

PHASE III STORMWATER DRAINAGE REPORT

for

***QuikTrip No. 4273
SDP25-0013***

***Wolfensberger Road & Caprice Drive
Castle Rock, Douglas County, Colorado 80109***

***Prepared For (Owner/Developer):
QuikTrip Corporation
5725 Foxridge Drive
Mission, Kansas 66202***

***Prepared By (Engineer):
Midwest Design Group
P.O. Box 860015
Shawnee, Kansas 66286-0015
913.248.9385***

Date Submitted: 08/06/2026

Revisions Log:

Revision No.	Description	Date

ENGINEER'S CERTIFICATION

Phase III Stormwater Drainage Report QuikTrip Store #4273

Wolfensberger Road & Caprice Drive
Castle Rock, Douglas County, Colorado 80109

I affirm that this report and plan for the Phase III drainage design of QuikTrip No. 4273 was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others.



Darla Holman, P.E.
Project Manager
CO Registration No. 0056104

08/27/2026

Date



Seal

DEVELOPER'S CERTIFICATION

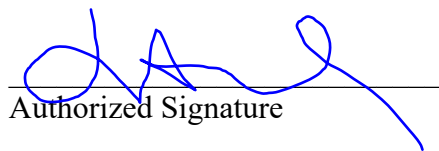
Stormwater Drainage Report QuikTrip Store #4273

Wolfensberger Road & Caprice Drive
Castle Rock, Douglas County, Colorado 80109

QuikTrip Corporation hereby certifies that the drainage facilities for QuikTrip No. 4273 shall be constructed according to the design presented in this report. I understand that the Town of Castle Rock does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the Town of Castle Rock reviews drainage plans pursuant to the Municipal Code; but cannot, on behalf of QuikTrip No. 4273, guarantee the final drainage design review will absolve QuikTrip Corporation and/or their successors and/or assigns of future liability for improper design.

QuikTrip Corporation

Name of Developer



Authorized Signature

REPORT PURPOSE

This stormwater drainage report has been prepared to detail the stormwater drainage design for the QuikTrip No. 4273 project to be located in Castle Rock, Colorado. This study will confirm that the proposed development will be designed to comply with the design parameters set forth by the Town of Castle Rock's Storm Drainage Design and Technical Criteria Manual (SDDTCM) and the Mile High Flood District's (MHFD) Urban Storm Drainage Criteria Manual, Volumes 1-3.

PROJECT SUMMARY

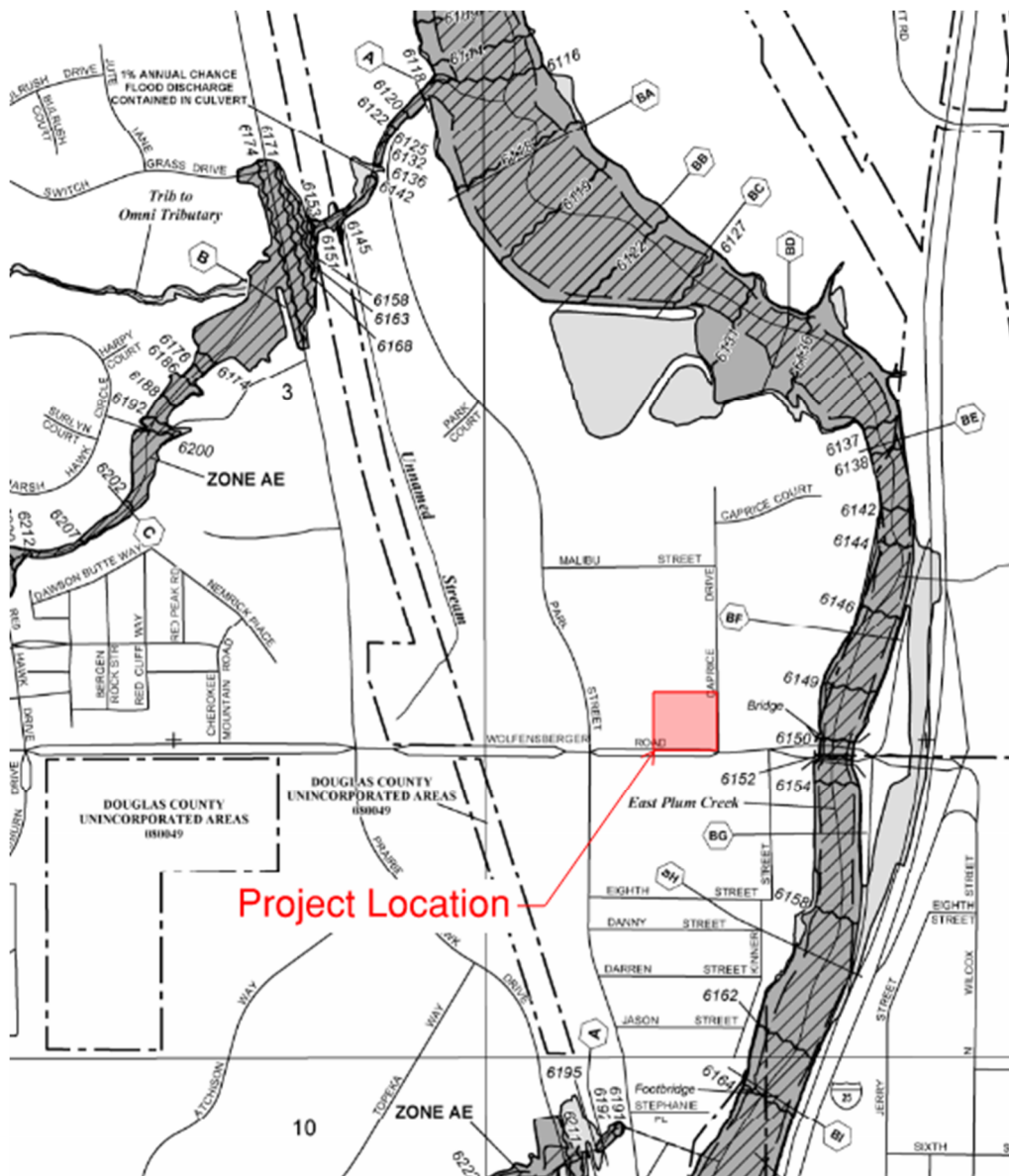
QuikTrip Corporation is proposing to build a new convenience store with fuel offerings in the northwest corner of the intersection of Wolfensberger Road and Caprice Drive in Castle Rock, Douglas County, Colorado. The QuikTrip development will include a convenience store, auto fuel canopy, parking lot, and private drive entrances. The store will be oriented to face Wolfensberger Road (south) with an auto fuel canopy west of the store. The new QuikTrip facility will be constructed on properties currently platted as *Lot 1A, Village North Amended Subdivision Reception #254392* and *Lot 1 and Lot 2, William's Subdivision Reception #348102 & Correction #9021814*. The entire property is currently zoned B (Business/Commercial) and contains 80,520 s.f. (1.848 acres). The Site Plan is included in the Appendix of this report for reference.

WATERSHED

This property lies within the East Plum Creek Watershed, which ultimately drains to Plum Creek.

FLOODPLAIN CERTIFICATE

According to the National Flood Insurance Program (NFIP) Flood Insurance Rate Map (FIRM) Panel No. 08035C0188G, effective March 16, 2016 as published by the Federal Emergency Management Agency, the subject property lies within Flood Zone "X", areas determined to be "outside the 0.2% annual chance floodplain".



Map taken from FIRM Panel

SITE SOIL CHARACTERISTICS

This property contains soils classified as:

- BrB – Bresser sandy loam, 1 to 3 percent slopes, HSG B
- Newlin gravelly sandy loam, 8 to 30 percent slopes, HSG B

The hydrologic soil group used for this site is B. The USDA/NRCS soil survey can be found in the Appendix.



Map taken from USDA/NRCS Soil Survey

WETLANDS

Per the U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) mapping system, there are no existing wetlands within the limits of disturbance or property limits for this project.

Refer to the NWI map provided in the Appendix.

METHODOLOGY

Hydrologic and hydraulic calculations were performed using Bentley's CivilStorm program. The Castle Rock SDDTCM was used for the 1-hour rainfall depth, which was used in conjunction with the Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual (USDCM) to create the Intensity-Duration-Frequency curve rainfall data used in the CivilStorm program. The USDCM, Volume 1, Table 6-5, NRCS HSG B, was used to calculate the runoff coefficients for the 2, 10, and 100-year storm events.

EXISTING DEVELOPMENT

The existing property is developed commercial land consisting of mostly impervious surfaces. It is bordered on the north by a commercial property (Safelite AutoGlass), on the west by a commercial property (OYO Hotel), on the east by Caprice Drive, and on the south by Wolfensberger Road. This property is currently zoned B, Business/Commercial.

