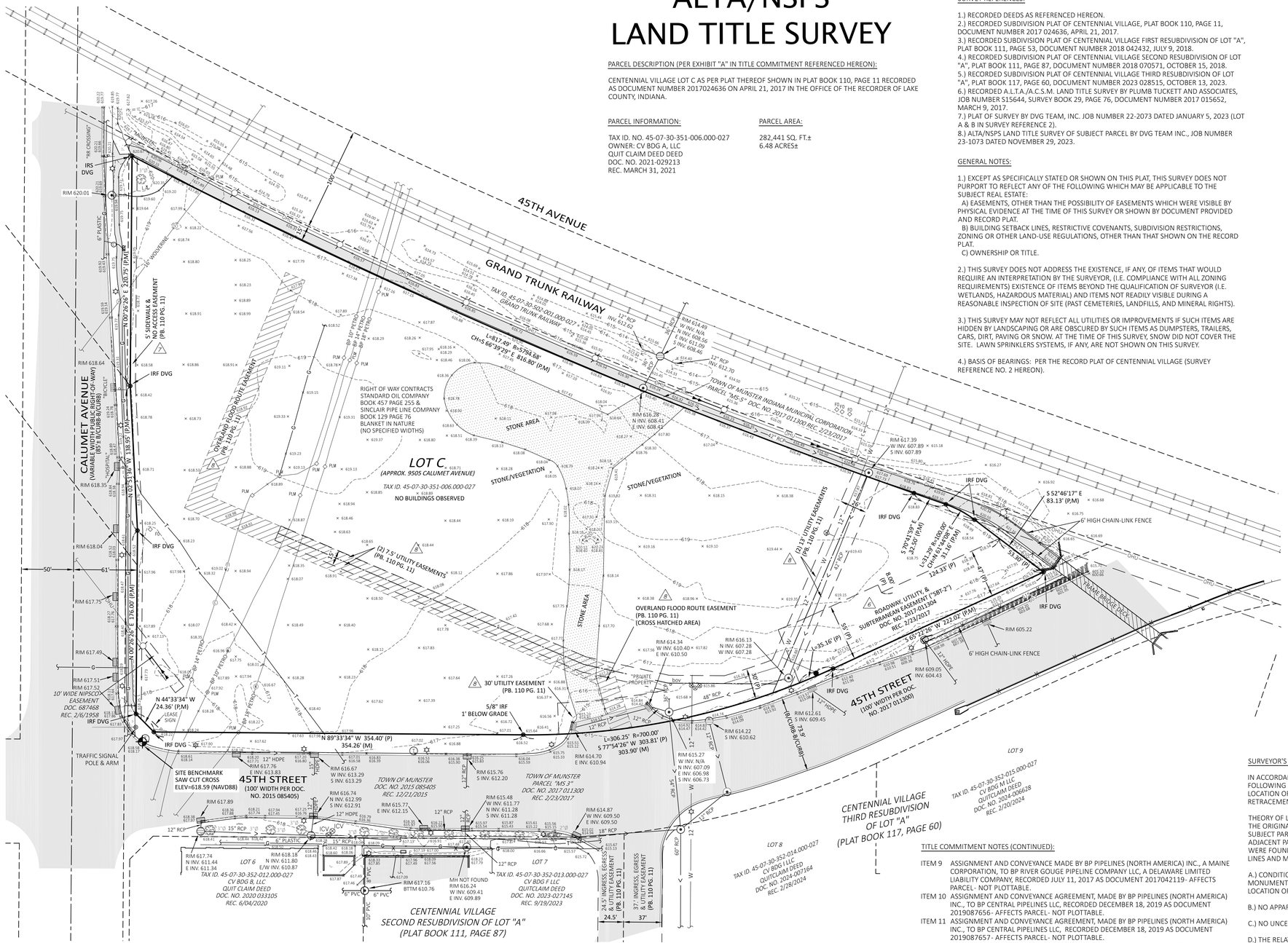
GENERAL NOTES:

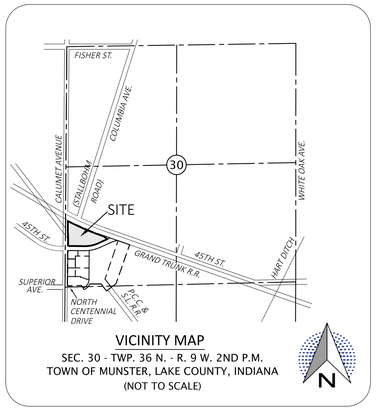
1.) EXCEPT AS SPECIFICALLY STATED OR SHOWN ON THIS PLAT, THIS SURVEY DOES NOT PURPORT TO REFLECT ANY OF THE FOLLOWING WHICH MAY BE APPLICABLE TO THE SUBJECT REAL ESTATE:
A) EASEMENTS, OTHER THAN THE POSSIBILITY OF EASEMENTS WHICH WERE VISIBLE BY PHYSICAL EVIDENCE AT THE TIME OF THIS SURVEY OR SHOWN BY DOCUMENT PROVIDED AND RECORD PLAT.
B) BUILDING SETBACK LINES, RESTRICTIVE COVENANTS, SUBDIVISION RESTRICTIONS, ZONING OR OTHER LAND-USE REGULATIONS, OTHER THAN THAT SHOWN ON THE RECORD PLAT.
C) OWNERSHIP OR TITLE.

2.) THIS SURVEY DOES NOT ADDRESS THE EXISTENCE, IF ANY, OF ITEMS THAT WOULD REQUIRE AN INTERPRETATION BY THE SURVEYOR, (I.E. COMPLIANCE WITH ALL ZONING REQUIREMENTS) EXISTENCE OF ITEMS BEYOND THE QUALIFICATION OF SURVEYOR (I.E. WETLANDS, HAZARDOUS MATERIAL) AND ITEMS NOT READILY VISIBLE DURING A REASONABLE INSPECTION OF SITE (PAST CEMETERIES, LANDFILLS, AND MINERAL RIGHTS).

3.) THIS SURVEY MAY NOT REFLECT ALL UTILITIES OR IMPROVEMENTS IF SUCH ITEMS ARE HIDDEN BY LANDSCAPING OR ARE OBSCURED BY SUCH ITEMS AS DUMPSTERS, TRAILERS, CARS, DIRT, PAVING OR SNOW. AT THE TIME OF THIS SURVEY, SNOW DID NOT COVER THE SITE. LAWN SPRINKLERS SYSTEMS, IF ANY, ARE NOT SHOWN ON THIS SURVEY.

4.) BASIS OF BEARINGS: PER THE RECORD PLAT OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON).





VICINITY MAP
SEC. 30 - TWP. 36 N. - R. 9 W. 2ND P.M.
TOWN OF MUNSTER, LAKE COUNTY, INDIANA
(NOT TO SCALE)

LEGEND

P - DIMENSION SHOWN ON RECORDED PLAT.
M - DIMENSION MEASURED BETWEEN MONUMENTS.
IRS "DVG" - 5/8" REBAR SET WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF "DVG" - 5/8" REBAR FOUND WITH BLUE CAP STAMPED "DVG TEAM INC. FIRM NO. 0120"
IRF - REBAR FOUND
PB. - PLAT BOOK
DOC. NO. - DOCUMENT NUMBER
NIPSCO - NORTHERN INDIANA PUBLIC SERVICE COMPANY
L.A. - LANDSCAPE AREA
PG. - PAGE
REC. - RECORDED

UTILITY POLE
LIGHT POLE
MANHOLE
CURB INLET
CATCH BASIN
TRAFFIC MANHOLE
GUY/ANCHOR
ROAD SIGN
PLM PIPELINE MARKER
GAS TEST STATION
GAS LINE VENT
GAS VALVE
CV IRRIGATION CONTROL VALVE
bov BLOW OFF VALVE
A SCHEDULE B, PART II TITLE EXCEPTION ITEM PER COMMITMENT REFERENCED HEREON

—W— BURIED WATER LINE
—G— BURIED GAS LINE
—E— BURIED ELECTRIC LINE
—T— BURIED COMMUNICATION LINE
—OHU— OVERHEAD UTILITY WIRES
—BP— BURIED BRITISH PETROLEUM PIPE LINE
—WOLVERINE— BURIED WOLVERINE PIPE LINE
SUBJECT PARCEL LINE
ADJOINING PARCEL LINE
SECTION/QUARTER LINE
EASEMENT LINE
STORM SEWER WITH FLOW DIRECTION
SANITARY SEWER WITH FLOW DIRECTION
WATER VALVE
FIRE HYDRANT ASSEMBLY
FIBER OPTIC MARKER POST
TREE WITH SIZE
EXISTING 1-FOOT CONTOUR
xxx.x EXISTING SPOT ELEVATION
ADA PAD
CONCRETE
ASPHALT
STONE

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES:

ITEM 1: MONUMENTS SET OR FOUND ARE SHOWN HEREON.

ITEM 2: ADDRESS SHOWN HEREON WAS REFERENCED FROM DOCUMENT NO. 2021-029213.

ITEM 3: FLOOD ZONE DESIGNATION: THE ACCURACY OF ANY FLOOD HAZARD DATA SHOWN ON THIS PLAT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE FLOOD INSURANCE RATE MAP, (FIRM). THE SUBJECT PARCEL DESCRIBED IN THE PARCEL DESCRIPTION SHOWN HEREON APPEARS TO LIE WITHIN THAT FLOOD HAZARD ZONE "X" AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AS SAID SUBJECT PARCEL PLOTS BY SCALE ON FLOOD INSURANCE RATE MAP FOR THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, COMMUNITY NUMBER 180139, PANEL NO. 18089C0117E. MAP EFFECTIVE DATE: JANUARY 18, 2012.

ITEM 4: LAND AREA IS SHOWN HEREON.

ITEM 5: VERTICAL RELIEF- ELEVATIONS AND THE RESULTING CONTOURS (1-FOOT INTERVAL UNLESS OTHERWISE SPECIFIED) SHOWN HEREON WERE MEASURED ON THE GROUND THIS SURVEY AND ARE REFERENCED TO A STATEWIDE GNSS REFERENCE STATION NETWORK KNOWN AS INCORS WHICH IS MAINTAINED BY THE INDIANA DEPARTMENT OF TRANSPORTATION USING THE NORTH AMERICAN VERTICAL DATUM OF 1988.

ITEM 8: SUBSTANTIAL VISIBLE FEATURES SUCH AS PARKING LOTS, BILLBOARDS, SIGNS, SWIMMING POOLS, LANDSCAPED AREAS, AND SUBSTANTIAL AREAS OF REFUSE (IF ANY) ARE SHOWN HEREON.

ALTA/NSPS OPTIONAL TABLE "A" SURVEY RESPONSIBILITIES AND SPECIFICATIONS ITEM NOTES (CONTINUED):

ITEM 11(a): LOCATION OF UTILITIES EXISTING ON OR SERVING THE SURVEYED PROPERTY WAS DETERMINED BY OBSERVED EVIDENCE AND EVIDENCE FROM PLANS REQUESTED BY THE SURVEYOR AND OBTAINED FROM UTILITY COMPANIES OR PROVIDED BY CLIENT TO DEVELOP A VIEW OF UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY, AND RELIABLY DEPICTED. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM VISIBLE LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS OR PROBINGS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES, DRAINAGE TILES, UNDERGROUND DITCHES, FEEDERS OR LATERALS. NO ATTEMPT HAS BEEN MADE AS A PART OF THIS SURVEY TO OBTAIN DATA CONCERNING SIZE, DEPTH, CONDITION, CAPACITY OF ANY UTILITIES LOCATED WITHIN THE SITE SURVEYED OR SERVING THE SITE, UNLESS SHOWN HEREON. A UTILITY LOCATE REQUEST WAS MADE FOR THE SITE (INDIANA 811, TICKET NO. 241010146O) AND IS SHOWN HEREON IF MARKED BY THE UTILITY COMPANIES AT THE TIME OF THIS SURVEY. IF ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, EXCAVATION AND/OR A PRIVATE UTILITY LOCATE REQUEST MAY BE NECESSARY.

ITEM 13: NAMES OF ADJOINING OWNERS ACCORDING TO PUBLIC RECORDS ARE SHOWN HEREON. PARCELS IDENTIFIED BY TITLE DESCRIPTION OR RECORD REFERENCES AS PER 865 IAC 1-12-13-(11) ARE OBTAINED FROM COUNTY AUDITOR'S OFFICE AND OR RECORDER'S OFFICE AND ARE NOT CERTIFIED. THE INFORMATION MAY OR MAY NOT REFERENCE THE MOST CURRENT DEED OF RECORD OR THE MOST CURRENT STATUS OR TITLE FOR THAT PARCEL. A TITLE COMMITMENT OR ABSTRACT MAY BE NECESSARY.