In the existing conditions, the site generally drains south to north. It does not appear there is any existing storm sewer system on site. Drainage area EX-DA-1 drains as overland flow north into an existing drainage swale (Outlet 1) north of the property, which appears to drain west along the north property line. Drainage area EX-DA-2 drains north as overland flow onto the adjacent commercial property (Safelite AutoGlass) where an existing grate inlet (Outlet 2) appears to capture the runoff. The outlet point of this inlet is unknown. Drainage area EX-DA-3 drains south into Wolfensberger Road and is captured by the public storm sewer curb inlet (Outlet 3) along Wolfensberger Road. This runoff is not conveyed to the regional detention facility at the north end of Caprice Drive. Drainage area EX-DA-4 drains overland flow into Caprice Drive (Outlet 4). There does not appear to be any public storm sewer inlets along Caprice Drive, so it is assumed the runoff is conveyed by the roadway to the regional detention facility at the north end of Caprice Drive. Ultimately, the entire site drains to East Plum Creek.

The existing property contains approximately 79,198 sf of impervious areas (98.4%) and 1,322 sf of pervious areas (1.6%). Pre-developed runoff coefficients were calculated using the equations from Table 6-5 for NRCS HSG B soils. The weighted runoff coefficients for the total QuikTrip property were calculated to be: 2-year = 0.82, 10-year = 0.85, and 100-year = 0.88. Refer to Pre-Developed Drainage Map in the Appendix for additional calculations.

Existing Development Runoff Rate Summary

	Outlet 1 (EX-DA-1)	Outlet 2 (EX-DA-2)	Outlet 3 (EX-DA-3)	Outlet 4 (EX-DA-4)
Storm Event	Runoff Rate (cfs)	Runoff Rate (cfs)	Runoff Rate (cfs)	Runoff Rate (cfs)
2-year	3.14	1.33	0.12	0.86
10-year	5.09	2.15	0.22	1.39
100-year	8.25	3.49	0.42	2.24

Note: The runoff rate provided for Outlet 2 is only the on-site drainage area. This will allow for direct comparison with the proposed conditions of the runoff draining from the QuikTrip property onto the adjacent commercial property. Off-site drainage patterns and hydrologic conditions are not impacted by the proposed improvements.

PROPOSED DEVELOPMENT

The proposed development will be graded to generally maintain existing drainage patterns. QuikTrip will be constructing public storm sewer along Caprice Drive, from the existing manhole at the intersection of Malibu Street and Caprice Drive to a new manhole near the northeast corner of the property in Caprice Drive. Stormwater runoff from most of the QuikTrip site (Drainage areas DA-1 to DA-8) will be captured by private storm sewer inlets and conveyed to the new public storm sewer manhole (Outlet 5) near the northeast corner of the property. Drainage areas DA-9 will be captured by the existing off-site grate inlet (Outlet 2) on the commercial property (Safelite AutoGlass) north of the QuikTrip site. The outlet point of this inlet is unknown. Outlet 2 is analyzed for existing versus proposed conditions of runoff entering the commercial property north of QuikTrip to verify existing flows are not exceeded in the proposed conditions. Drainage area DA-10 will drain north as overland flow into the existing drainage swale (Outlet 1) north of the property. Drainage area DA-11 will drain east as overland flow into Caprice Drive (Outlet 4) where the roadway will convey the runoff north to the regional detention facility. Drainage area DA-12 will drain south as overland flow into Wolfensberger Road and will be captured by a public storm curb inlet (Outlet 3).

Stormwater runoff will be significantly reduced to the commercial property (Safelite AutoGlass), north of the QuikTrip site, after the improvements are completed.

The proposed site consists of 60,167 sf of impervious areas (74.7%) and 20,353 sf of pervious areas (25.3%). This is a decrease of 19,031 sf in impervious area. Post-developed runoff coefficients were calculated using the equations from Table 6-5 for NRCS HSG B soils. The weighted runoff coefficients for the total QuikTrip property were calculated to be: 2-year = 0.59, 10-year = 0.66, and 100-year = 0.77. Refer to Post-Developed Drainage Map in the Appendix for more details.

Proposed Development Runoff Rate Summary

	Outlet 1 (DA-10)	Outlet 2 (DA-9)	Outlet 3 (DA-12)	Outlet 4 (DA-11)	Outlet 5 (DA-1 to DA-8)
Storm Event	Runoff Rate (cfs)	Runoff Rate (cfs)	Runoff Rate (cfs)	Runoff Rate (cfs)	Runoff Rate (cfs)
2-year	0.05	0.07	0.02	0.16	3.70
10-year	0.14	0.16	0.04	0.38	6.16
100-year	0.45	0.44	0.06	1.22	10.44

Note: The runoff rate provided for Outlet 2 is only the on-site drainage area. This will allow for direct comparison with the existing conditions of the runoff draining from the QuikTrip property onto the adjacent commercial property. Off-site drainage patterns and hydrologic conditions are not impacted by the proposed improvements.

DETENTION

Per the City of Castle Rock, the QuikTrip No. 4273 project is located within the service area of the regional detention facility at the north end of Caprice Drive. No additional detention volume will be required. This development will be required to buy in to the regional detention facility. See Appendix for excerpts from the *Phase III Drainage Report for Village North Drainage and Infrastructure Improvements*, dated November 2, 2020 and prepared by Harris Kocher Smith.

DOWNSTREAM DRAINAGE IMPACTS

The proposed improvements will reduce impervious surfaces which should reduce runoff rates and volume. Additionally, QuikTrip will be constructing a new public storm sewer along Caprice Drive that will receive majority of the runoff from the site. The proposed private and public storm sewer systems will greatly reduce uncontrolled runoff onto adjacent properties and into the right-of-way. No adverse impacts to downstream drainage facilities are expected.

WATER QUALITY

Per the Town of Castle Rock SDDTCM, Section 14.1, Volume 3 of the MHFD Manual defines a four-step process that has become the cornerstone of the Town's approach to selecting and implementing control measures. Specific Town of Castle Rock criteria related to the four-step process are identified below.

Step 1: Reduce Runoff Volume to the Maximum Extent Practicable

Reducing runoff volume is accomplished by reducing the amount of pavement and roof area that is directly connected to inlets and storm sewer, while maximizing the pervious area that receives runoff from unconnected pavement or roofs.

The QuikTrip No. 4273 project will reduce runoff volume to the maximum extent practicable by reducing impervious surface area from the existing conditions as mentioned in the "Proposed Development" section of the report. With the construction of the public storm sewer along Caprice Drive, the Town has requested QuikTrip to maximize runoff capture and convey the runoff to the public storm sewer system to minimize uncontrolled flows entering adjacent properties and the right-of-way.

Step 2: Provide Water Quality Capture Volume and Flood Control Detention Via Full-Spectrum Detention

As mentioned in the "Detention" section of this report, the QuikTrip No. 4273 project is within the service area of the existing regional detention facility at the north end of Caprice Drive. No additional Full-Spectrum Detention is expected to be required.

Step 3: Utilize Stream Channel Stabilization Techniques

No existing or proposed drainageways are present on or adjacent to the QuikTrip No. 4273 project. No stream channel stabilization techniques are expected to be required.

Step 4: Undertake Source Control

QuikTrip will install SNOUT water quality units in the structures immediately downstream of the fuel canopy and the underground fuel storage tanks. These units will treat the areas that are most susceptible to water quality issues. Bio-skirts will be added to the SNOUT units for oil absorption. Information on these water quality units is provided in the Appendix.

FLOOD STUDY

The QuikTrip No. 4273 property will be within Zone “X”, as shown in the Floodplain Certificate section. This development is not expected to incur damages as a result of flooding.

U.S. ARMY CORPS OF ENGINEERS REQUIREMENTS

The QuikTrip No. 4273 project will not disturb jurisdictional waters or wetlands of the U.S.

CONCLUSION

The QuikTrip No. 4273 development has been designed to comply with the design parameters set forth by the Town of Castle Rock’s Storm Drainage Design and Technical Criteria Manual (SDDTCM) and the Mile High Flood District’s (MHFD) Urban Storm Drainage Criteria Manual, Volumes 1-3. An off-site existing detention facility, constructed per the *Phase III Drainage Report for Village North Drainage and Infrastructure Improvements*, dated November 2, 2020 and prepared by Harris Kocher Smith, currently services the QuikTrip property. Therefore, no on-site detention is required. SNOUT water quality units will be installed to treat the areas that are most susceptible to water quality issues. No adverse effects are expected on adjacent properties or downstream drainage systems after the proposed improvements are completed.

QuikTrip No. 4273

***Wolfensberger Road & Caprice Drive
Castle Rock, Douglas County, Colorado 80109***

APPENDIX



Phase III Drainage Report Checklist

The Phase III Drainage Report must be in conformance with the latest Town of Castle Rock Storm Drainage Design and Technical Criteria Manual available on the Town's website.

The Phase III Drainage Report must be signed and sealed by a Professional Engineer licensed in the State of Colorado. The purpose of the Phase III Drainage Report is to update the concepts, and to present the design details on construction plans for the drainage facilities discussed in the Phase II Drainage Report.

The preparer should contact and work with the Town Stormwater Engineering Staff regarding any design, master planning and existing system questions (720-733-6000). The following outline sets forth the **required minimum** content to be provided in the Phase III Drainage Report that shall be submitted with the Planned Development Plan or Straight Zoning documents. A copy of this checklist must be submitted with the Phase III Drainage Report.

Please see Chapter 4 of the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual for additional details and information. Please check off the following items to assure your report is complete. Appropriate notations shall be provided with the checklist. For example, if a specific item is not addressed or not applicable, an explanation needs to be provided.

Included	N/A	
		I. COVER SHEET
X		A. Name of Project, including legal name of development
X		B. Address
X		C. Owner
X		D. Developer
X		E. Engineer
X		F. Submittal date and revision dates as applicable
		II. GENERAL LOCATION AND DESCRIPTION
X		A. Site Location
X		B. Description of Property and Land Use
		III. DRAINAGE BASIN AND SUB-BASINS
X		A. Major Drainage Basins
X		B. Minor Drainage Basins
		IV. DRAINAGE DESIGN CRITERIA
X		A. Regulations
X		B. Drainage Studies, Master Plans, Site Constraints
X		C. Hydrology
X		D. Hydraulics
X		E. Water Quality Enhancement

Phase III Drainage Report Checklist

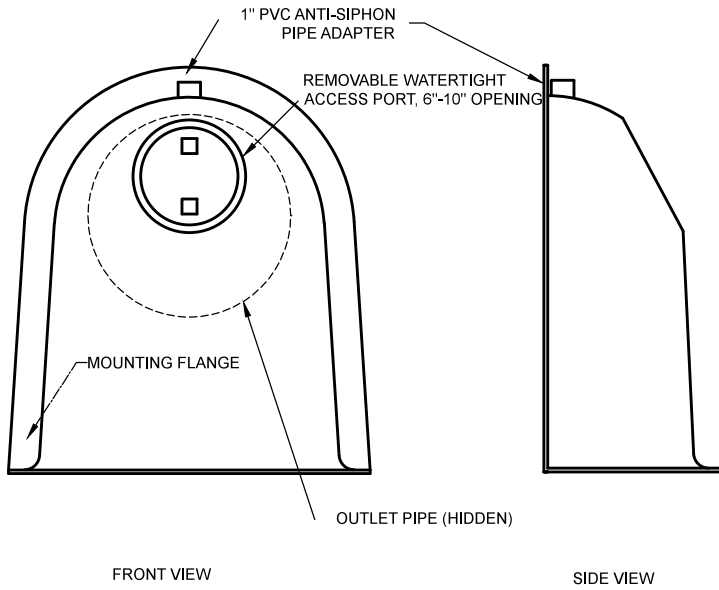
Included	N/A	
		V. STORMWATER MANAGEMENT FACILITY DESIGN
X		A. Stormwater Conveyance Facilities
	X	B. Stormwater Storage Facilities
X		C. Water Quality Enhancement Best Management Practices
	X	D. Floodplain Modification
	X	E. Additional Permitting Requirements
	X	F. General
		VI. CONCLUSIONS
X		A. Compliance with Standards
	X	B. Variances
X		C. Drainage Concept
		VII. REFERENCES
		VIII. APPENDICES
X		A. Hydrologic Computations
X		B. Hydraulic Computations
X		C. Water Quality Enhancement Best Management Practices
X		D. Referenced Information
X		OVERALL DRAINAGE PLAN (IN POCKET)
X		DETAILED DRAINAGE PLANS (IN POCKET)

Notes/Comments:

QuikTrip No. 4273

BMP Water Quality Measures
SNOUT & Bio-Skirt

CONFIGURATION DETAIL



SNOUT OIL-WATER-DEBRIS SEPARATOR

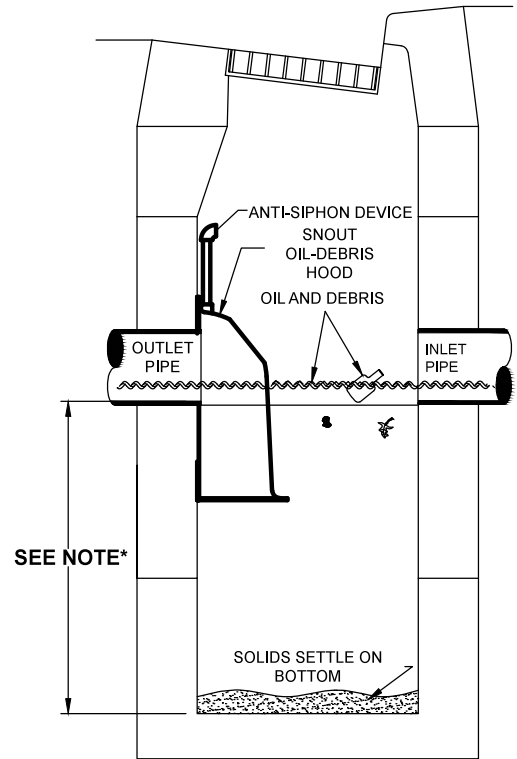
CORRECT SNOOT SIZE ALWAYS LARGER THAN PIPE SIZE. SEE NOTE 4 BELOW.

NOTES:

- ALL HOODS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY:
BEST MANAGEMENT PRODUCTS, INC.
9 MATHEWS DRIVE, UNIT A1-A2.
EAST HADDAM, CT 06423
TOLL FREE: (800) 504-8008 OR (888) 434-0277, FAX: (877) 434-3197
WEB SITE: www.bmpinc.com
OR PRE-APPROVED EQUAL
- ALL HOODS SHALL BE CONSTRUCTED OF A GLASS REINFORCED RESIN COMPOSITE WITH ISO GEL COAT EXTERIOR FINISH WITH A MINIMUM 0.125" LAMINATE THICKNESS.
- ALL HOODS SHALL BE EQUIPPED WITH A WATERTIGHT ACCESS PORT, A MOUNTING FLANGE, AND AN ANTI-SIPHON VENT PIPE AND ELBOW AS DRAWN. (SEE CONFIGURATION DETAIL)
- THE SIZE AND POSITION OF THE HOOD SHALL BE DETERMINED BY OUTLET PIPE SIZE AS PER MANUFACTURER'S RECOMMENDATION. NOTE: THE CORRECT SNOOT SIZE WILL ALWAYS BE LARGER THAN NOMINAL PIPE SIZE (E.G. 12" ID PIPE REQS. 18 SERIES SNOOT OR LARGER).
- THE BOTTOM OF THE HOOD SHALL EXTEND DOWNWARD A MINIMUM DISTANCE EQUAL TO 1/2 THE OUTLET PIPE DIAMETER WITH A MINIMUM DISTANCE OF 6" FOR PIPES <12" I.D.
- THE SURFACE OF THE STRUCTURE WHERE THE HOOD IS MOUNTED SHALL BE FINISHED SMOOTH AND FREE OF LOOSE MATERIAL AND PIPE SHALL BE FINISHED FLUSH TO WALL.
- THE ANTI-SIPHON VENT SHALL EXTEND ABOVE HOOD BY MINIMUM OF 3" AND A MAXIMUM OF 12" ACCORDING TO STRUCTURE CONFIGURATION.
- ALL STRUCTURE JOINTS SHALL BE WATERTIGHT.
- THE HOOD SHALL BE SECURELY ATTACHED TO STRUCTURE WALL WITH $\frac{3}{8}$ " STAINLESS STEEL BOLTS AND OIL-RESISTANT GASKET AS SUPPLIED BY MANUFACTURER. (SEE INSTALLATION DETAIL)
- INSTALLATION INSTRUCTIONS SHALL BE FURNISHED WITH MANUFACTURER SUPPLIED INSTALLATION KIT.
INSTALLATION KIT SHALL INCLUDE:
A. INSTALLATION INSTRUCTIONS
B. PVC ANTI-SIPHON VENT PIPE AND ADAPTER
C. OIL-RESISTANT CRUSHED CELL FOAM GASKET WITH PSA BACKING
D. 3/8" STAINLESS STEEL BOLTS
E. ANCHOR SHIELDS