TITLE COMMITMENT NOTES:

THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY THE SURVEYOR. ALL INFORMATION REGARDING RECORD EASEMENTS AND OTHER DOCUMENTS WHICH MIGHT AFFECT THE QUALITY OF TITLE TO PARCEL SHOWN HEREON WAS GAINED FROM AN ALTA COMMITMENT, COMMITMENT NUMBER NCS-1231860-CHI2 ISSUED BY FIRST AMERICAN TITLE INSURANCE COMPANY, ON 8/27/2024. THE FOLLOWING SURVEY RELATED MATTERS CORRESPOND TO THE ITEMS NUMBERED IN SCHEDULE B, PART 2, EXCEPTIONS IN SAID COMMITMENT AND ARE ADDRESSED HEREON IN THE FOLLOWING MANNER:

ITEM 3 RIGHTS OF THE PUBLIC, THE STATE OF INDIANA AND/OR THE MUNICIPALITY, AND OTHERS ENTITLED THERETO, IN AND TO THE WEST 50 FEET OF THE LAND DEDICATED FOR CALUMET AVENUE PER PLAT OF DEDICATION RECORDED SEPTEMBER 24, 1980 AS DOCUMENT 599730 IN PLAT BOOK 52 PAGE 49- DOES NOT AFFECT PARCEL-RIGHT-OF-WAY SUPERSEDED BY OTHER DOCUMENTS. RIGHT-OF-WAY SHOWN PER RECORD PLAT.
ITEM 4 PERMANENT RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA RECORDED OCTOBER 20, 2010 AS DOCUMENT 2010060886- DOES NOT AFFECT PARCEL. ABROGATION OF RESTRICTIVE COVENANT BY MUNSTER PARKS AND RECREATION DEPARTMENT OF THE TOWN OF MUNSTER, INDIANA, RECORDED SEPTEMBER 3, 2015 AS DOCUMENT 2015060068- DOES NOT AFFECT PARCEL.
ITEM 5 TEMPORARY CONSTRUCTION EASEMENT RECORDED FEBRUARY 23, 2017 AS INSTRUMENT NO. 2017-011302- DOES NOT AFFECT PARCEL.
ITEM 6 GRANT OF ROADWAY, UTILITY AND SUBTERRANEAN EASEMENTS TO THE TOWN OF MUNSTER, INDIANA, RECORDED FEBRUARY 23, 2017 AS DOCUMENT 2017011304- AFFECTS PARCEL- SHOWN HEREON.
ITEM 7 SIDEWALK AND NO ACCESS EASEMENT AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 - AFFECTS PARCEL- SHOWN HEREON.
ITEM 8 UTILITY EASEMENT(S) AS SHOWN ON PLAT OF CENTENNIAL VILLAGE PLANNED UNIT DEVELOPMENT TO THE TOWN OF MUNSTER, LAKE COUNTY, INDIANA, RECORDED APRIL 21, 2017, IN PLAT BOOK 110, PAGE 11, AS DOCUMENT 2017024636 AFFECTS PARCEL- SHOWN HEREON.

TITLE COMMITMENT NOTES (CONTINUED):

ITEM 9 ASSIGNMENT AND CONVEYANCE MADE BY BP PIPELINES (NORTH AMERICA) INC., A MAINE CORPORATION, TO BP RIVER GOLIGE PIPELINE COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED JULY 11, 2017 AS DOCUMENT 2017042119- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 10 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087656- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 11 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 18, 2019 AS DOCUMENT 2019087657- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 12 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090554- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 13 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090555- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 14 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090556- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 15 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090628- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 16 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP CENTRAL PIPELINES LLC, RECORDED DECEMBER 30, 2019 AS DOCUMENT 2019090629- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 17 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073216- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 18 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073223- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 19 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073260- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 20 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073261- AFFECTS PARCEL- NOT PLOTTABLE.
ITEM 21 ASSIGNMENT AND CONVEYANCE AGREEMENT, MADE BY BP PIPELINES (NORTH AMERICA) INC., TO BP ONE PIPELINE COMPANY LLC, RECORDED OCTOBER 14, 2020 AS DOCUMENT 2020073262- AFFECTS PARCEL- NOT PLOTTABLE.

SURVEYOR'S REPORT:

IN ACCORDANCE WITH TITLE 865, ARTICLE 1.0, CHAPTER 12 OF THE INDIANA ADMINISTRATIVE CODE, THE FOLLOWING OBSERVATIONS AND OPINIONS ARE SUBMITTED REGARDING THE VARIOUS UNCERTAINTIES IN THE LOCATION OF THE LINES AND CORNERS ESTABLISHED OR REESTABLISHED ON THIS SURVEY. THIS PLAT REPRESENTS A RETRACEMENT SURVEY OF A PLATTED COMMERCIAL LOT.

THEORY OF LOCATION: PLUMB, TUCKETT AND ASSOCIATES, INC. (NOW DOING BUSINESS AS DVG TEAM, INC.) WAS THE ORIGINAL SURVEYOR OF CENTENNIAL VILLAGE (SURVEY REFERENCE NO. 2 HEREON) WHICH CREATED THE SUBJECT PARCEL (LOT "C"). A SEARCH FOR MONUMENTS WAS PERFORMED AROUND THE SUBJECT PARCEL AND ADJACENT PARCELS. SEVERAL DVG AND PLUMB TUCKETT REBARS ALONG WITH ORIGINAL SUBDIVISION CONTROL WERE FOUND. THE ORIGINAL CONTROL AND ORIGINAL MONUMENTS WERE USED TO RETRACE THE SUBJECT PARCEL LINES AND MEASURED WELL WITH PLATTED BEARINGS AND DISTANCES.

A.) CONDITION OF FOUND REFERENCE MONUMENTS: UNLESS OTHERWISE STATED ON THIS PLAT, REFERENCE MONUMENTS WERE FOUND UNDISTURBED, AT OR NEAR GRADE AND OF UNKNOWN ORIGIN. UNCERTAINTY IN LOCATION OF FOUND MONUMENTS MEASURED 0.14 FEET EAST-WEST AND 0.14 FEET NORTH-SOUTH.

B.) NO APPARENT UNCERTAINTIES DUE TO SUBSTANTIAL OBSERVED OCCUPATION OR POSSESSION.

C.) NO UNCERTAINTIES DUE TO RECORD DESCRIPTIONS WERE DISCOVERED.

D.) THE RELATIVE POSITIONAL ACCURACY (DUE TO RANDOM ERRORS IN MEASUREMENTS) FOR THIS SURVEY, BASED ON EQUIPMENT AND PROCEDURES USED, WAS WITHIN THE ALLOWABLE (0.07 FEET PLUS 50 PARTS PER MILLION) FOR AN URBAN SURVEY, PER 865 IAC 1-12-7.

TO: CV BDG A, LLC;
JP MORGAN CHASE BANK, N.A.;
FIRST AMERICAN TITLE INSURANCE COMPANY;

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11a AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON OCTOBER 28, 2024. I FURTHER STATE THAT SURVEY WAS PERFORMED IN ACCORDANCE WITH THE GUIDELINES SET IN TITLE 865 IAC 1-12 (RULE 12).

DATE OF PLAT: OCTOBER 30, 2024
DATE OF LAST REVISION: NOVEMBER 16, 2024

PROFESSIONAL LAND SURVEYOR: GLEN E. BOREN
INDIANA REGISTRATION NUMBER: LS20000006
gboren@dvgteam.com

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
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www.dvgteam.com

DATE:	REVISIONS AND NOTES:
11/16/24	ADDED OPTIONAL TABLE "A" ITEM 5

ALTA/NSPS LAND TITLE SURVEY
APPROX. 9505 CALUMET AVENUE
MUNSTER, IN 46321
LOT C, CENTENNIAL VILLAGE

N
0' 25' 50'
SCALE: 1" = 50'

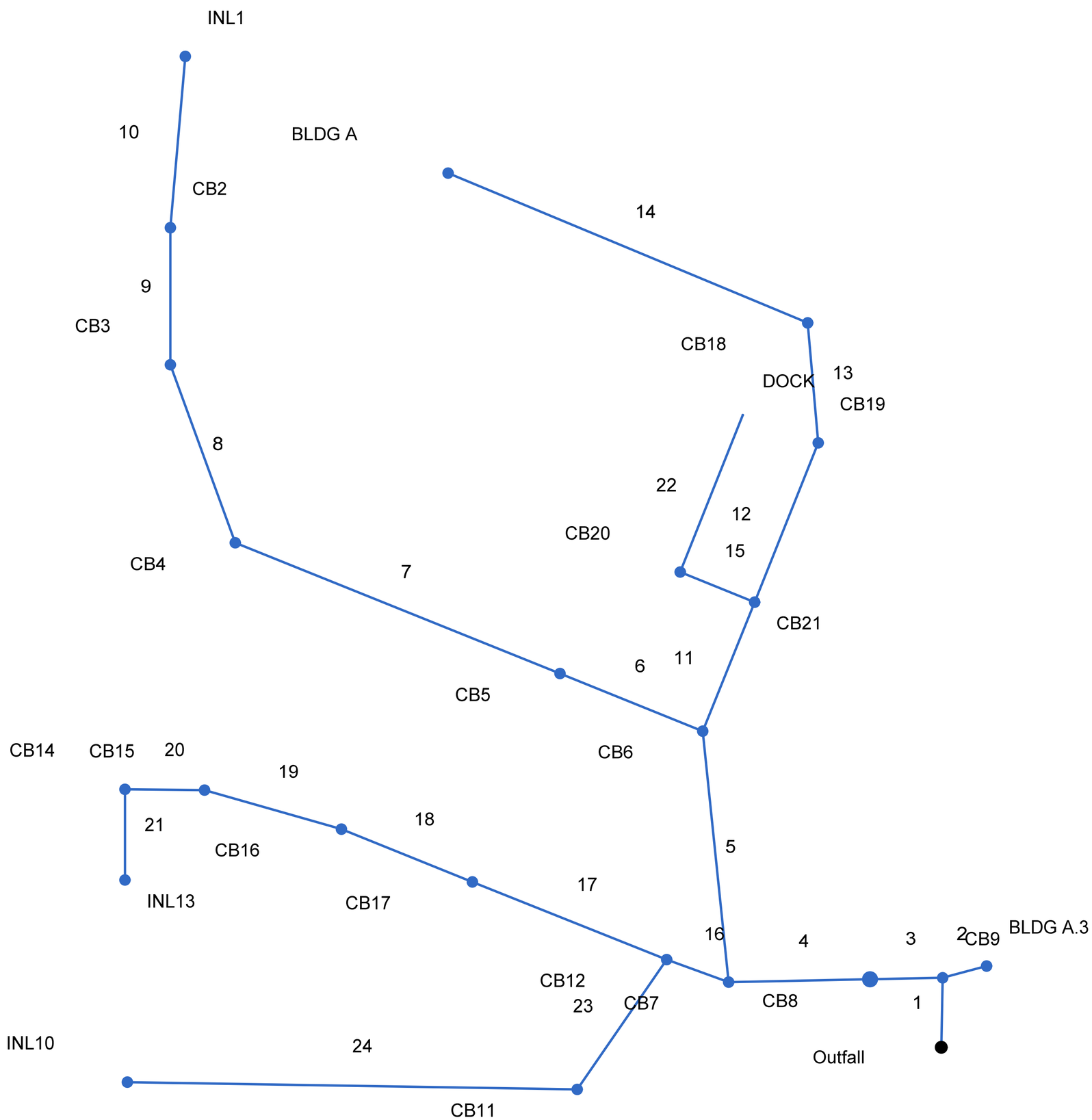
THE ARCHITECTS PARTNERSHIP

\24-0091 R1.dwg	
FB/PG	FILE NO.
DRAWN BY GAH	DATE 10/30/24
SECTION 30-36-9	COUNTY, STATE LAKE, IN
JOB NO. 24-0091	

Exhibit 2

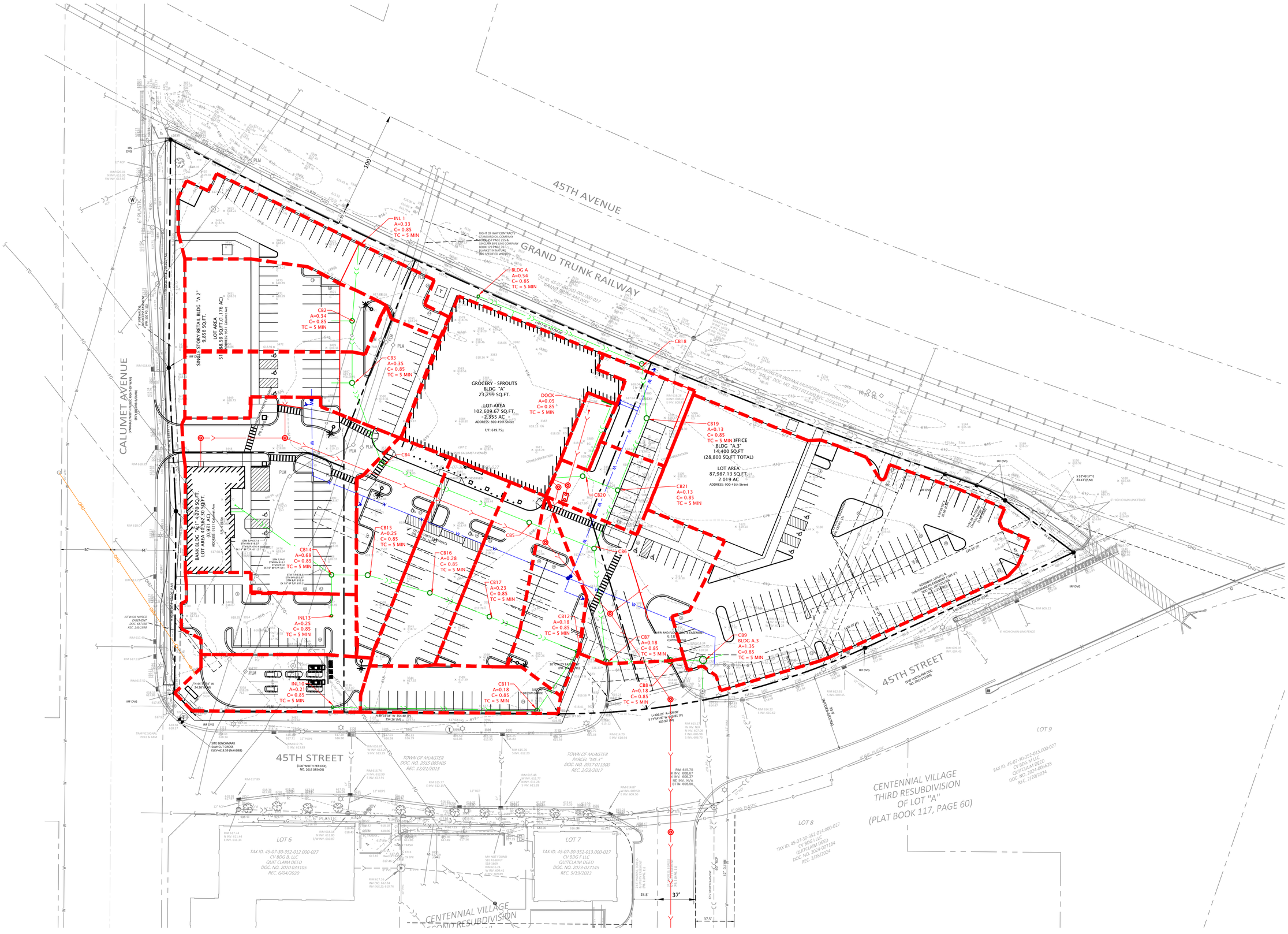
Storm Sewer Calculations

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: SS.stm	Number of lines: 24	Date: 8/20/2025