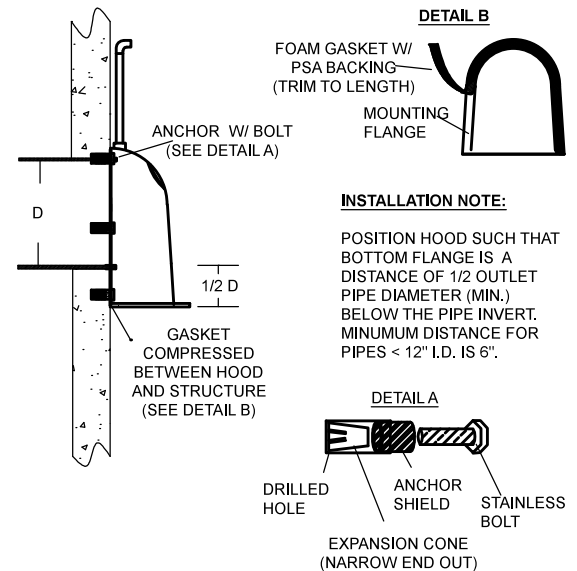
US Patent # 6126817, 7951294, 7857966, 8512556
Canada Patent # 2285146, 2690156, 2690156 others pending

TYPICAL INSTALLATION



*NOTE- SUMP DEPTH OF 36" MIN. FOR UP TO 12" ID PIPE. OUTLET. FOR PIPES 15" ID AND ABOVE SUMP DEPTH OF 2.5 TO 3 TIMES PIPE ID RECOMMENDED (E.G. 5' DEEP for 24" PIPE)

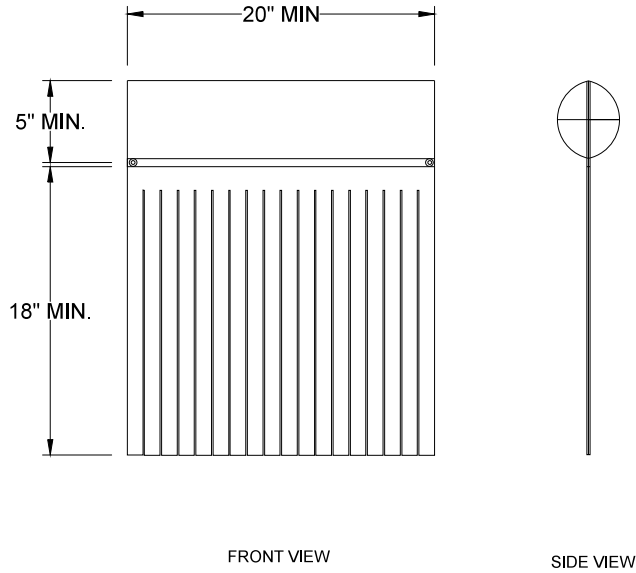
INSTALLATION DETAIL



HOOD SPECIFICATION FOR CATCH BASINS AND WATER QUALITY STRUCTURES

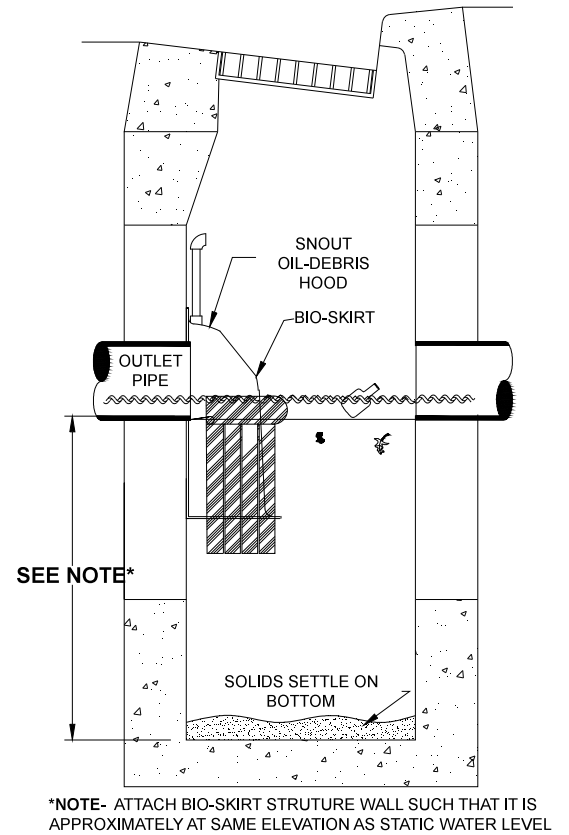
DESCRIPTION	DATE	SCALE
OIL- DEBRIS HOOD SPECIFICATION AND INSTALLATION (TYPICAL)	01/08/20	NONE
	DRAWING NUMBER SP-SN	

CONFIGURATION DETAIL



The BIO-SKIRT
HYDROCARBON ADSORBING SKIRTED BOOM

TYPICAL INSTALLATION

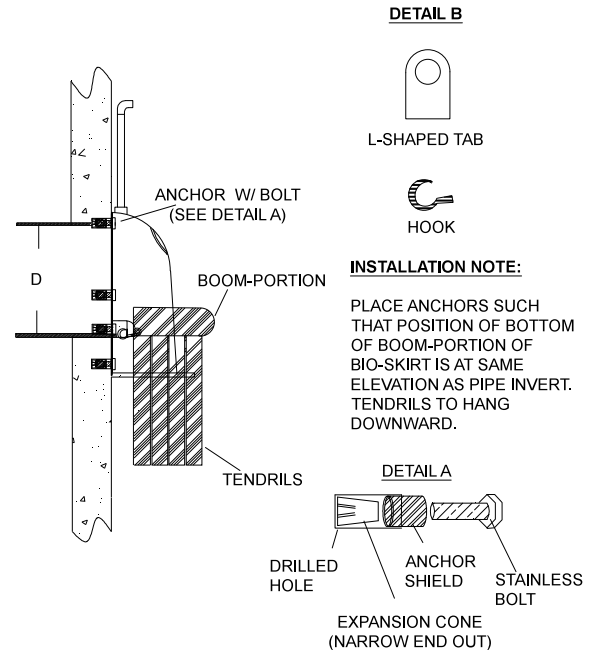


NOTES:

1. All new and/or existing catch basins or water quality structures shall be outfitted with the Bio-Skirt(R) Hydrocarbon reducing skirted boom as manufactured by: BEST MANAGEMENT PRODUCTS, INC.
53 MT. ARCHER RD.
LYME, CT 06371
(860) 434-0277, (860) 434-3195 FAX
TOLL FREE: (800) 504-8008 OR (888) 434-0277
WEB SITE: www.bmpinc.com
or pre-approved equal.
2. The skirted boom shall be comprised of an upper boom portion that is an adsorbent fabric covered floating boom of 5" minimum diameter with an integral lower skirt portion comprised of fabric tendrils of an 18" minimum length that hang beneath the boom.
3. All booms shall be made from geo-textile quality needle-woven filtration fabric manufactured from 100% recycled select fibers with a .125" minimum thickness.
4. All fabric shall be protected with a covalently surface bonded non-leaching antimicrobial agent and booms shall display a tag indicating "Antimicrobial" which preserves the service life of the unit.
5. The Bio-Skirt shall be positioned in front of the exit pipe and SNOUT® Oil-Debris Separator if so equipped (the preferred application of the Bio-Skirt is to be deployed with the SNOUT).
6. The skirted boom shall be securely attached to the structure wall on each side of the exit pipe with 3/8" stainless steel bolts, stainless steel tabs, plastic-composite hooks and elastomeric cord as found in manufacturer supplied in installation kit.
7. For applications where multiple Bio-Skirts are deployed together for larger SNOUTs (e.g. on 24" and larger SNOUTs per schedule below*), connect skirts grommet to grommet with hooks and cord as supplied in the installation kit.

Typical Deployment Schedule:
12-18" SNOUT- One Bio-Skirt
24-30" SNOUT- Two Bio-Skirts
36-52" SNOUT- Three Bio-Skirts
72" and up, Call 800-504-8008 for guidance.