Storm Sewers v2023.00



DVG TEAM INC
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NOT FOR CONSTRUCTION

08/20/25

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

DATE:	REVISIONS AND NOTES:

Centennial Village-Lot 11
Bldg. A Sprouts

Tributary Area Exhibit

N

0' 20' 40'

SCALE: 1" = 40'

NOT FOR CONSTRUCTION

DESIGN BY	DATE
GMPF	08/20/25

PROJECT NO.
25-0081

TRIB EX

BY: ___DPW___
DATE: __08/20/2025__
CHECKED BY: ____
DATE: __

PROJECT: 25-0081 CVP Sprouts
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
1	CB9	CB9-EXMH	0.00	5.79	0.85	5.00	9.20	5.74	0.00	28.24	29.62	4.77	0.013	30.00	36.00	0.20	615.90	607.15	607.09	609.49	609.43
2	BLDG A.3	BLDGA3-CB9	1.35	1.35	0.85	5.00	5.00	7.07	0.00	8.11	12.25	2.69	0.012	20.00	24.00	0.25	615.90	608.05	608.00	609.86	609.85
3	CB8	CB8-CB9	0.18	4.44	0.85	5.00	9.10	5.77	0.00	21.77	24.85	4.52	0.012	32.00	30.00	0.31	615.05	607.55	607.45	609.91	609.85
4	CB7	CB7-CB8	0.18	4.26	0.85	5.00	8.90	5.83	0.00	21.10	25.18	4.40	0.012	62.00	30.00	0.32	615.55	607.75	607.55	610.06	609.95
5	CB6	CB6-CB7	0.00	1.87	0.85	5.00	8.30	5.98	0.00	9.51	12.77	3.03	0.012	110.00	24.00	0.27	617.93	608.20	607.90	610.54	610.37
6	CB5	CB5-CB6	0.00	1.02	0.85	5.00	7.00	6.35	0.00	5.51	6.91	3.12	0.012	68.00	18.00	0.37	618.74	609.25	609.00	610.82	610.66
7	CB4	CB4-CB5	0.00	1.02	0.85	5.00	6.20	6.61	0.00	5.73	6.48	4.15	0.012	154.00	18.00	0.32	618.68	613.50	613.00	614.60	614.10
8	CB3	CB3-CB4	0.35	1.02	0.85	5.00	5.80	6.76	0.00	5.86	7.90	4.00	0.012	83.00	18.00	0.48	617.80	613.90	613.50	614.96	614.80
9	CB2	CB2-CB3	0.34	0.67	0.85	5.00	5.50	6.87	0.00	3.91	4.95	3.48	0.012	60.00	15.00	0.50	617.90	614.20	613.90	615.21	615.08
10	INL1	INL1-CB2	0.33	0.33	0.85	5.00	5.00	7.07	0.00	1.98	2.81	2.72	0.012	75.00	12.00	0.53	617.40	614.60	614.20	615.41	615.24
11	CB21	CB21-CB6	0.13	0.85	0.85	5.00	8.00	6.06	0.00	4.38	4.91	3.61	0.012	61.00	15.00	0.49	618.60	609.70	609.40	610.88	610.66
12	CB19	CB19-CB21	0.13	0.67	0.85	5.00	5.90	6.72	0.00	3.83	5.11	3.15	0.012	75.00	15.00	0.53	618.60	610.10	609.70	611.29	611.08
13	CB18	CB18-CB19	0.00	0.54	0.85	5.00	5.70	6.80	0.00	3.12	3.36	3.98	0.012	53.00	12.00	0.76	618.00	610.50	610.10	611.71	611.37
14	BLDG A	BLDGA-CB18	0.54	0.54	0.85	5.00	5.00	7.07	0.00	3.24	3.49	5.02	0.012	171.00	12.00	0.82	617.00	613.50	612.10	614.27	612.86
15	CB20	CB20-CB21	0.00	0.05	0.85	5.00	6.40	6.54	0.00	0.28	3.25	1.33	0.012	35.00	12.00	0.71	619.70	610.60	610.35	610.82	611.08
16	CB12	CB12-CB7	0.18	2.21	0.85	5.00	7.50	6.22	0.00	11.68	14.40	5.10	0.012	29.00	24.00	0.35	615.75	611.15	611.05	612.52	612.42
17	CB17	CB17-CB12	0.23	1.64	0.85	5.00	6.00	6.70	0.00	9.34	9.56	5.29	0.012	92.00	18.00	0.71	616.20	611.80	611.15	613.53	612.91
18	CB16	CB16-CB17	0.23	1.41	0.85	5.00	5.70	6.78	0.00	8.13	8.54	4.60	0.012	62.00	18.00	0.56	616.25	612.15	611.80	613.91	613.60
19	CB15	CB15-CB16	0.25	1.18	0.85	5.00	5.50	6.88	0.00	6.90	7.19	3.91	0.012	63.00	18.00	0.40	616.35	612.40	612.15	614.19	613.96
20	CB14	CB14-CB15	0.68	0.93	0.85	5.00	5.30	6.93	0.00	5.48	6.47	4.47	0.012	35.00	15.00	0.86	616.35	612.70	612.40	614.48	614.27
21	INL13	INL13-CB14	0.25	0.25	0.85	5.00	5.00	7.07	0.00	1.50	2.74	1.91	0.012	40.00	12.00	0.50	616.40	612.90	612.70	614.85	614.79
22	DOCK	DOCK-CB21	0.05	0.05	0.85	5.00	5.00	7.07	0.00	0.30	0.96	2.44	0.012	74.00	8.00	0.54	615.75	613.00	612.60	613.26 j	612.86
23	CB11	CB11-CB12	0.18	0.39	0.85	5.00	7.10	6.34	0.00	2.10	2.75	2.68	0.012	69.00	12.00	0.51	616.30	612.10	611.75	613.10	612.91
24	INL10	INL10-CB11	0.21	0.21	0.85	5.00	5.00	7.07	0.00	1.26	2.60	2.26	0.012	198.00	12.00	0.45	617.00	613.00	612.10	613.54	613.19

INLET CAPACITY ANALYSIS

BY: DPW
DATE: 8/20/2025
CHECKED: GMPF
DATE: 8/20/2025

Project: 25-0081 CVP-Sprouts
Location: 45th & Calumet Munster, IN

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

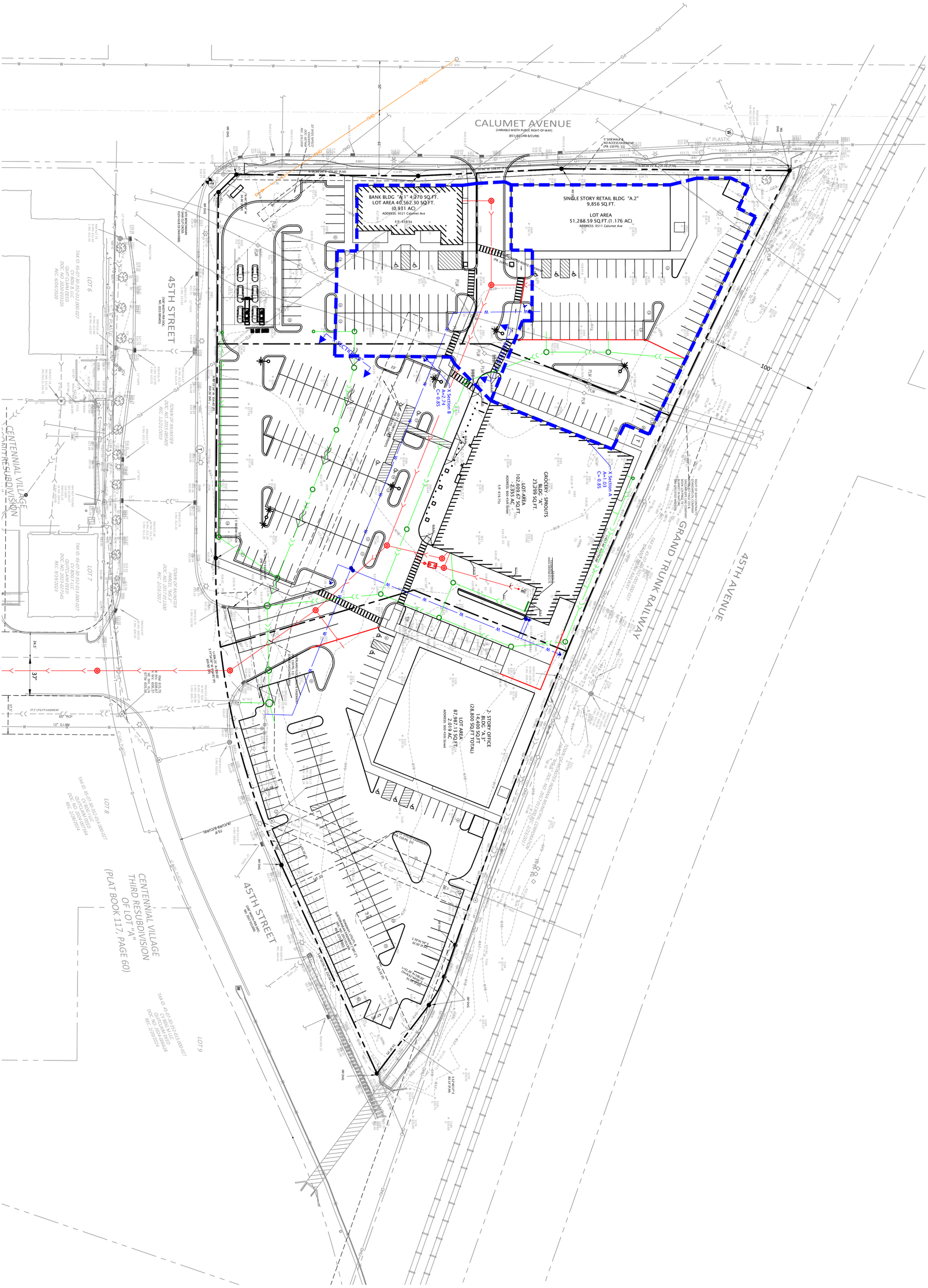
$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
INL1	EJ 1020 M1	0.97	5.92	0.67	0.33	0.85	7.08	1.99	0.58	0.35	6.9
CB2	EJ 1040 M1	1.32	6.83	0.67	0.34	0.85	7.08	2.05	0.33	0.32	4.0
CB3	EJ 1040 M1	1.32	6.83	0.67	0.35	0.85	7.08	2.11	0.35	0.33	4.2
CB7	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB8	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL10	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB11	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
CB12	EJ 1020 M1	0.97	5.92	0.67	0.18	0.85	7.08	1.08	0.17	0.23	2.8
INL13	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB14	V5630	3.29	10.00	0.67	0.58	0.85	7.08	3.50	0.16	0.36	4.3
CB15	EJ 1020 M1	0.97	5.92	0.67	0.25	0.85	7.08	1.50	0.33	0.29	4.0
CB16	EJ 1020 M1	0.97	5.92	0.67	0.28	0.85	7.08	1.69	0.42	0.31	5.0
CB17	EJ 1020 M1	0.97	5.92	0.67	0.23	0.85	7.08	1.38	0.28	0.27	3.4
CB19	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
CB21	EJ 1020 M1	0.97	5.92	0.67	0.13	0.85	7.08	0.78	0.09	0.19	2.2
DOCK	EJ 1020 M1	0.97	5.92	0.67	0.05	0.85	7.08	0.30	0.01	0.10	1.2

Exhibit 3

Overland Flood Route Calculations



NOT FOR CONSTRUCTION

Centennial Village-Lot 11
Bldg. A Sprouts

Overland Flood Route Exhibit

DATE:	REVISIONS AND NOTES:

CV BDG A LLC

631 Killarney Drive
Dyer, IN 46311

08/20/25

NOT FOR CONSTRUCTION

DVG TEAM INC
1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

EX

PROJECT NO: 25-0081
DATE: 08/20/25
DESIGNED BY: GMPF

SCALE: 1" = 40'

Overland Flood Route Computation Calculation

Project: 25-0081 CVP-Sprouts
Date: 8/20/2025

Storm Event: 100yr
*** Areas Calculated from Exhibit 3, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: G A					
Tc=	10	min			
Area=	1.03	acres			
C=	0.85				
i=	5.46	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**4.77**	**cfs**
100YR Overflow Water Elevation=				**618.55**	**Elev**
Freeboard to Nearest Bldg=				**1.20**	**ft**

Cross Section: B					
Tc=	15	min			
Area=	2.74	acres			
C=	0.85				
i=	4.52	in/hr			
Rational Method Q_{100}=CiA			**Q=**	**10.53**	**cfs**
100YR Overflow Water Elevation=				**616.85**	**Elev**
Freeboard to Nearest Bldg=				**2.90**	**ft**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 20 2025

XSectionA

User-defined

Invert Elev (ft)	=	618.35
Slope (%)	=	1.20
N-Value	=	0.011

Calculations

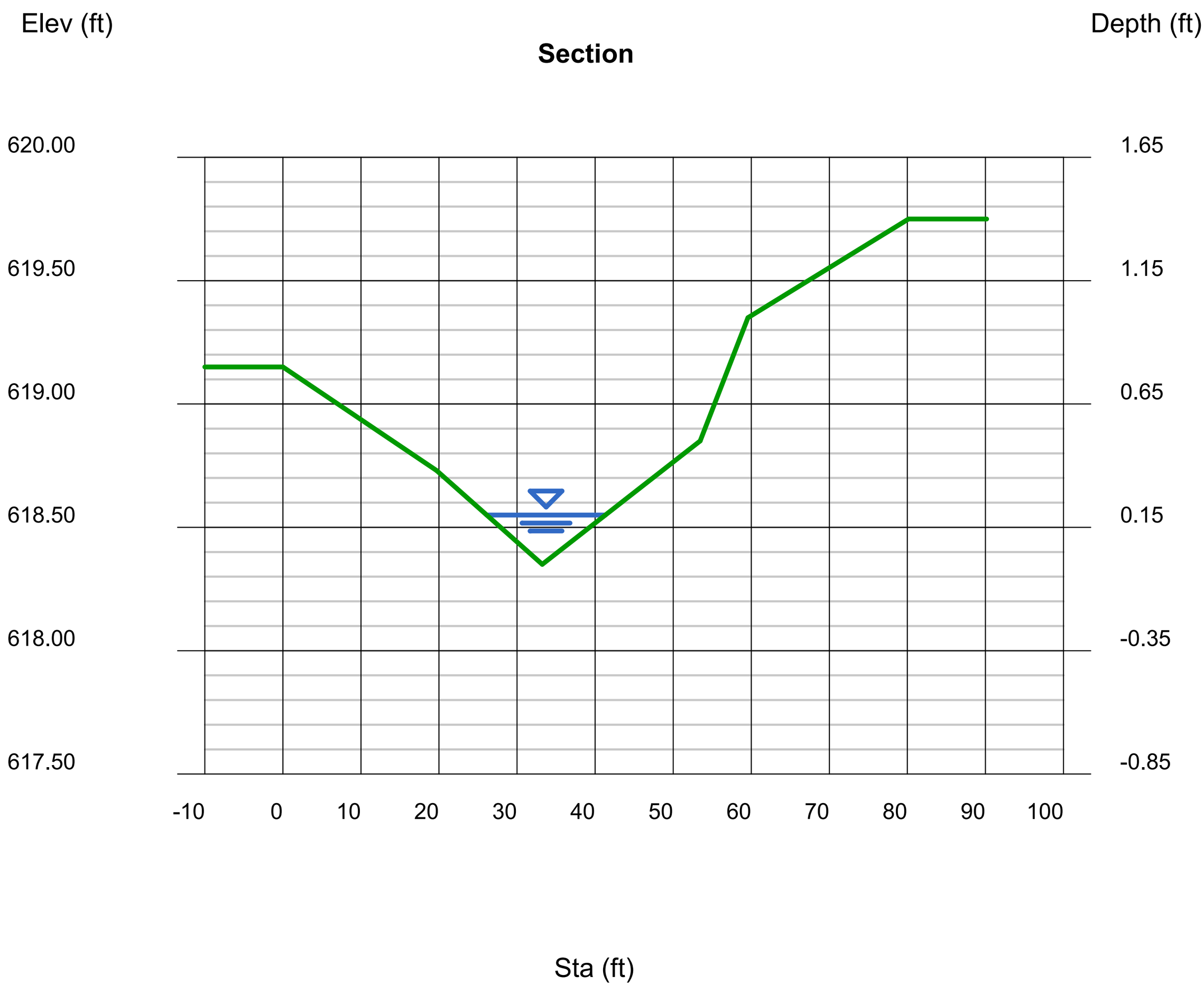
Compute by:		Known Q
Known Q (cfs)	=	4.77

Highlighted

Depth (ft)	=	0.20
Q (cfs)	=	4.770
Area (sqft)	=	1.52
Velocity (ft/s)	=	3.14
Wetted Perim (ft)	=	15.21
Crit Depth, Yc (ft)	=	0.26
Top Width (ft)	=	15.20
EGL (ft)	=	0.35

(Sta, El, n)-(Sta, El, n)...

(0.00, 619.15)-(19.71, 618.73, 0.011)-(33.23, 618.35, 0.011)-(53.45, 618.85, 0.011)-(59.57, 619.35, 0.011)-(80.15, 619.75, 0.011)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Aug 20 2025

XSectionB

User-defined

Invert Elev (ft)	= 616.70
Slope (%)	= 3.20
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.53

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 10.53
Area (sqft)	= 2.71
Velocity (ft/s)	= 3.89
Wetted Perim (ft)	= 36.13
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 36.13
EGL (ft)	= 0.38

(Sta, El, n)-(Sta, El, n)...

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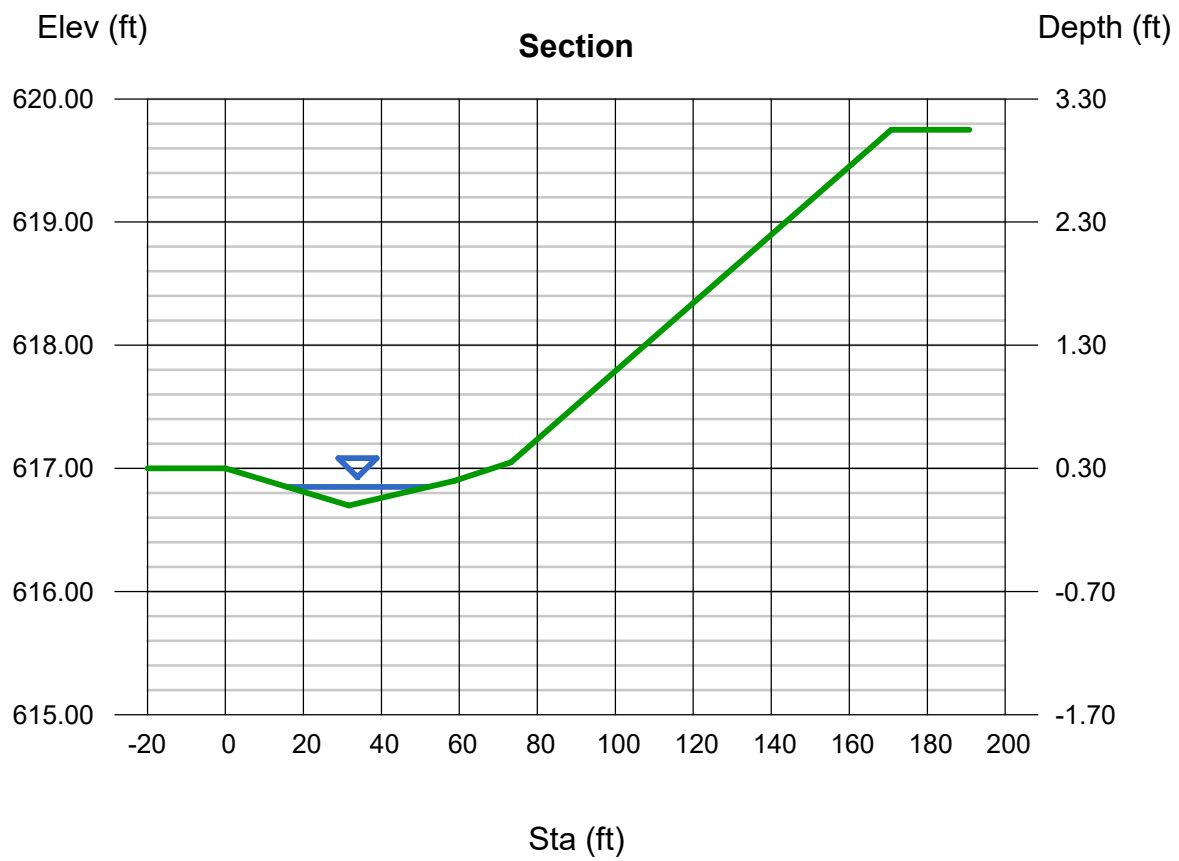


Exhibit 4

Centennial Village – Lot 9 – Building M, dated June 2023

1155 Troutwine Road
Crown Point, IN 46307

219.662.7710
fax 219.662.2740

Centennial Village – Lot 9 – Building "M"
9603 N. Centennial Drive Munster, IN

Storm Water Technical Report
June 2023

Prepared for:

Centennial Village
631 Killarney Drive
Dyer, IN 46311

Prepared by:

DVG Team Inc.
1155 Troutwine Road
Crown Point, IN 46307

Table of Contents

1.0 Project Description

2.0 Storm Sewer Design

3.0 Overland Flood Route

Exhibits

1. USGS Location Map
2. Storm Sewer Calculations
3. Overland Flood Route Calculations

1.0 Project Description

Centennial Village is proposing to develop two retail buildings, M and I, as the next phase of the ongoing Centennial Village Subdivision PUD project. Building M will be permitted and built at this time, while building I will be developed in a near future phase. The northwestern portion of Lot A is to be further subdivided into Lots 8 and 9, with Lot 8 serving building I and Lot 9 serving building M. Lot 8 contains approximately 0.84 acres and Lot 9 contains 2.14 acres. The project will also include construction of a new paved parking area, concrete sidewalks, a retaining wall adjacent to 45th Street, and installation of new water, sanitary, and storm services.

The intent of this report is to model drainage conditions and demonstrate how the new development will accommodate the City of Munster's Stormwater Technical Standards and Planned Unit Development Design Standards.

See **Exhibit 1 USGS Location Map** to view the project location.

2.0 Storm Sewer Design

Centennial Village utilizes storm sewers and sheet flow design to transport stormwater. Storm sewer design takes into consideration the full development of Lots 8 and 9, as well as the future development of Building A directly north of 45th Street. Depicted outfall data from Building A is provided in a stormwater report by Robinson Engineering dated 10/02/17. This data was incorporated into our storm sewer calculations to accurately model pipe capacity.

Storm sewer calculations were performed for each storm structure and its respective tributary area. The proposed sewers shall be HDPE material having a Manning's n-value of 0.012. Hydraflow Storm Sewers Extension was used for the storm sewer modeling using a 10-yr design flow. This proposed storm sewer system then ties into an existing 60" HDPE before discharging to Clayhole Lake.

See **Exhibit 2 Storm Sewer Calculations** for the results of the proposed storm sewer design.

Included are the following:

- **Storm Sewer Tributary Exhibit**
- **Storm Sewer 10-Year Design Calculations**
- **Robinson Engineering Stormwater Report Excerpts**
- **Inlet Capacity Calculations**

3.0 Overland Flood Route

The main overland flood route follows its designated easement, running west to east off of North Centennial Drive, directly south of Lots 8 and 9. Overland flood route calculations and cross sections have been provided as an exhibit. Also provided is an overall exhibit that includes overland flood routing from the existing developments to the west.

See **Exhibit 6 Overland Flood Route Calculations**.

Included are the following:

- **Overall Overland Flood Route Exhibit**
- **Overland Flood Route Calculations**
- **Overland Flood Route Cross Sections**

Exhibit 1

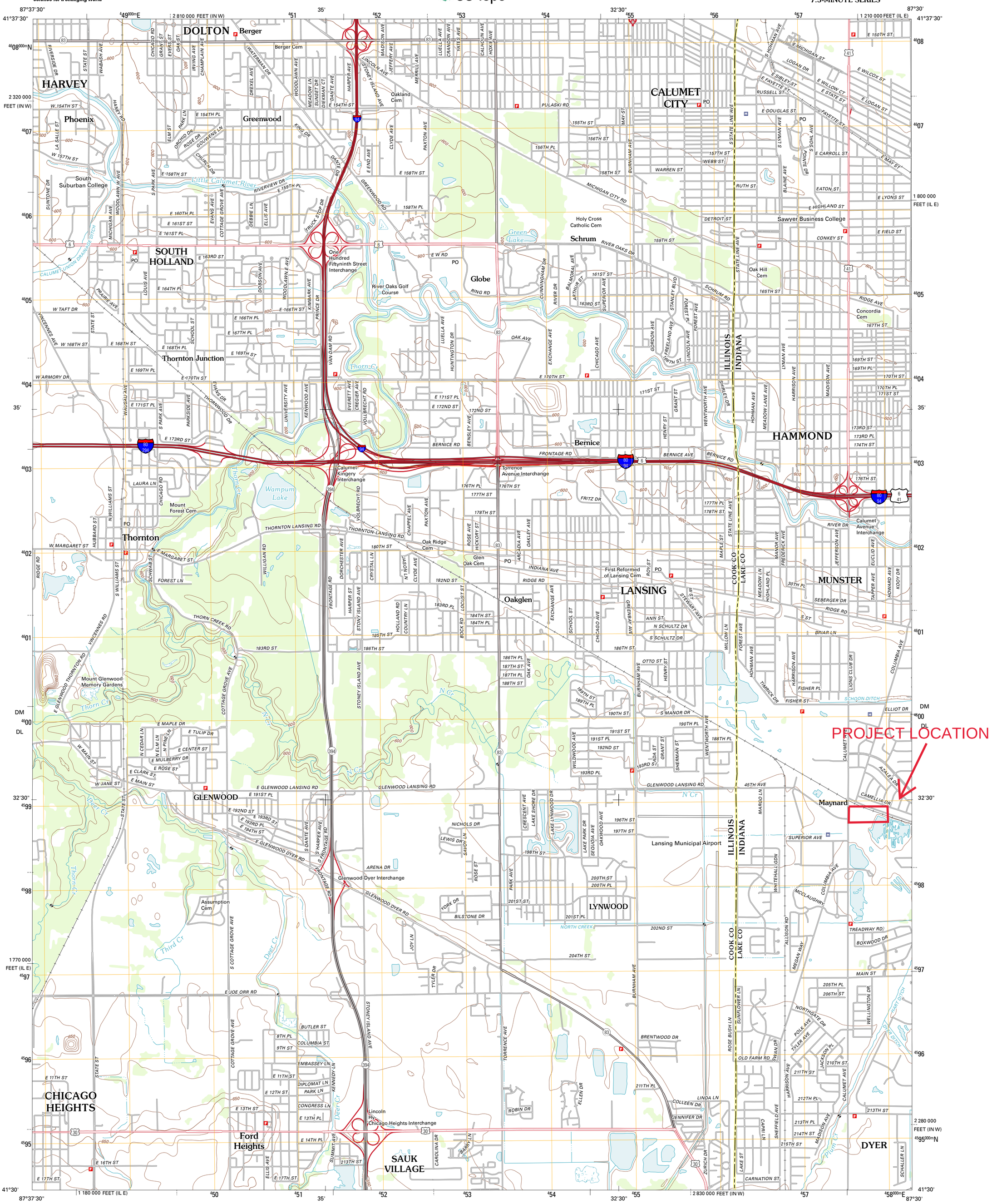
USGS Location Map

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

The National Map
US Topo

CALUMET CITY QUADRANGLE
ILLINOIS-INDIANA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 16T
10 000-foot ticks: Illinois Coordinate System of 1983 (east zone), Indiana Coordinate System of 1983 (west zone)