INSTALLATION DETAIL



OIL ADSORBENT SPECIFICATION FOR CATCH BASINS AND WATER QUALITY STRUCTURES

DESCRIPTION
BIO-SKIRT (TM)
SPECIFICATION AND
INSTALLATION
(TYPICAL)

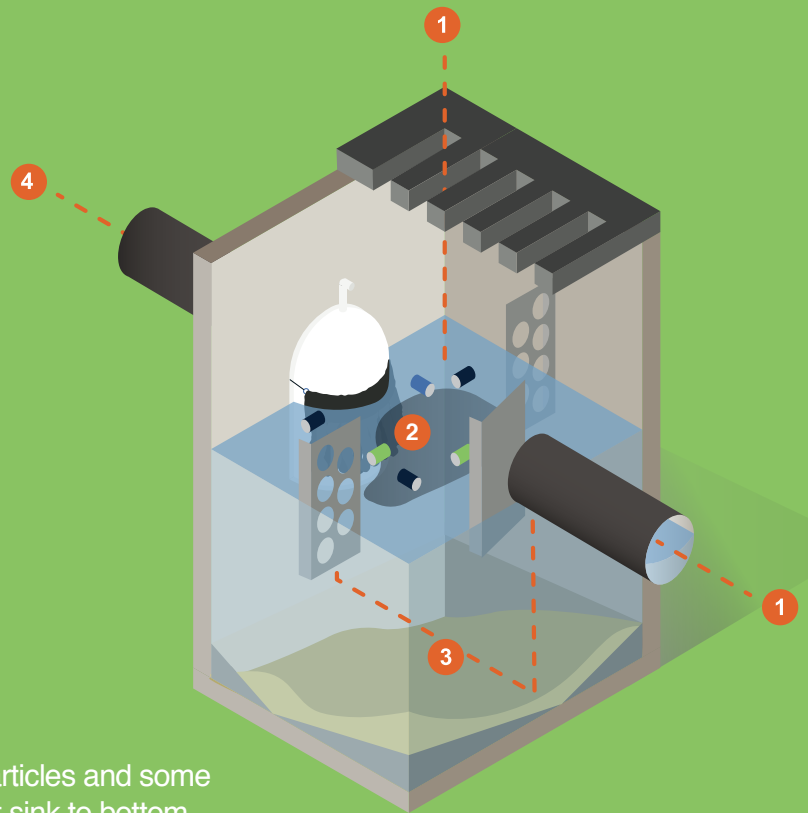
DATE
10/29/14

SCALE
NONE

DRAWING NUMBER
SP-BIO

The Quality Stormwater Management System

Helping you do more water quality improvement with less budget.



1 Stormwater and trash enter through grate or pipe.

3 Gross particles and some sediment sink to bottom.

2 Oil and floatable debris on surface cannot exit pipe.

4 Cleaner water exits from under SNOUT®.

Make the most of your stormwater dollars with the SNOUT® system.

We have stormwater quality experts on staff to help you with our wide range of products, including the SNOUT®, Bio-Skirt®, Stainless Steel TrashScreen™, and our new Turbo Plate® to reduce turbulence and increase sediment capture.

Whether it is for highway or municipal drainage, governmental, educational, or residential facilities, we have the experience for your stormwater quality improvement needs.



Products for a better environment.



**Best
Management
Products**
The Stormwater Quality Experts

More than 80,000 SNOUTs® installed. Made in the USA since 1999.

For more information on how our systems can solve any stormwater situation, contact us at **800.504.8008** or visit us at **bmpinc.com**



Design and Maintenance Considerations for SNOUT[®] Stormwater Quality Systems

Background:

The SNOUT system from Best Management Products, Inc. (BMP, Inc.) is based on a vented hood that can reduce floatable trash and debris, free oils, and other solids from stormwater discharges. In its most basic application, a SNOUT hood is installed over the outlet pipe of a catch basin or other stormwater quality structure with a deep sump (see Installation Drawing). The SNOUT forms a baffle that traps floatable debris and free oils on the surface, while permitting heavier solids to sink to the bottom of the sump. The clarified intermediate layer is forced out of the structure through the open bottom of the SNOUT by displacement from incoming flow. The resultant discharge contains considerably less unsightly trash and other gross pollutants, and can also offer reductions of free-oils and finer solids.

As with any structural stormwater quality design, maintenance considerations will have a dramatic impact on SNOUT system performance over the life of the facility. The most important factor to consider when designing structures with a SNOUT is the depth of the sump. Sump is defined as the depth from the invert of the outlet pipe to the bottom of the structure. *Simply put, the deeper the sump, the more effective the unit will be both in terms of pollutant removals and reducing frequency of maintenance.* More volume in a structure means more quiescence, thus allowing the pollutants a better chance to separate out. Secondly, more volume means fewer cycles between maintenance, because the structure has a greater capacity. Of equal importance to good performance is putting SNOUTs in multiple structures. The closer one captures pollution to where it enters the infrastructure (e.g. at the inlet), the less mixing of runoff there is, and the easier it will be to separate out pollutants. Putting SNOUTs and deep sumps in all inlets that can be easily maintained develops a powerful structural treatment train with a great deal of effective storage volume, where even finer particles may have chance to settle out.

Design Notes:

- The SNOUT size is ALWAYS greater than the nominal pipe size. The SNOUT should cover the pipe OD and optimally the grouted area around the pipe (e.g. for a 12" pipe, an 18" SNOUT is the correct choice).
- As a rule of thumb, BMP, Inc. recommends *minimum* sump depths based on outlet pipe inside diameters of 2.5 to 3 times the outlet pipe size.
- For best performance, the inlet pipe and outlet pipe should have inverts close to the same elevation (a six inch or less deviation is optimal).
- Special note for smaller pipes: A minimum sump depth of 36 inches for all

pipe sizes 12 inches ID or less, and 48 inches for pipe 15-18 inches ID is required if collection of finer solids is desired.

- The plan dimension of the structure should be up to 6 to 7 times the flow area of the outlet pipe. Increasing area beyond that has a minimal impact on performance. However, the structure wall where the SNOUT is mounted must accommodate the size of the SNOUT (either the correct diameter or enough width).
- To optimize pollutant removals establish a “treatment train” with SNOUTs placed in as many inlets where it is feasible to do so (this protocol applies to most commercial, institutional or municipal applications and any application with direct discharge to surface waters).
- At a minimum, SNOUTs should be used in every third structure for less critical applications (less critical areas might include flow over grassy surfaces, very low traffic areas in private, non-commercial or non-institutional settings, single family residential sites).
- Use Bio-Skirts® for increased hydrocarbon reduction. Bio-Skirts are highly recommended for fueling or vehicle service stations, convenience stores, restaurants, loading docks, marinas, beaches, schools or high traffic applications. Each Bio-Skirt can retain about one gallon of oils.
- Use the Stainless TrashScreen for “Full Trash Capture” requirements.
- Use BMP Turbo Plates™ for increased sediment capture.
- The “R” series SNOUTs (12R, 18R, 24R, 30R, 30R/96, 42RTB/60, 52RTB/72, 52RTB/84 and 72RTB/96) are available for round manhole type structures of up to 96” ID; the “F” series SNOUTs (LP318F, 12F, 18F, 24F, 30F, 36F, 48F, 72F and 96F) are available for flat walled structures; the “NP” series SNOUTs (NP1218R, NP1524R, NP1830R, and NP2430R) are available for smaller diameter structures up to 30” ID.

Example Structure Sizing Calculation:

A SNOUT equipped structure with a 15 inch ID outlet pipe (1.23 sqft. flow area) will offer best performance with a minimum plan area of 7.4 sqft. and 48 inch sump. Thus, a readily available 48 inch diameter manhole-type structure, or a rectangular structure of 2 feet x 4 feet will offer sufficient size when combined with a sump depth of 48 inches or greater.

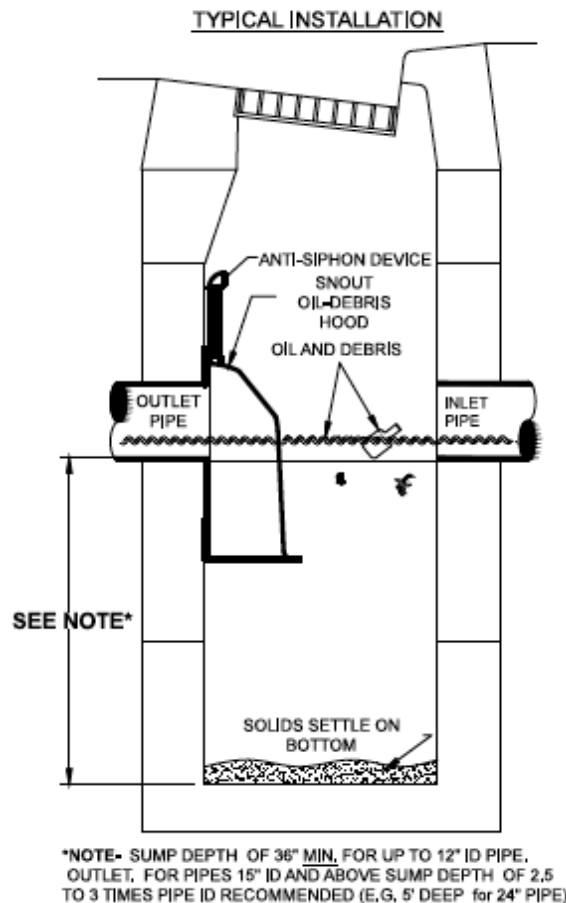
Maintenance Recommendations:

- Monthly monitoring for the first year of a new installation after the site has been stabilized is a recommended practice.
- Measurements should be taken after each rain event of .5 inches or more, or monthly, as determined by local weather conditions.
- Checking sediment depth and noting the surface pollutants in the structure will be helpful in planning maintenance.
- The pollutants collected in SNOUT equipped structures will consist of floatable debris and oils on the surface of the captured water, and grit and sediment on the bottom of the structure.
- It is best to schedule maintenance based on the solids collected in the sump.
- Optimally, the structure should be cleaned when the sump is half full (e.g. when 2 feet of material collects in a 4 foot sump, clean it out).
- Structures should also be cleaned if a spill or other incident causes a larger

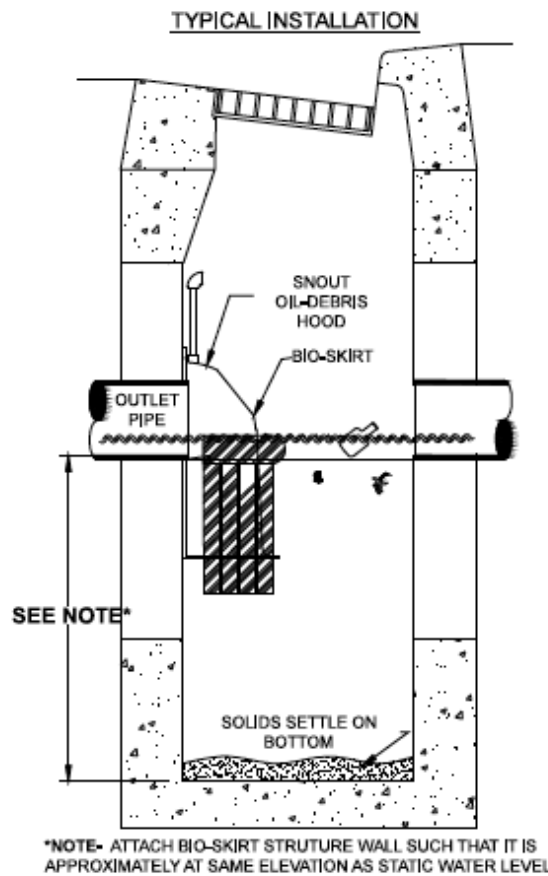
- than normal accumulation of pollutants in a structure.
- Maintenance is best done with a vacuum truck.
 - If Bio-Skirts are being used in the structure to enhance hydrocarbon capture, they should be checked on a monthly basis for the first year, and serviced or replaced when more than 2/3 of the boom is submerged, indicating a nearly saturated state. Assuming a typical pollutant-loading environment exists, Bio-Skirts should be serviced* annually or replaced as necessary.
 - In the case of an oil spill, the structure should be checked and serviced and Bio-Skirts (if present) replaced or serviced immediately.
 - All collected wastes must be handled and disposed of according to local environmental requirements.
 - To maintain the SNOUT hoods, an annual inspection of the anti-siphon vent and access hatch are recommended. A simple flushing of the vent, or a gentle rodding with a flexible wire are all that's typically needed to maintain the anti-siphon properties. Opening and closing the access hatch once a year ensures a lifetime of trouble-free service.

*To extend the service life of a Bio-Skirt, the unit may be "wrung out" to remove oils and washed in an industrial washing machine with warm water. The Bio-Skirt may then be re-deployed if the material maintains it's structural integrity. A maintained Bio-Skirt can last for several years. Each Bio-Skirt can hold about on gallon of oils.

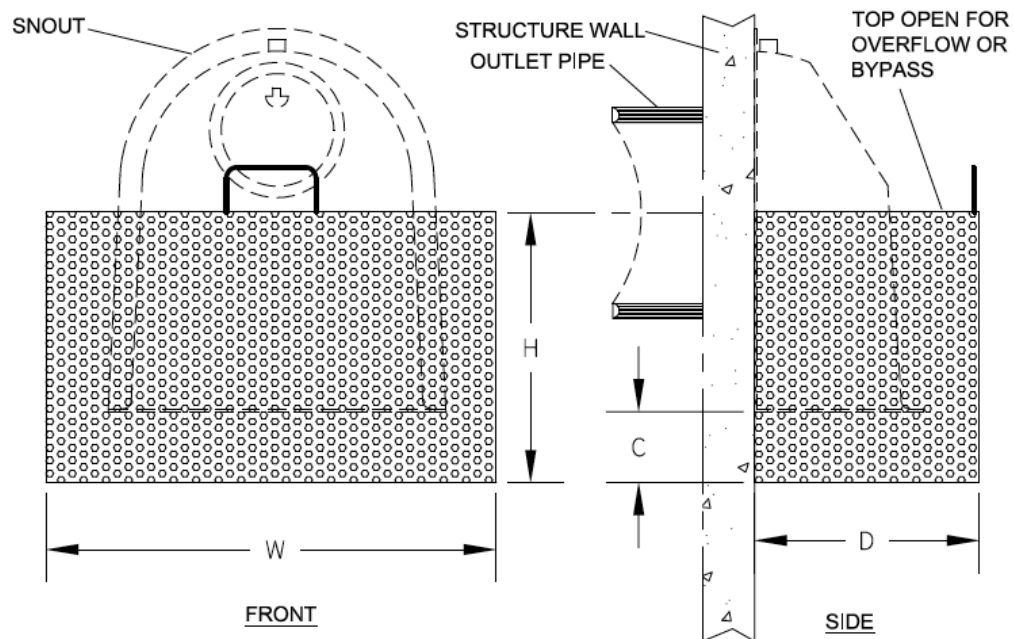
SNOUT INSTALLATION:



BIO-SKIRT INSTALLATION:

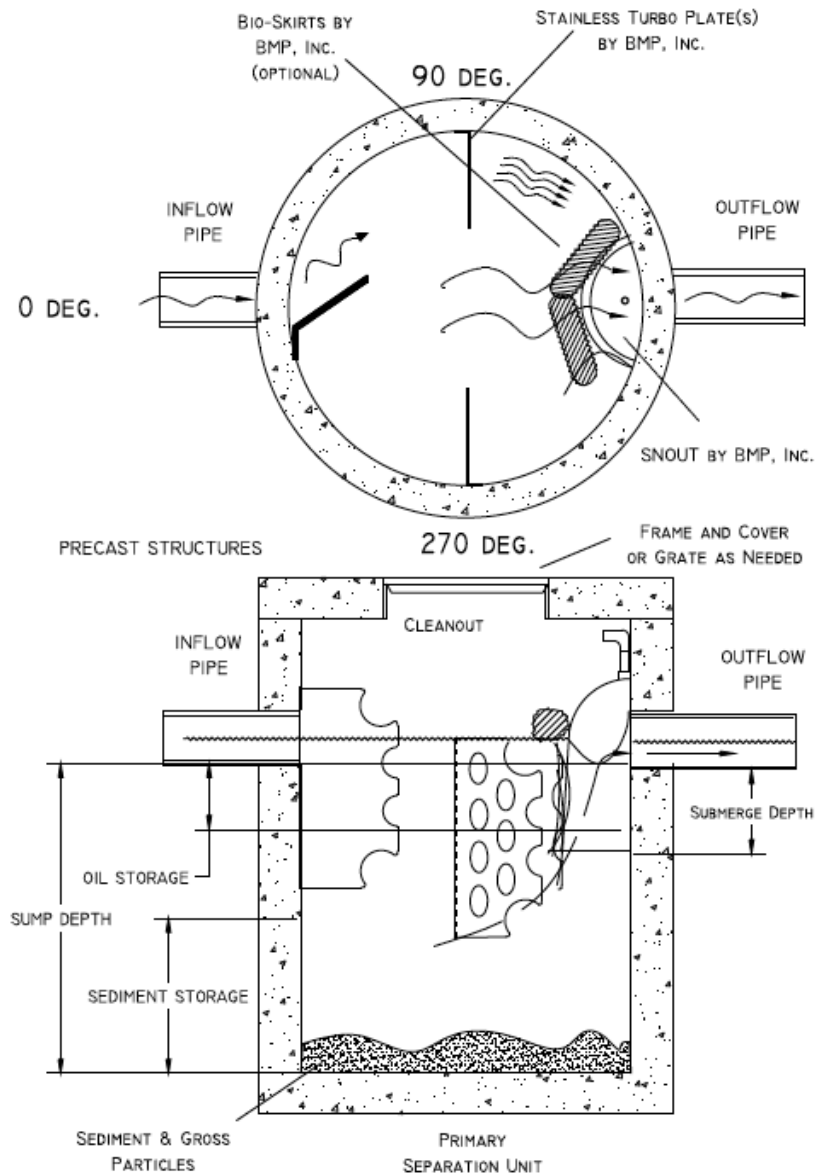


STAINLESS TRASHSCREEN INSTALLATION:



TURBO PLATE INSTALLATION:

SNOUT TURBO PLATE-OIL-GRIT SEPARATOR



Contact Information: Please contact T. J. Mullen at 800-504-8008, tjm@bmpinc.com or Matt White at 888-434-0277, mwhite@bmpinc.com for design assistance.

Website: www.bmpinc.com

The SNOUT, Bio-Skirt and TrashScreen are protected by: US Patents 6126817, 7857966, 7951294 and 8512556. More US patents are pending and BMP holds Canadian patents for much of the technology patented in the US. Canadian Patents numbers include 2285146, 2688012, 2690156 and 2740678. The SNOUT®, Bio-Skirt® Turbo Plate™ and Stainless TrashScreen™ are trademarks of Best Management Products,

Bio-Skirt™ Installation Instructions

1. Select the appropriate number of Bio-Skirts according to the size of the SNOUT® as follows: For 12" and 18" SNOUTs or NP1218 or NP1524 (use one Bio-Skirt); For 24" and 30" SNOUTs or NP1830 or NP2430 (use two Bio-Skirts); 36" to 54" SNOUT (use three Bio-Skirts); for SNOUT sizes over 54" consult with BMP application engineer.

2. To optimally position the Bio-skirt, it should be centered across the width of the Snout, and placed vertically so that the blue webbing stripe with grommets will float approximately at the same elevation as the static waterline (see photo 3). To do this, place one anchor bolt on each side of the SNOUT at the invert of the pipe the SNOUT covers. If this is an existing Snout installation, follow the instructions below to secure the mounting bolts and clips, directly onto the structure wall to which the Snout is attached (see photo 1). You may also utilize existing bolts on either side of the Snout if it will allow the Bio-skirt to float at the static waterline.

3. Install the Anchor Assemblies and Clips s follows.

For Concrete Structures:

Mark the location of where the anchors will be placed:

- (1) Drill a 3/4" hole into the base material to the required depth (approximately 1-1/4" deep.)
- (2) Blow the hole clean of dust and other material.
- (3) Insert the anchor into the hole. Narrow end of cone must point out, lead shield slides over cone.
- (4) Position the setting tool or a 9/16 socket against the anchor outer sleeve. (The outer rim of the tool or socket should seat onto the lead shield rim.) Set the anchor by driving the lead sleeve over the cone using several sharp hammer blows. Be sure the anchor is at the required embedment depth (flush or slightly below face of concrete)
- (5) Attach the clip, aligned vertically, onto anchor with the supplied bolt and washer. (see photo 1)

Plastic Structure Install:

- (1) Mark and pre-drill (To match holes in SNOUT®) six pilot holes (3/16") for the 14 x 1 1/4" SS self tapping hex drive screws provided in kit. Install 1/4 x 1" Neoprene Backed Washers on each screw and tighten to approximately 10-15 pounds.
- (2) Attach the clip, vertically, onto anchor via supplied bolt and washer. (see photo 1).

3. Assemble the Bio-skirt tether, using the provided black adjustable hooks and blue elastomeric cord (see photo 2). Cut cord to length as needed.

4. Attach the Bio-Skirt using the two tethers, one per side, and four hooks, two per side, one hook attached to grommet and one hook to clip on each side.
5. For applications where multiple Bio-Skirts are deployed together for larger SNOUTs (e.g. on 24" and larger SNOUTs per schedule below), connect skirts grommet to grommet with hooks and cord as supplied in installation kit. Trim cord sections to length between Bio-Skirts to loosely span circumference of SNOUT.

Bio-Skirt Installation Kit Items :

- 2- 3/8" expansion anchor assemblies (anchors, stainless bolts & stainless washers)
- 4- Plastic Hooks(1) 1" or 2" female pipe adapter
- 2- Stainless Steel Connector Tabs
- 1- 6' Length Elastomeric Cord (cut two pieces to length)



Photo 1. Clip on SNOUT
(Align vertically)



Photo 2. Hook and Cord Assembly

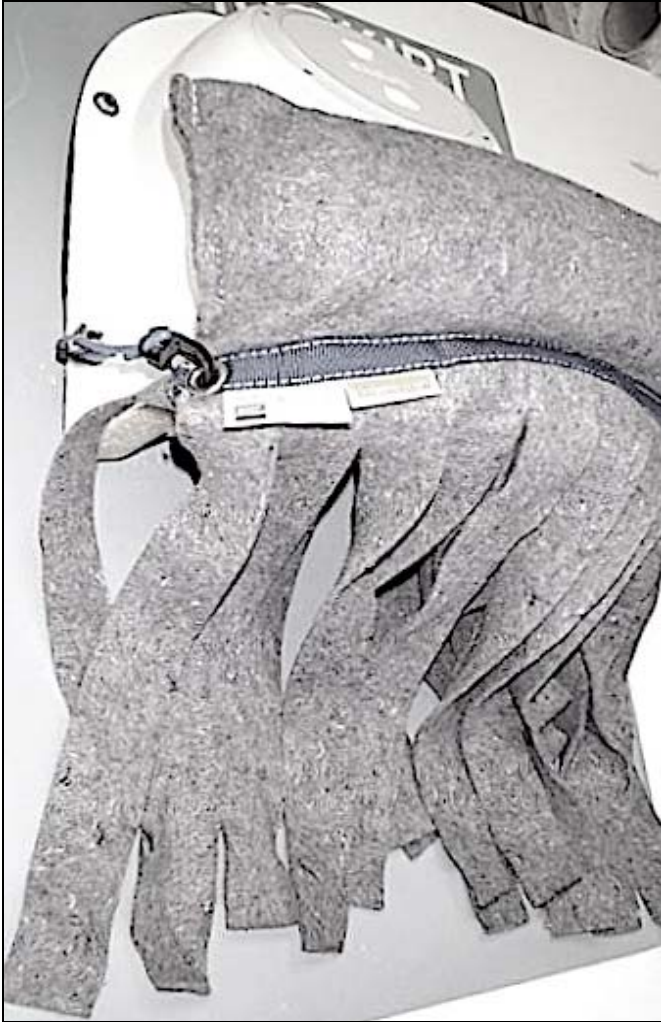


Photo 3. Installed Bio-Skirt, grommet and clip at static water line.

Maintenance Note: Should Bio-Skirt become saturated with oil, it can be wrung out and re-deployed. It can also be washed in a washing machine and re-deployed. The Anti-microbial properties that protect the fabric will stay intact, even after washing. Dispose of any captured oils or the Bio-Skirt themselves according to local regulations.



Removal of Emulsified Oil with Bio-Skirt™ Media

Stubborn emulsions where oil has become dispersed are one of the most challenging filtration problems for industrial wastewater. In an emulsion, oil is partially dissolved. Consequently, most sorbents and filtration products are completely ineffective.

Method

Testing was performed using a laboratory prepared stock solution of 5 ml of motor oil and 5 ml of diesel fuel to 200 ml of water. 10 ml of a citrus-based degreaser was added to the solution and vigorously agitated creating a known emulsion.

Three separate concentrations of stock solution were created and tested:

Low - 1.0 ml of stock solution to 1.0 liter of water
Medium - 10 ml of stock solution to 1.0 liter of water
High - 100 ml of stock solution to 1.0 liter of water

A 15 cm by 6 cm filter housing was used and filled with 20 grams of the bulk filtration Bio-Skirt media. The Bio-Skirt was wetted prior to the commencement of the test. The test solution was run through the Bio-Skirt at a rate of 500 ml per minute and the first filtrate was discarded. An additional portion of the test solution was run through the Bio-Skirt and collected for analysis. Filtered and unfiltered test solutions were sampled by USEPA Method 418 (USEPA Method 418 measures petroleum hydrocarbons as well as fats in soaps).

The samples were extracted and a silica gel cleanup was performed to remove the fatty acids and soaps from the samples allowing accurate measurement of the motor oil and diesel components.

Results of analytical chemistry are presented in the table below.