Imagery.....NAIP, August 2011
Roads.....©2006-2011 TomTom
Names.....GNIS, 2011
Hydrography.....National Hydrography Dataset, 2011
Contours.....National Elevation Dataset, 2012
Boundaries.....Census, IBWC, IBC, USGS, 1972 - 2010

MN
GN
3° 36'
64 MILS
0° 22'
7 MILS

UTM GRID AND 2012 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DM / DL
Grid Zone Designation 16T

SCALE 1:24 000

KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.3

ILLINOIS

QUADRANGLE LOCATION

Blue Island	Lake Calumet	Whiting
Harvey	Calumet City	Highland
Steger	Dyer	Saint John

ADJOINING 7.5' QUADRANGLES

ROAD CLASSIFICATION

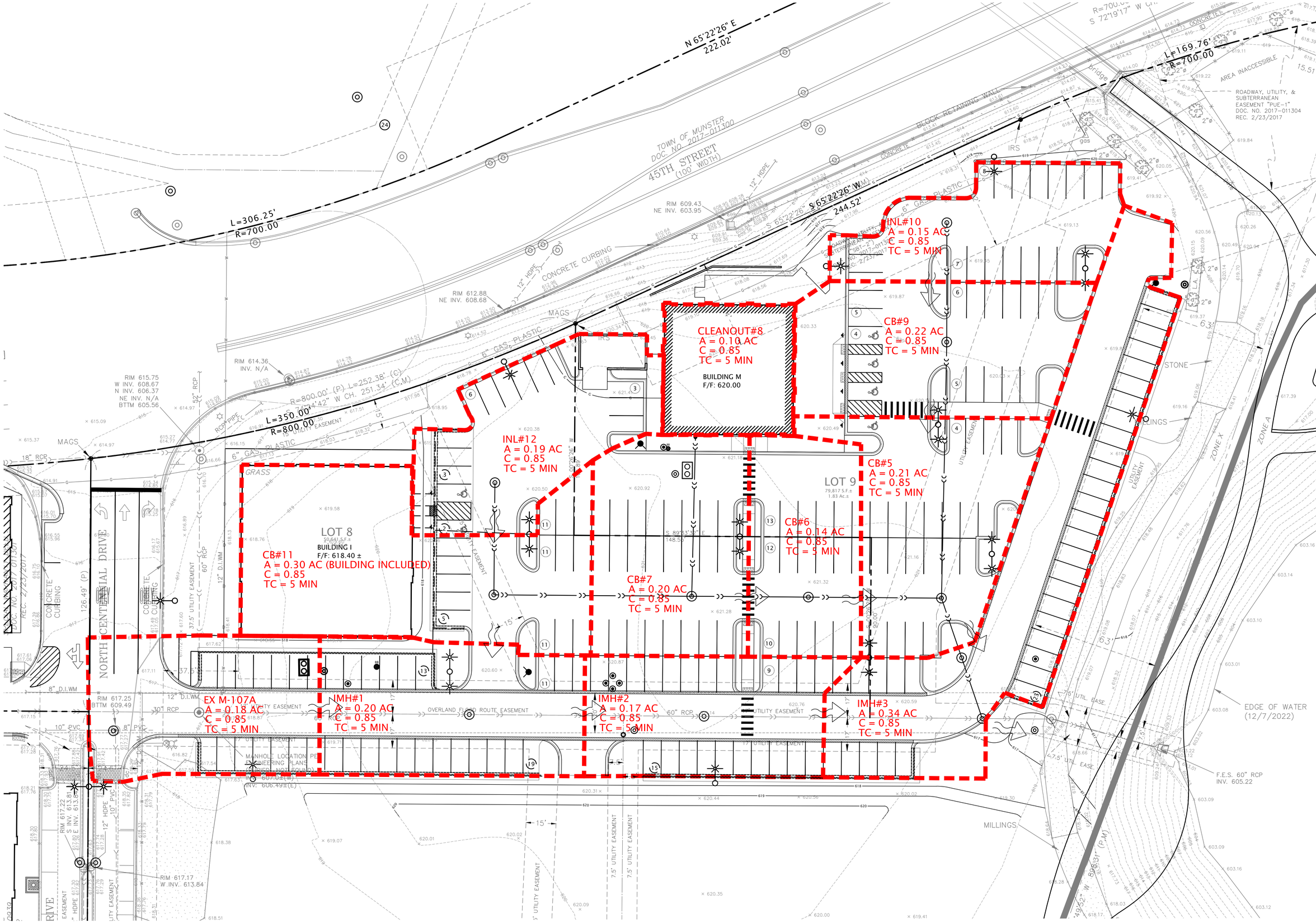
Interstate Route
US Route
Ramp
State Route
Local Road
4WD

Interstate Route
US Route
State Route

CALUMET CITY, IL-IN
2012

Exhibit 2

Storm Sewer Calculations



DVG TEAM INC
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www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Stormwater Tributary Area Exhibit

N
0' 10' 20'
SCALE: 1" = 20'

DESIGN BY	DATE
MPO	06/20/23
PROJECT NO.	
23-0026	

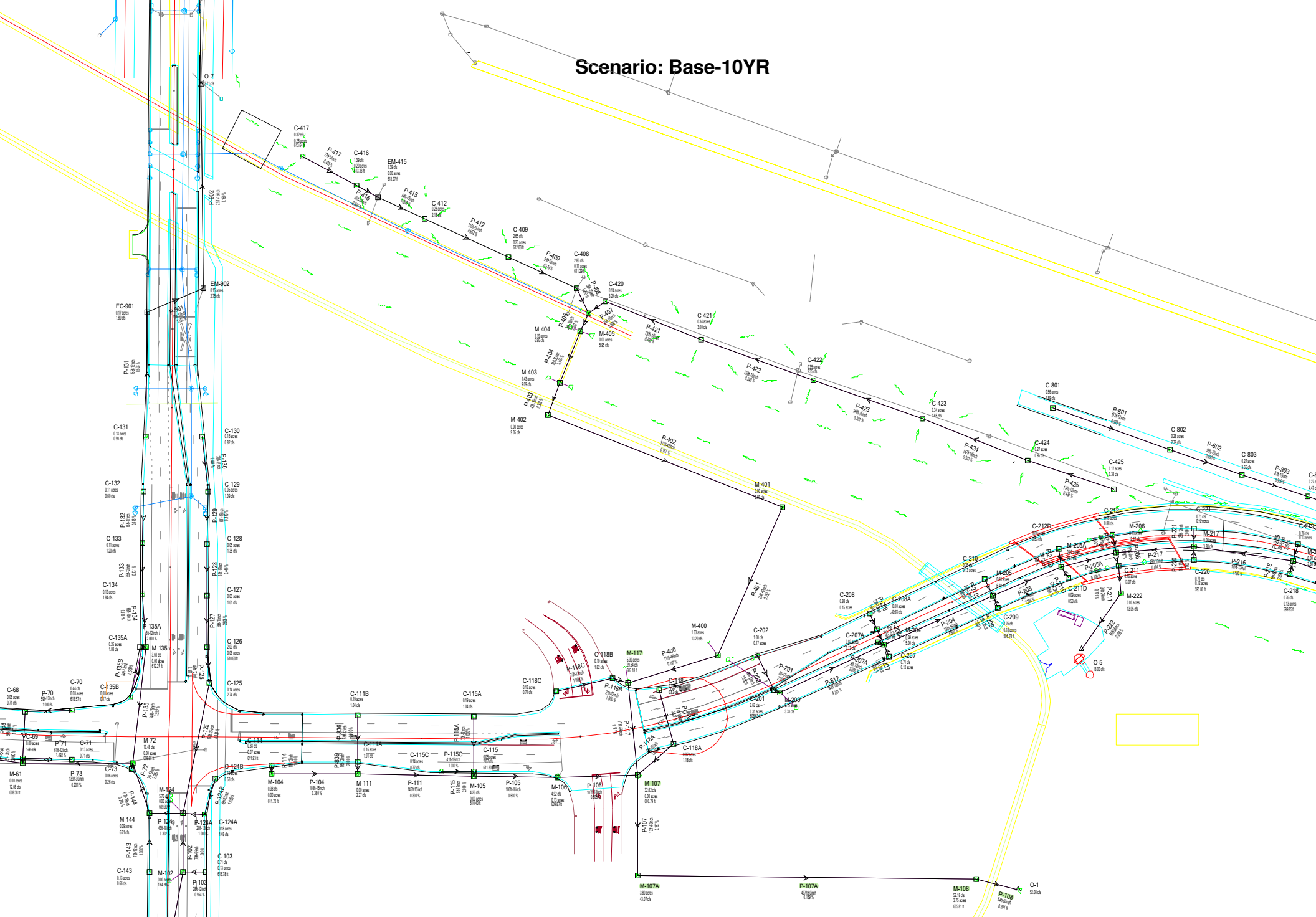
EX 2

BY: MPO
DATE: 06/20/23
CHECKED BY: RJP
DATE: 6/20/23

PROJECT: 23-0026 Centennial Village Buildings M & I
DESCRIPTION: Storm Sewer Design Calculations
DESIGN STORM: 10-yr Storm Event
RAINFALL DATA: Munster Stormwater Technical Manual
COMPUTATIONAL METHOD: Hydraflow Storm Sewers Extension for Autodesk AutoCAD Civil 3D

Line No.	Upstream Structure	Downstream Structure	Drainage Area (ac)	Total Area (ac)	Runoff Coeff. (C)	Tc (min)	Time in Pipe (min)	i Sys (in/hr)	Known Q (cfs)	Flow Rate (cfs)	Capacity Full (cfs)	Vel Ave (ft/s)	n-Value	Line Length (ft)	Line Size (in)	Line Slope (%)	Grnd/Rim Elev Up (ft)	Invert Up (ft)	Invert Dn (ft)	HGL Up (ft)	HGL Dn (ft)
32	CLEANOUT#8	CB#7	0.10	0.10	0.85	5.00	5.00	7.07	0.00	0.60	2.00	2.40	0.012	81	8	2.35	620.00	615.00	613.10	615.36 j	614.90
31	INL#12	CB#11	0.19	0.19	0.85	5.00	5.00	7.07	0.00	1.14	2.82	1.45	0.012	56	12	0.54	617.00	614.00	613.70	615.69	615.64
30	EX M-117	EX M-107	8.48	8.48	0.84	3.50	3.50	7.07	0.00	50.33	85.49	4.02	0.012	118	54	0.16	614.68	607.18	606.99	610.42	610.35
29	INL#10	CB#9	0.15	0.15	0.85	5.00	5.00	7.07	0.00	0.90	2.73	2.43	0.012	60	12	0.50	617.90	614.90	614.60	615.30	615.22
28	CB#9	CB#5	0.22	0.37	0.85	5.00	5.90	6.74	0.00	2.12	3.59	4.44	0.012	127	12	0.87	617.90	614.60	613.50	615.22	614.05
27	CB#11	CB#7	0.30	0.49	0.85	5.00	5.60	6.82	0.00	2.84	3.00	3.62	0.012	99	12	0.61	616.70	613.70	613.10	615.44	614.90
26	CB#7	CB#6	0.20	0.79	0.85	5.00	6.10	6.66	0.00	4.47	4.95	3.64	0.012	60	15	0.50	616.60	613.10	612.80	614.69	614.45
25	CB#6	CB#5	0.14	0.93	0.85	5.00	6.40	6.57	0.00	5.19	5.41	4.23	0.012	67	15	0.60	616.55	612.80	612.40	614.41	614.04
24	CB#5	HYDRODYNAMIC SEP#4	0.21	1.51	0.85	5.00	6.60	6.47	0.00	8.31	8.99	5.60	0.012	32	18	0.63	616.50	612.40	612.20	613.54	613.41
23	HYDRODYNAMIC SEP#4	IMH#3	0.00	1.51	0.85	5.00	6.80	6.44	0.00	8.26	8.99	5.77	0.012	32	18	0.63	617.20	612.2	612	613.33	613.13
22	EX M-107	EX M-107A	0	8.48	0	3.40	4.10	7.07	0.00	50.33	111.96	3.31	0.012	127	60	0.16	615.75	606.79	606.59	610.33	610.29
21	EX BLDG G	EX CB#13	0.52	0.52	0.9	10.00	10.00	5.55	0.00	2.60	6.8	6.28	0.012	45	12	3.11	618.40	613.5	612.1	614.19	612.53
20	EX INL#16	EX IMH#14	0.21	0.21	0.81	5.00	5.00	7.07	0.00	1.2	7.84	2.46	0.012	45	12	4.13	616.50	613.5	611.64	613.96 j	613.16
19	EX INL#15	EX IMH#14	0.12	0.12	0.81	5.00	5.00	7.07	0.00	0.69	6.15	1.87	0.012	85	12	2.54	616.80	613.8	611.64	614.15 j	613.16
18	EX YD#12	EX YD#11	0.03	0.03	0.81	5.00	5.00	7.07	0.00	0.17	1.02	1.82	0.012	46	8	0.61	618.30	615.00	614.72	615.19	614.96
17	EX YD#11	EX YD#10	0.02	0.05	0.81	5.00	6.60	6.50	0.00	0.26	1.02	1.87	0.012	53	8	0.60	618.30	614.72	614.40	614.96	614.76
16	EX YD#10	EX IMH#6	0.10	0.15	0.81	5.00	7.70	6.16	0.00	0.75	5.57	1.94	0.012	111	12	2.09	618.30	614.40	612.09	614.76 j	613.80
15	EX IMH#14	EX IMH#5	0.14	0.47	0.81	5.00	6.60	6.48	0.00	2.47	4.72	2.01	0.012	44	15	0.45	616.40	611.64	611.44	613.07	613.01
14	EX INL#9	EX IMH#8	0.10	0.10	0.81	5.00	5.00	7.07	0.00	0.57	5.74	1.72	0.012	45	12	2.21	617.00	614.00	613.00	614.31 j	614.24
13	EX IMH#8	EX IMH#7	0.10	0.20	0.81	5.00	6.00	6.68	0.00	1.08	3.36	1.38	0.012	66	12	0.76	616.90	613.00	612.50	614.20	614.15
12	EX IMH#7	EX IMH#6	0.31	0.51	0.81	5.00	6.80	6.42	0.00	2.65	3.33	3.38	0.012	55	12	0.75	616.80	612.50	612.09	614.06	613.80
11	EX IMH#6	EX IMH#5	0.29	0.95	0.81	5.00	9.40	5.69	0.00	4.38	5.42	3.57	0.012	108	15	0.60	616.60	612.09	611.44	613.43	613.01
10	EX IMH#5	EX CB#4	0.10	1.52	0.81	5.00	9.80	5.58	0.00	6.87	7.67	5.60	0.012	76	15	1.20	616.60	609.06	608.15	612.15	611.42
9	EX CB#4	EX CB#3	0.97	2.49	0.81	8.00	10.00	5.54	0.00	11.17	16.29	3.56	0.012	86	24	0.44	616.70	608.15	607.77	611.15	610.97
8	EX CB#3	EX CB#13	0.39	2.88	0.81	5.00	10.40	5.45	0.00	12.72	16.53	4.05	0.012	68	24	0.46	616.60	607.77	607.46	610.84	610.66
7	EX CB#13	EX HYDRODYNAMIC SEP#2	0.13	3.01	0.81	5.00	10.70	5.40	0.00	13.16	27.86	2.68	0.013	13	30	0.46	616.60	607.46	607.40	610.61	610.59
6	EX HYDRODYNAMIC SEP#2	EX M-107A	0	3.53	0.81	5.00	10.70	5.38	0.00	15.63	18.16	3.19	0.013	102	30	0.2	616.77	607.4	607.2	610.43	610.29
5	EX M-107A	IMH#1	0.18	12.19	0.85	5.00	11.30	5.27	0.00	53.65	113.9	3.46	0.012	135	60	0.16	617.00	606.49	606.27	610.09	610.05
4	IMH#1	IMH#2	0.2	12.39	0.85	5.00	12.10	5.11	0.00	52.86	110.56	3.28	0.012	117	60	0.15	616.45	606.27	606.09	610.02	609.99
3	IMH#2	IMH#3	0.17	12.56	0.85	5.00	12.80	4.97	0.00	52.18	114.18	3.12	0.012	140	60	0.16	616.50	606.09	605.86	609.97	609.93
2	IMH#3	EX MH107B	0.34	14.41	0.85	5.00	13.70	4.82	0.00	58.14	109.82	3.54	0.012	33	60	0.15	616.20	605.86	605.81	609.74	609.73

Scenario: Base-10YR



Title: REL #08-315 45TH ST UNDERPASS - MUNSTER, IN
c:\...\stormcad-no-cal_10-17\munster-ph1.stm
10/02/17 05:46:02 PM

Robinson Engineering Ltd

Project Engineer: JJD
StormCAD v5.6 [05.06.014.00]

Scenario: Base-10YR

DOT Pipe Report 2

Label	Up. Node	Dn. Node	Up. Inlet Rat. Coef.	Up. Inlet Area (acres)	Up. Calc. Sys. CA (acres)	System Tc (min)	I (in/hr)	System Q (cfs)	L (ft)	S (%)	Size	Mannings n	Q Full (cfs)	Up. Invert (ft)	Dn. Invert (ft)	Up. Gr Elev. (ft)	Dn. Gr. Elev. (ft)	Up. Cover (ft)	Dn. Cover (ft)	HGL In (ft)	HGL Out (ft)
P-417	C-417	C-416	0.60	0.17	0.17	15.00	4.84	0.82	77	0.403	12 inch	0.012	2.45	613.64	613.33	616.30	616.00	1.66	1.67	614.04	613.83
P-425	C-425	C-424	0.45	0.08	0.08	15.00	4.84	0.38	114	0.439	12 inch	0.012	2.56	612.28	611.78	614.90	615.00	1.62	2.22	612.54	612.20
P-416	C-416	EM-41	0.60	0.12	0.29	15.46	4.79	1.39	31	0.516	12 inch	0.012	2.77	613.33	613.17	616.00	616.50	1.67	2.33	613.83	613.67
P-424	C-424	C-423	0.45	0.12	0.20	15.82	4.76	0.95	142	0.303	15 inch	0.012	3.85	611.78	611.35	615.00	615.20	1.97	2.60	612.20	611.92
P-415	EM-415	C-412	0.00	0.00	0.29	15.60	4.78	1.39	64	0.563	15 inch	0.012	5.25	613.07	612.71	616.50	616.00	2.18	2.04	613.54	613.28
P-423	C-423	C-422	0.45	0.15	0.35	16.73	4.66	1.65	146	0.301	15 inch	0.012	3.84	611.35	610.91	615.20	615.00	2.60	2.84	611.92	611.59
P-412	C-412	C-409	0.60	0.17	0.46	15.90	4.75	2.18	116	0.552	15 inch	0.012	5.20	612.69	612.05	616.00	615.60	2.06	2.30	613.28	612.68
P-422	C-422	C-421	0.45	0.16	0.51	17.53	4.58	2.35	150	0.240	18 inch	0.012	5.57	610.91	610.55	615.00	615.30	2.59	3.25	611.59	611.28
P-409	C-409	C-408	0.45	0.10	0.56	16.38	4.70	2.65	94	0.574	15 inch	0.012	5.30	612.03	611.49	615.60	615.70	2.32	2.96	612.68	612.11
P-421	C-421	C-420	0.45	0.15	0.66	18.36	4.49	3.00	130	0.300	18 inch	0.012	6.23	610.55	610.16	615.30	615.30	3.25	3.64	611.28	610.85
P-408	C-408	M-405	0.45	0.05	0.61	16.74	4.66	2.86	36	1.000	15 inch	0.012	7.00	611.29	610.93	615.70	615.70	3.16	3.52	611.97	611.49
P-407	C-420	M-405	0.45	0.06	0.73	18.98	4.43	3.24	26	0.500	18 inch	0.012	8.05	610.16	610.03	615.30	615.70	3.64	4.17	610.85	610.69
P-405	M-405	M-404	0.00	0.00	1.33	19.08	4.42	5.95	24	0.292	36 inch	0.012	39.02	609.83	609.76	615.70	615.60	2.87	2.84	610.64	610.61
P-404	M-404	M-403	0.40	0.48	1.81	25.00	3.81	6.96	70	0.300	36 inch	0.012	39.57	609.76	609.55	615.60	615.80	2.84	3.25	610.61	610.53
P-403	M-403	M-402	0.40	0.57	2.38	25.28	3.78	9.09	43	0.302	36 inch	0.012	39.73	609.55	609.42	615.80	616.00	3.25	3.58	610.53	610.37
P-836	C-111E	C-111A	0.84	0.16	0.16	5.00	6.48	1.04	59	2.000	12 inch	0.012	5.46	613.71	612.53	617.64	617.09	2.93	3.56	614.14	613.02
P-114	C-114	M-104	0.84	0.06	0.06	5.00	6.48	0.38	10	1.600	12 inch	0.012	4.88	611.93	611.77	618.60	618.12	5.67	5.35	612.19	611.96
P-402	M-402	M-401	0.00	0.00	2.38	25.43	3.77	9.05	317	0.151	42 inch	0.012	42.41	608.92	608.44	616.00	616.90	3.58	4.96	610.02	609.52
P-115A	C-115A	C-115	0.84	0.16	0.16	5.00	6.48	1.04	70	1.000	12 inch	0.012	3.86	612.50	611.80	616.66	616.66	3.16	3.86	612.93	612.41
P-115C	C-115C	C-115	0.84	0.12	0.12	5.00	6.48	0.77	41	1.000	12 inch	0.012	3.86	612.50	612.09	616.88	616.66	3.38	3.57	612.87	612.39
P-839	C-111A	M-111	0.84	0.13	0.29	5.18	6.46	1.91	16	2.000	12 inch	0.012	5.46	612.43	612.11	617.09	617.14	3.66	4.03	613.02	612.55
P-104	M-104	M-111	0.00	0.00	0.06	5.04	6.47	0.38	108	0.380	15 inch	0.012	4.31	611.72	611.31	618.12	617.14	5.15	4.58	611.98	611.95
P-401	M-401	M-400	0.00	0.00	2.38	26.94	3.61	8.68	204	0.152	42 inch	0.012	42.49	608.34	608.03	616.90	616.00	5.06	4.47	609.46	609.29
P-118C	C-118C	C-118B	0.84	0.11	0.11	5.00	6.48	0.71	73	1.000	12 inch	0.012	3.86	611.34	610.61	615.18	614.63	2.84	3.02	611.69	611.18
P-115	C-115	M-105	0.84	0.04	0.32	5.28	6.45	2.07	5	2.000	12 inch	0.012	5.46	611.80	611.70	616.66	616.60	3.86	3.90	612.41	612.20
P-111	M-111	M-105	0.00	0.00	0.35	5.87	6.38	2.27	146	0.390	15 inch	0.012	4.37	611.31	610.74	617.14	616.60	4.58	4.61	611.95	611.34
P-400	M-400	M-117	0.84	1.37	3.75	27.92	3.51	13.29	117	0.197	48 inch	0.012	68.99	607.83	607.60	616.00	614.68	4.17	3.08	609.24	609.19
P-118B	C-118B	M-117	0.90	0.17	0.28	5.32	6.44	1.82	21	1.000	12 inch	0.012	3.86	610.61	610.40	614.63	614.68	3.02	3.28	611.18	610.89
P-118	C-118	C-118A	0.90	0.13	0.13	5.00	6.48	0.82	71	0.507	12 inch	0.012	2.75	611.00	610.64	614.60	614.89	2.60	3.25	611.38	611.10
P-105	M-105	M-106	0.00	0.00	0.67	6.55	6.29	4.26	106	0.500	18 inch	0.012	8.05	610.40	609.87	616.60	616.80	4.70	5.43	611.19	610.72
P-117	M-117	M-107	0.84	4.45	8.48	28.38	3.47	29.64	118	0.161	54 inch	0.012	85.48	607.18	606.99	614.68	615.70	3.00	4.21	609.05	608.91
P-118A	C-118A	M-107	0.81	0.06	0.18	5.39	6.43	1.18	59	1.000	12 inch	0.012	3.86	610.64	610.05	614.89	615.70	3.25	4.65	611.10	610.43
P-106	M-106	M-107	0.84	0.11	0.78	6.93	6.25	4.92	101	0.505	18 inch	0.012	8.09	609.87	609.36	616.80	615.70	5.43	4.84	610.72	610.20
P-107	M-107	M-107A	0.00	0.00	9.45	28.78	3.42	32.62	127	0.157	60 inch	0.012	111.96	606.79	606.59	615.70	616.20	3.91	4.61	608.89	608.82
P-107A	M-107A	M-108	0.84	3.19	12.64	29.21	3.38	43.07	427	0.159	60 inch	0.012	112.59	606.49	605.81	616.20	615.70	4.71	4.89	608.64	607.98
P-108	M-108	O-1	0.84	3.15	15.79	30.54	3.28	52.18	54	0.204	60 inch	0.012	127.34	605.81	605.70	615.70	614.50	4.89	3.80	607.98	607.73

INLET CAPACITY ANALYSIS

BY: MPO
DATE: 5/31/2023
CHECKED: RJP
DATE: 6/20/2023

Project: **23-0026 Centennial Village Buildings M & I**
Location: **North Centennial Drive & 45th Street Munster, IN**

ORIFICE FLOW EQUATION

$$h = \frac{Q^2}{2g(CA)^2}$$

C = Orifice Coefficient (0.67 typical for storm sewer grates)
A_{open} = grate open area (sq. ft.)
% Clogged (decimal form)= 0.5
(At SAG Only)

WEIR FLOW EQUATION

$$h = \frac{Q}{(3.33P)^{\frac{2}{3}}}$$

P = wetted perimeter (ft)
Q=10-yr flow (cfs)

10-YR FLOW EQUATION

$$Q = CIA$$

C=runoff coefficient
I=rainfall intensity (in/hr)
A=watershed area (acres)

Structure Label	Type of Grate	A_{open} (sq.ft.)	P (ft)	$C_{orifice}$	$A_{watershed}$ (acres)	C_{runoff}	I (in/hr)	Q (10-YR) (cfs)	Orifice Flow h (ft)	Weir Flow h (ft)	Ponding Depth (in)
IMH#1	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
IMH#2	EJ 1020 M1	0.97	5.92	0.67	0.17	0.85	7.08	1.02	0.15	0.22	2.7
IMH#3	EJ 7020, TYPE T2, M1	1.81	5.92	0.67	0.34	0.85	7.08	2.05	0.18	0.35	4.2
CB#5	EJ 1020 M1	0.97	5.92	0.67	0.21	0.85	7.08	1.26	0.23	0.26	3.1
CB#6	EJ 1020 M1	0.97	5.92	0.67	0.14	0.85	7.08	0.84	0.10	0.20	2.3
CB#7	EJ 1020 M1	0.97	5.92	0.67	0.20	0.85	7.08	1.20	0.21	0.25	3.0
CB#9	EJ 1020 M1	0.97	5.92	0.67	0.22	0.85	7.08	1.32	0.26	0.26	3.2
INL#10	EJ 1020 M1	0.97	5.92	0.67	0.15	0.85	7.08	0.90	0.12	0.20	2.5
CB#11	EJ 1020 M1	0.97	5.92	1.67	0.30	0.85	7.08	1.81	0.08	0.32	3.9
INL#12	EJ 1020 M1	0.97	5.92	2.67	0.19	0.85	7.08	1.14	0.01	0.24	2.9

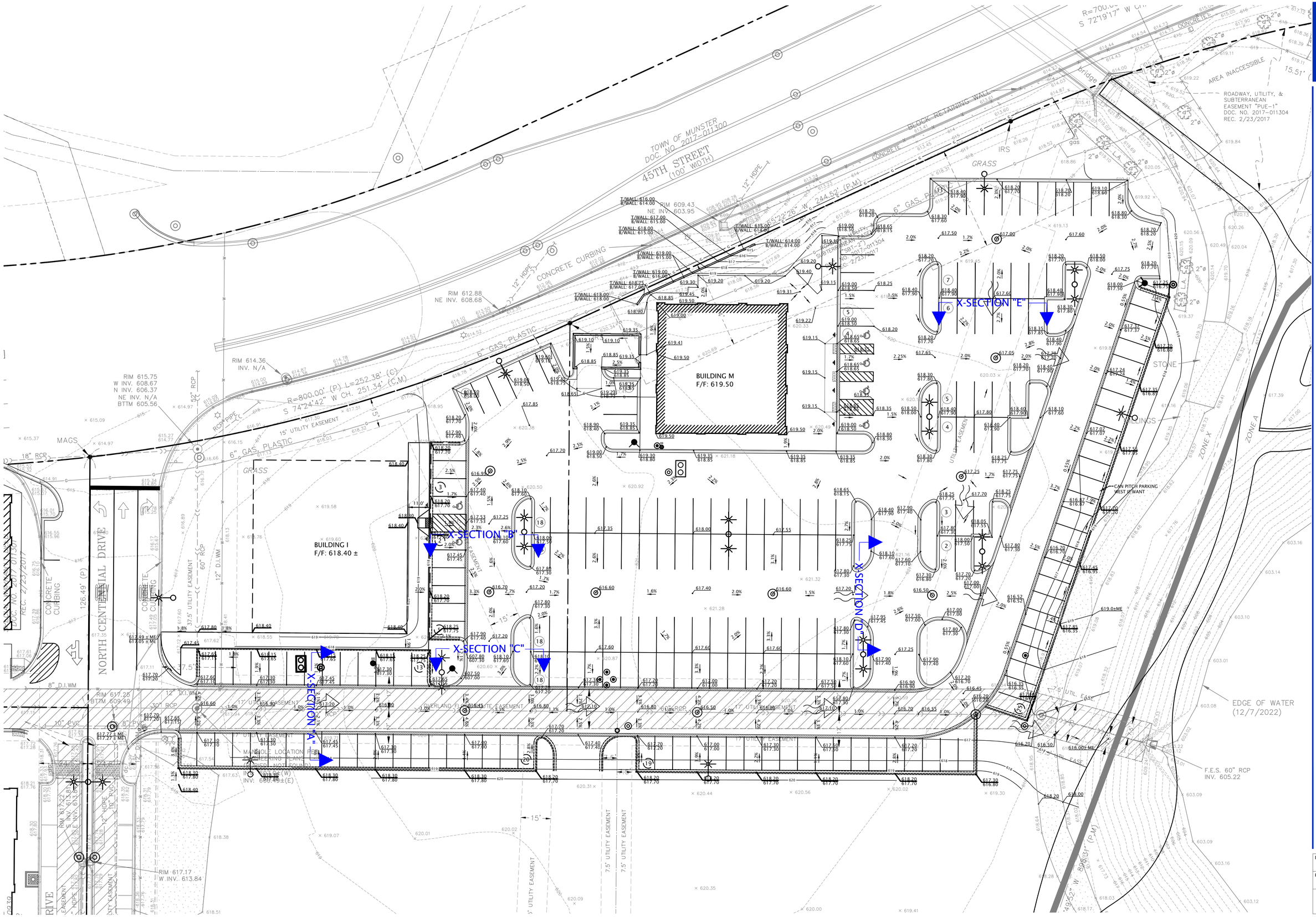
**** 10-YR Flow values are calculated using the Rational Method. Q=CIA***

Grate Properties

Type	Open Area (sq.in.)	A (sq.ft.)	P (ft)
EJ 1020 M1	140.00	0.97	5.92
EJ 1040 M1	190.00	1.32	6.83
EJ 7020, TYPE T2, M1	260.00	1.81	5.92

Exhibit 3

Overland Flood Route Calculations



DVG TEAM INC

1155 Troutwine Road
Crown Point, IN 46307
P: (219) 662-7710
F: (219) 662-2740
www.dvgteam.com

NOT FOR CONSTRUCTION

CENTENNIAL VILLAGE

631 KILLARNEY DRIVE
DYER, INDIANA 46311

DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

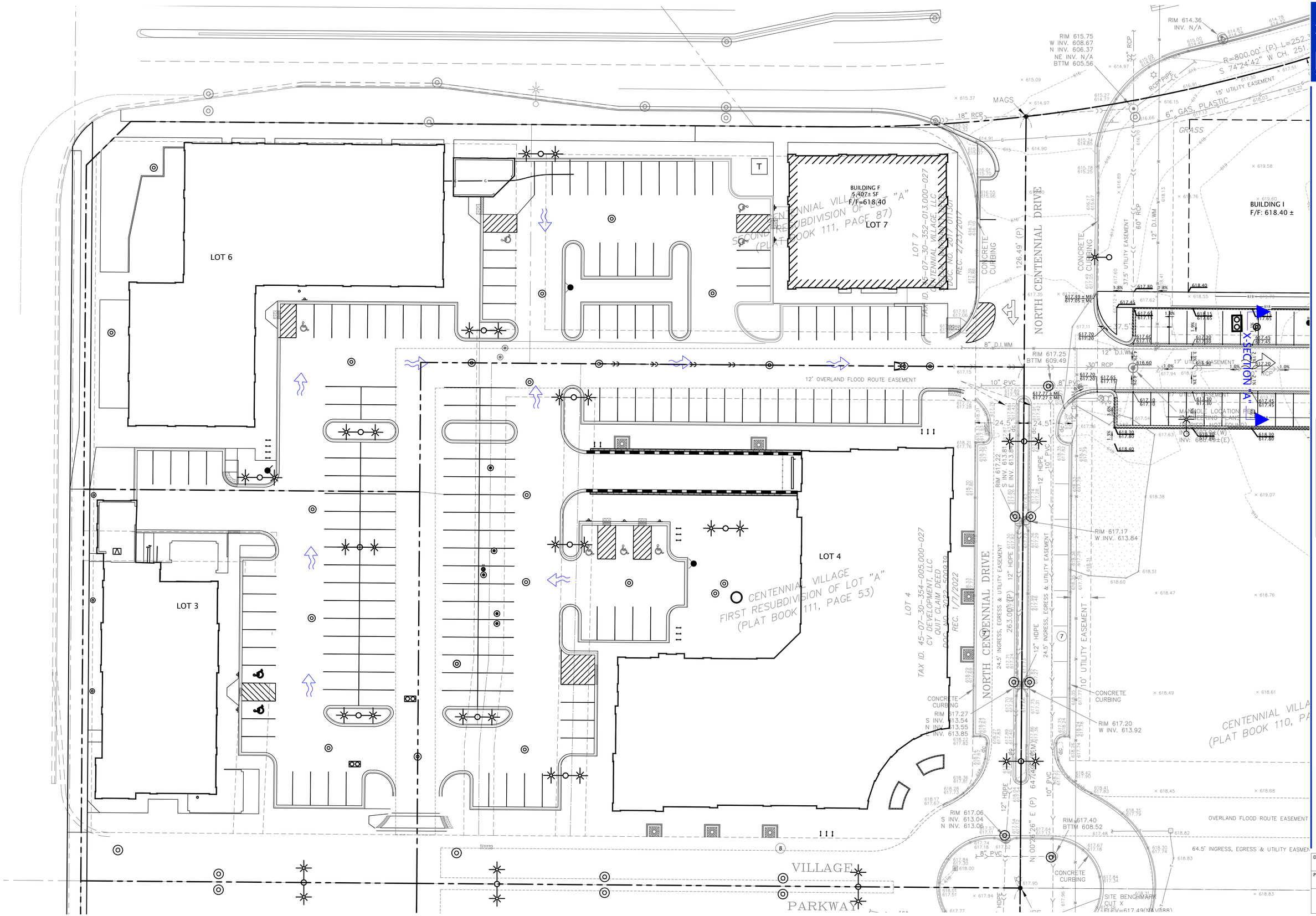
Overall Overland Flood Route Exhibit

N

0' 10' 20'
SCALE: 1" = 20'

DESIGN BY	DATE
MPO	05/31/23
PROJECT NO.	
23-0026	

EX 3



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DATE:	REVISIONS AND NOTES:

CENTENNIAL VILLAGE - LOT 9 - BUILDING "M"

Overall Overland Flood Route Exhibit

N
0' 10' 20'
SCALE: 1" = 20'

DESIGN BY	DATE
MPO	05/31/23

PROJECT NO.
23-0026

EX 3

Overland Flood Route Computation Calculation

Project: 23-0026 Centennial Village Buildings M & I
Date: 5/31/2023

Storm Event: 100yr
*** Areas Calculated from Exhibit 5, within the Stormwater Technical Report**
*** Overflow Elevations taken from Calculation, Within This Report**

Cross Section: A				
Tc=	5	min		
Area=	0.12	acres		
C=	0.85			
i=	9.84	in/hr		
Rational Method Q_{100}=CiA			**Q=**	**1.00** **cfs**
100YR Overflow Water Elevation=				**617.30** **Elev**
Freeboard to Nearest Bldg=				**2.20** **ft**

Cross Section: B				
Tc=	5	min		
Area=	0.18	acres		
C=	0.85			
i=	9.84	in/hr		
Rational Method Q_{100}=CiA			**Q=**	**1.51** **cfs**
100YR Overflow Water Elevation=				**617.36** **Elev**
Freeboard to Nearest Bldg=				**2.14** **ft**

Cross Section: C				
Tc=	5	min		
Area=	0.24	acres		
C=	0.85			
i=	9.84	in/hr		
Rational Method Q_{100}=CiA			**Q=**	**2.01** **cfs**
100YR Overflow Water Elevation=				**617.29** **Elev**
Freeboard to Nearest Bldg=				**2.21** **ft**

Cross Secti D				
Tc=	5	min		
Area=	0.20	acres		
C=	0.85			
i=	9.84	in/hr		
Rational Method Q_{100}=CiA			**Q=**	**1.67** **cfs**
100YR Overflow Water Elevation=				**617.28** **Elev**
Freeboard to Nearest Bldg=				**2.22** **ft**

Cross Secti E				
Tc=	5	min		
Area=	0.15	acres		
C=	0.85			
i=	9.84	in/hr		
Rational Method Q_{100}=CiA			**Q=**	**1.25** **cfs**
100YR Overflow Water Elevation=				**617.68** **Elev**
Freeboard to Nearest Bldg=				**1.82** **ft**

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section A

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.00
N-Value	= 0.011

Calculations

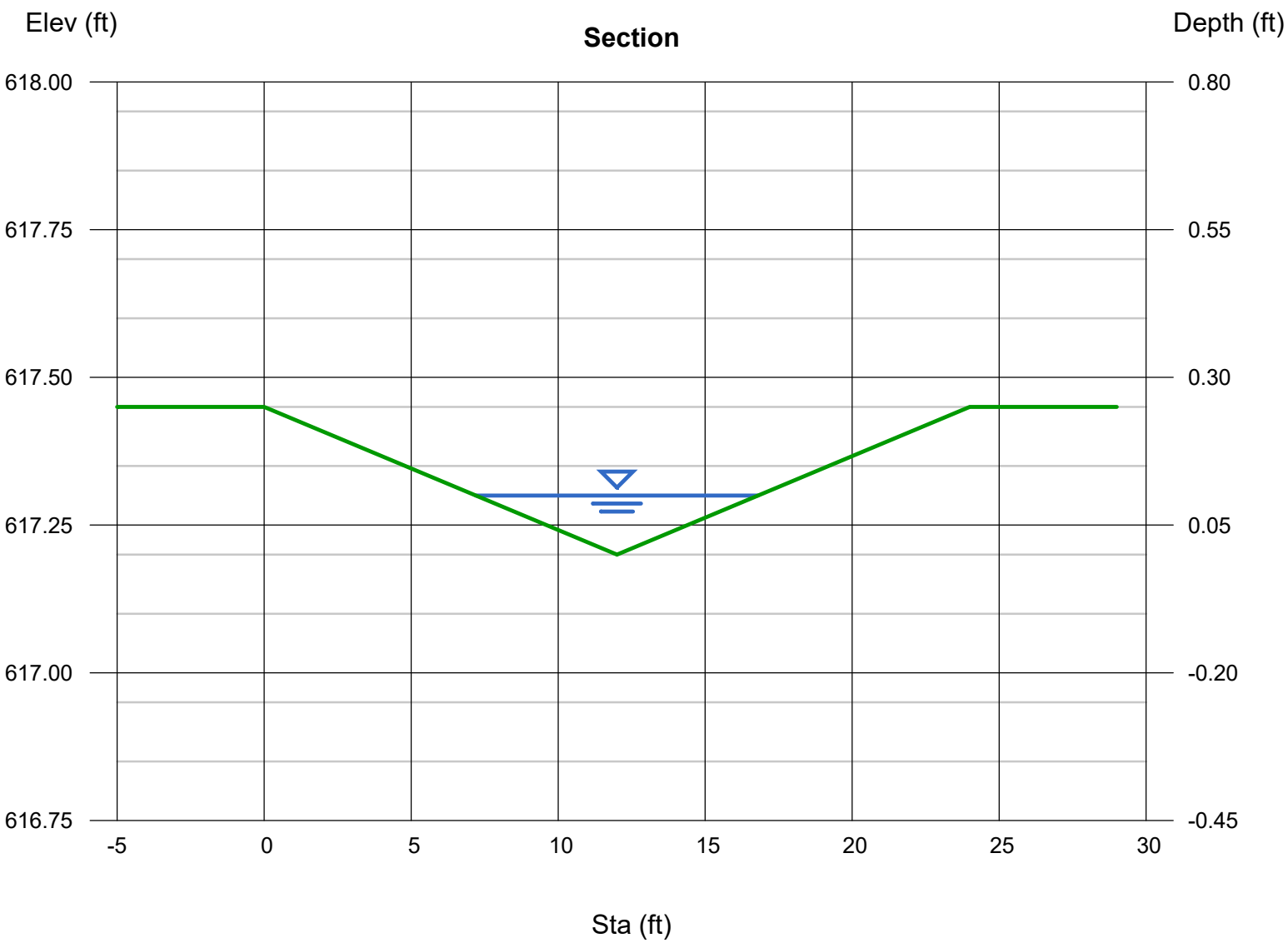
Compute by:	Known Q
Known Q (cfs)	= 1.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.45)-(12.00, 617.20, 0.011)-(24.00, 617.45, 0.011)

Highlighted

Depth (ft)	= 0.10
Q (cfs)	= 1.000
Area (sqft)	= 0.48
Velocity (ft/s)	= 2.08
Wetted Perim (ft)	= 9.60
Crit Depth, Yc (ft)	= 0.13
Top Width (ft)	= 9.60
EGL (ft)	= 0.17



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section B

User-defined

Invert Elev (ft)	= 617.25
Slope (%)	= 1.60
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.51

(Sta, El, n)-(Sta, El, n)...

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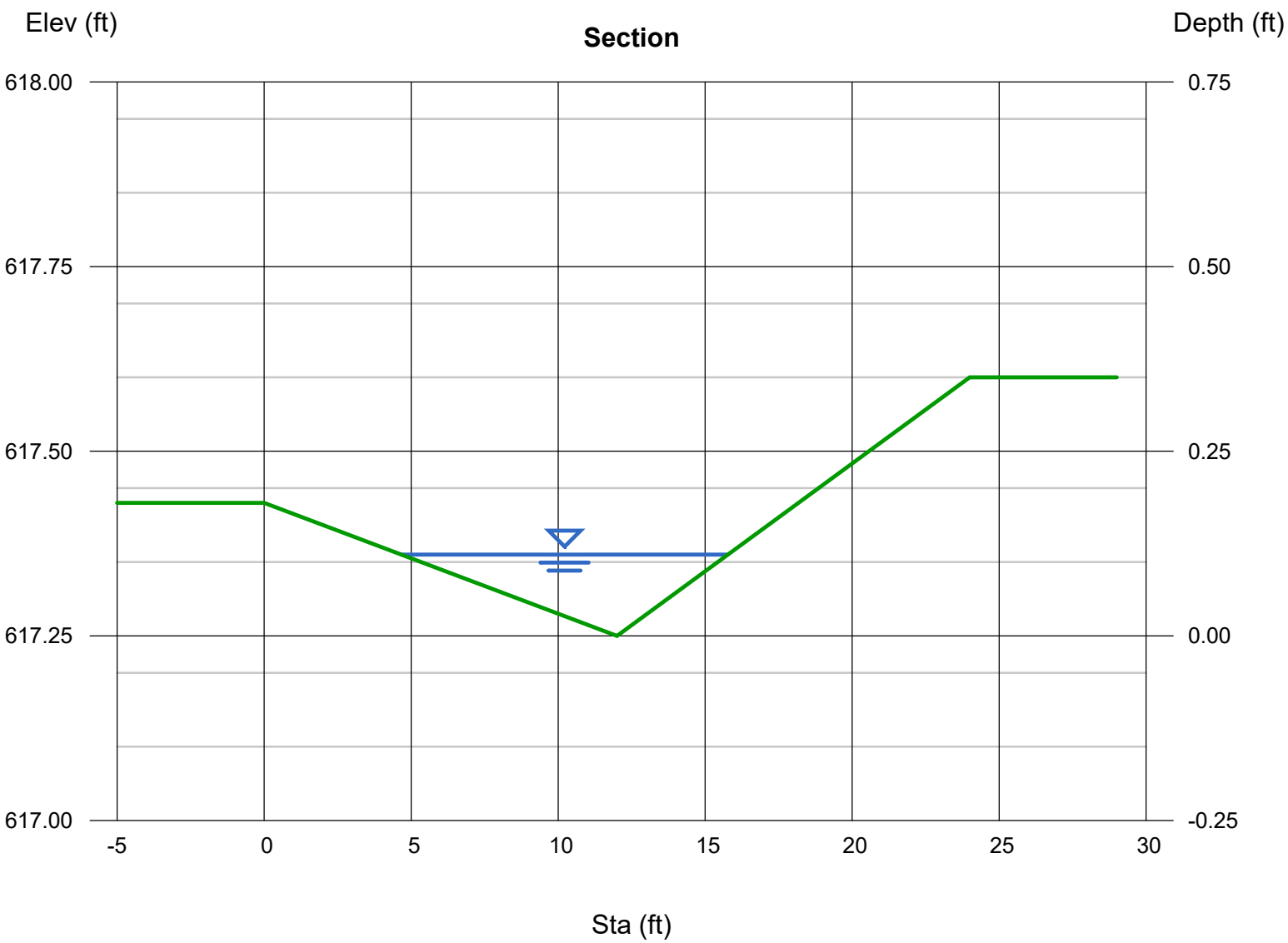
Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 1.510
Area (sqft)	= 0.61
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 11.11
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 11.10
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Jun 1 2023

X-Section C

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 2.50
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.01

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 2.010
Area (sqft)	= 0.72
Velocity (ft/s)	= 2.79
Wetted Perim (ft)	= 12.00
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 12.00
EGL (ft)	= 0.24

(Sta, El, n)-(Sta, El, n)...

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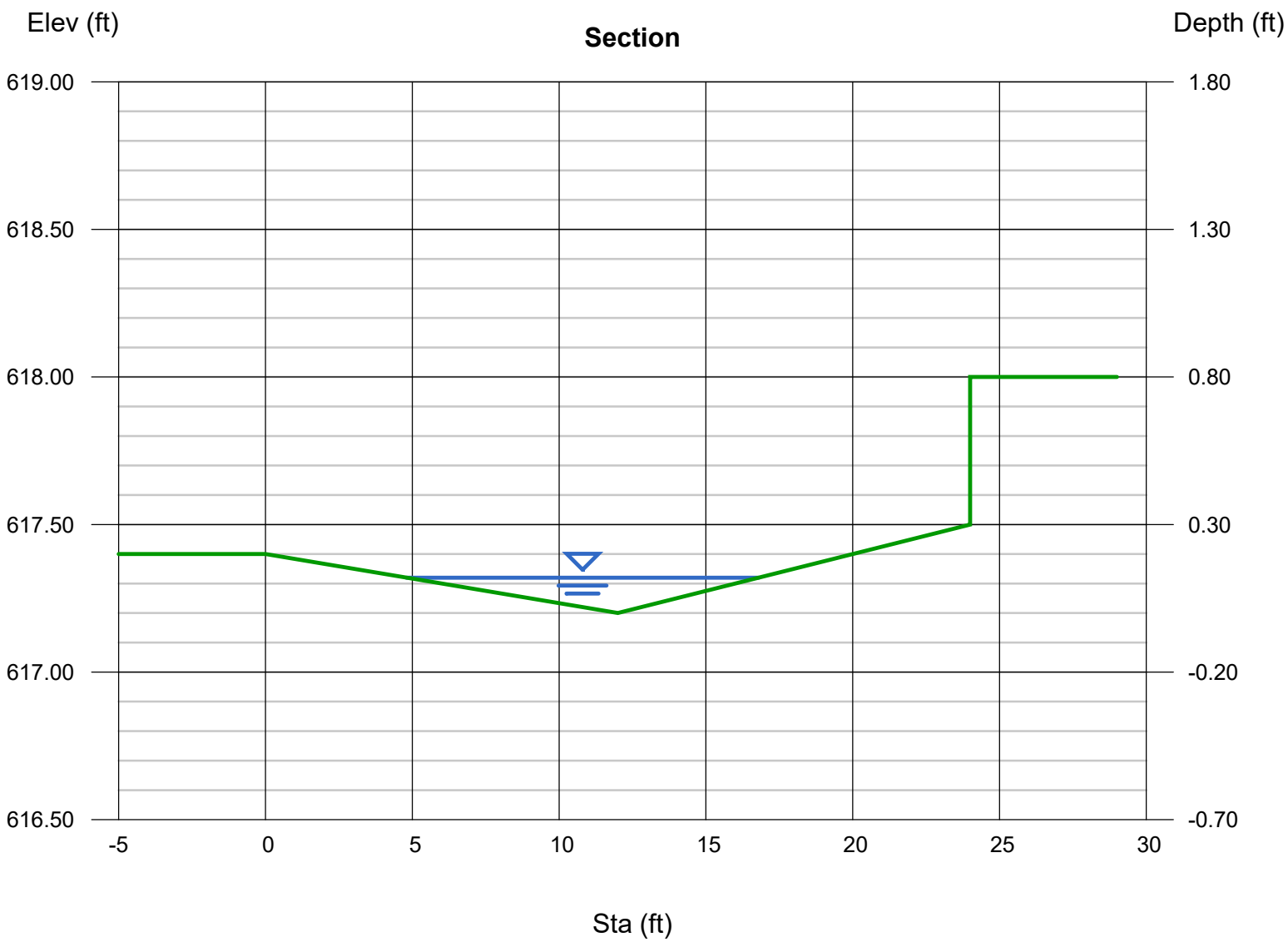


Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section D

User-defined

Invert Elev (ft)	= 617.20
Slope (%)	= 1.80
N-Value	= 0.011

Calculations

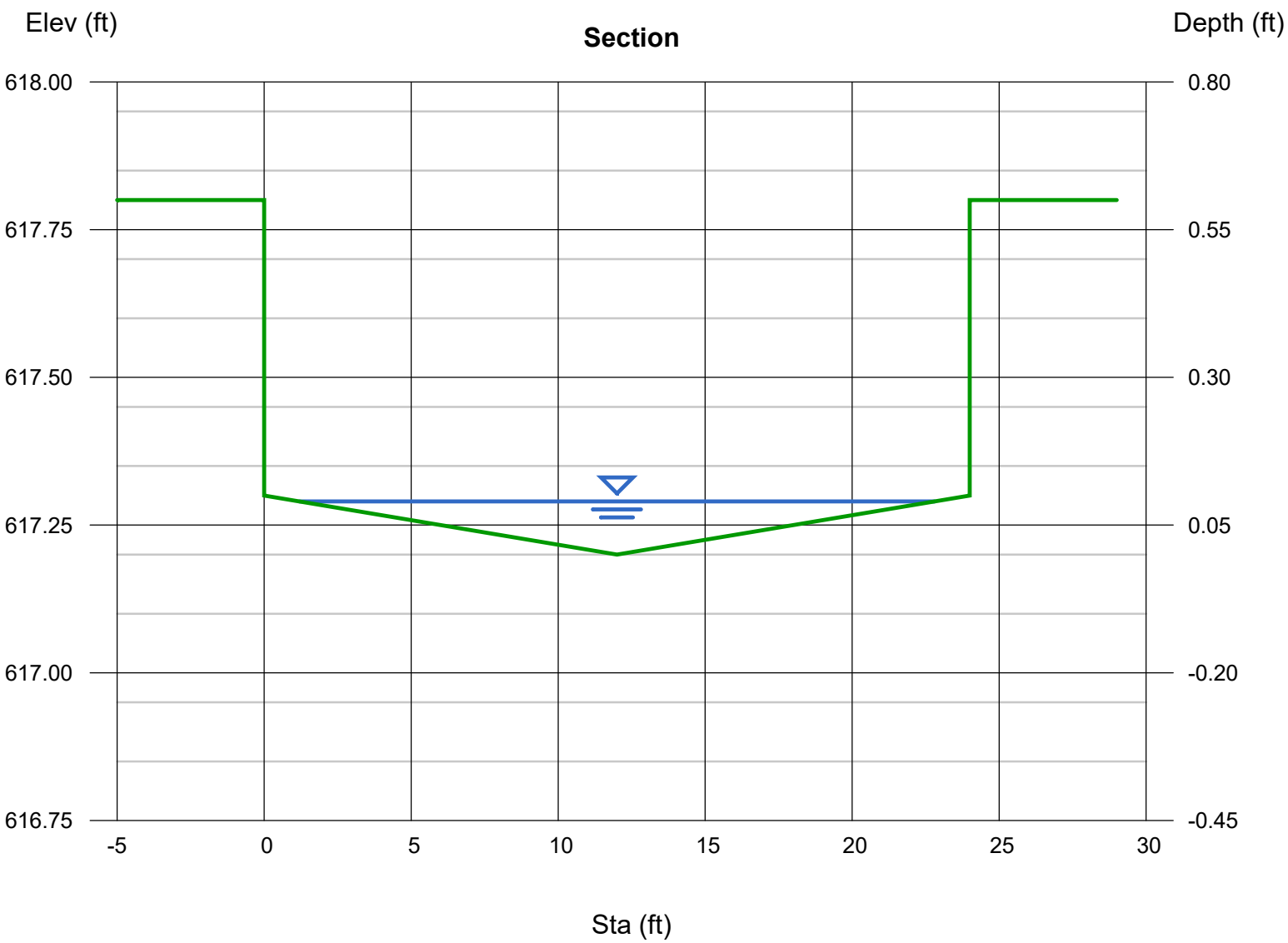
Compute by:	Known Q
Known Q (cfs)	= 1.67

(Sta, El, n)-(Sta, El, n)...

(0.00, 617.80)-(12.00, 617.20, 0.011)-(24.00, 617.30, 0.011)-(24.00, 617.80, 0.011)

Highlighted

Depth (ft)	= 0.09
Q (cfs)	= 1.670
Area (sqft)	= 0.97
Velocity (ft/s)	= 1.72
Wetted Perim (ft)	= 21.61
Crit Depth, Yc (ft)	= 0.11
Top Width (ft)	= 21.61
EGL (ft)	= 0.14



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, May 31 2023

X-Section E

User-defined

Invert Elev (ft)	= 617.60
Slope (%)	= 2.70
N-Value	= 0.011

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.25

Highlighted

Depth (ft)	= 0.08
Q (cfs)	= 1.250
Area (sqft)	= 0.67
Velocity (ft/s)	= 1.86
Wetted Perim (ft)	= 16.80
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 16.80
EGL (ft)	= 0.13

(Sta, El, n)-(Sta, El, n)...

(0.00, 618.40)-(27.00, 617.60, 0.011)-(63.00, 617.90, 0.011)-(63.00, 618.40, 0.011)