Results

<u>Sample</u>	<u>Result (ppm) Unfiltered</u>	<u>Result (ppm) with Bio-Skirt</u>	<u>% Oil Removed</u>
Low	24	3.2	87%
Med	140	7	95%
High	960	24	97%

Conclusions

At the medium and high levels Bio-Skirt™ media removed greater than 90 percent of the oil. Competing products that remove floating oil have generally proven ineffective with partially dissolved or emulsified oil. While this data should not be construed to predict performance in the field for any given SNOUT + Bio-Skirt application, it does give an accurate indication of the potential for oil removals of the Bio-Skirt media in a filtration application.



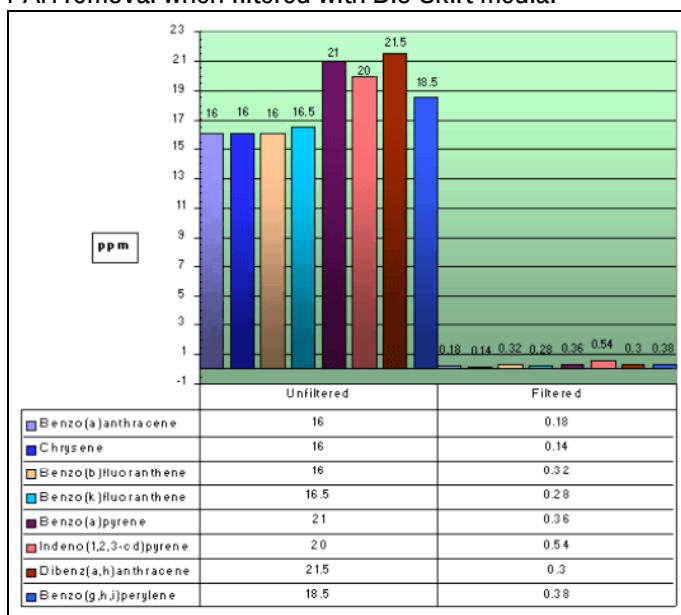
Polynuclear Aromatic Hydrocarbon (PAH) Removal with Bio-Skirt™ media

Many situations exist where PAHs need to be removed, especially in groundwater remediation efforts, and to a lesser extent in stormwater quality applications.

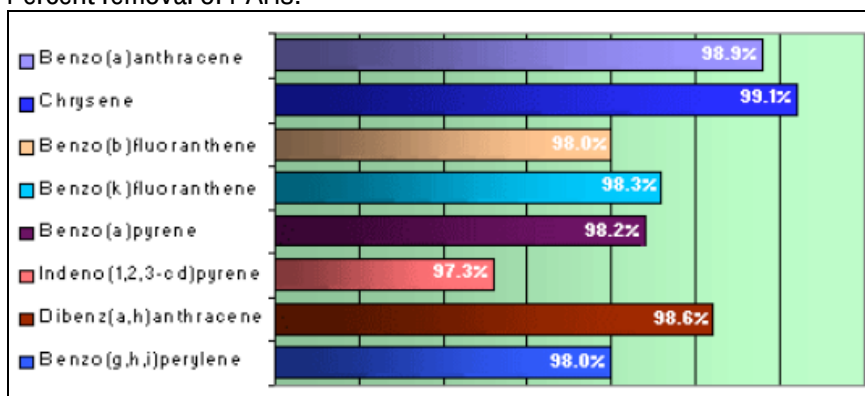
Method

Analytical laboratory spiked aqueous samples were analyzed for PAH concentrations by USEPA Method 8270. Those spiked samples were then poured through 20 grams of Bio-Skirt geo-textile filtration fabric and the water passing through the Bio-Skirt fabric was again analyzed by USEPA Method 8270 providing the results of analytical chemistry presented in the graphs below.

PAH removal when filtered with Bio-Skirt media:



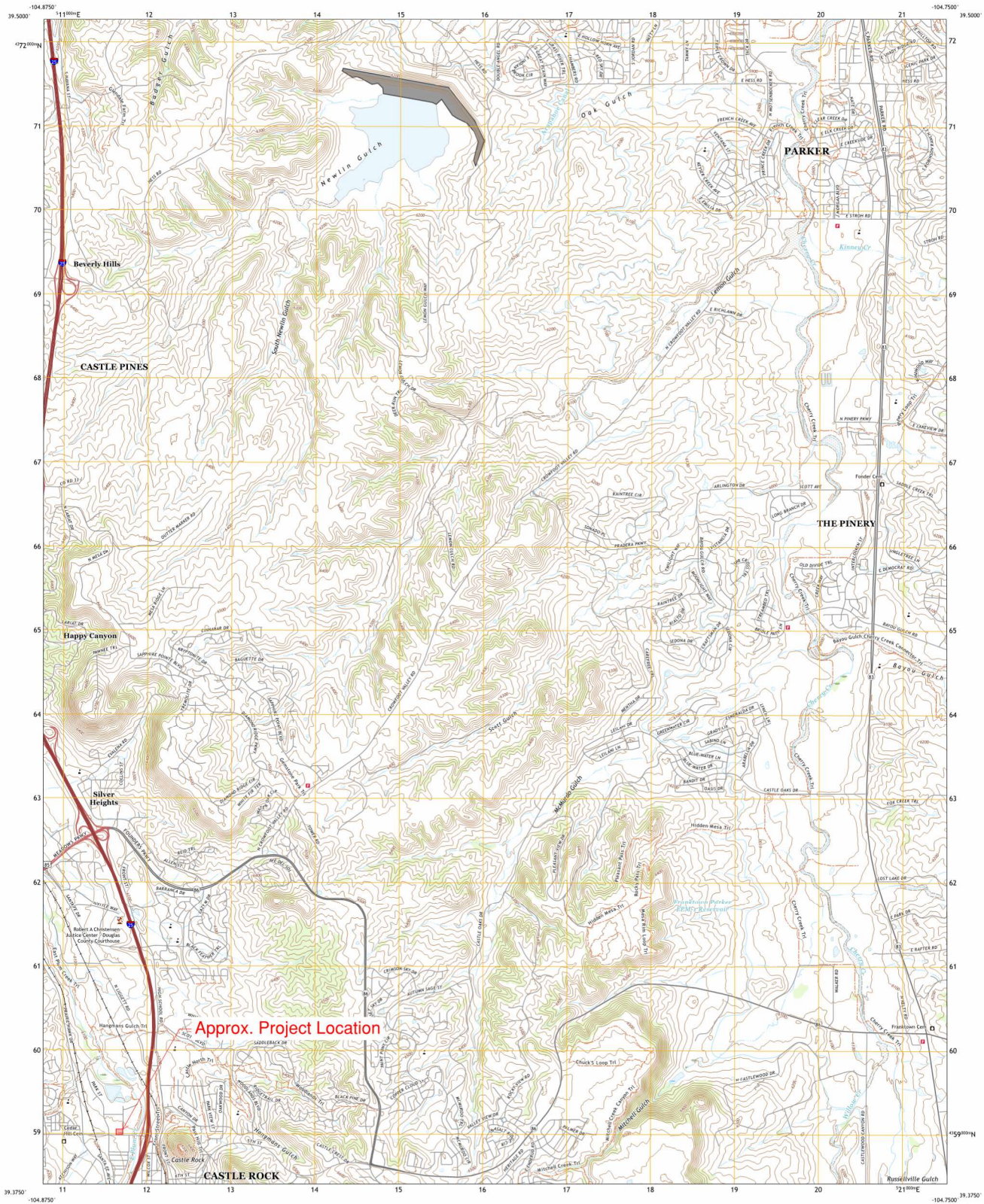
Percent removal of PAHs:



Conclusions: The PAH removal efficiency of Bio-Skirt media is in excess of 97%. While this data should not be construed to predict performance in the field for any given SNOUT + Bio-Skirt application, it does give an accurate indication of the potential for oil removals of the Bio-Skirt media in a filtration application.

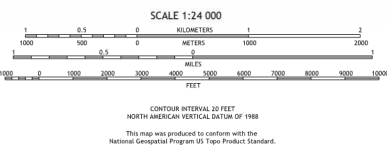
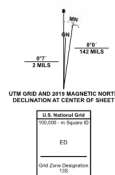
QuikTrip No. 4273

USGS Map
FEMA Map
NRCS Soils Map
NWI Wetland Map



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 13S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Source	Product	Date
Imagery	NAP	August 2017 - January 2018
Roads	U.S. Census	Bureau 2016
Names	U.S. Census	GNIS 1979 - 2021
Hydrography	National Hydrography Dataset	2003 - 2019
Contours	National Elevation Dataset	2002
Boundaries	Multiple sources; see metadata file	2019 - 2021
Public Land Survey System	Bureau of Land Management	2021
Wetlands	FWS National Wetlands Inventory	1984



1	2	3
4	5	6
7	8	9

Adjacent Quadrangles



CASTLE ROCK NORTH, CO
2022

NCA REF NO. J. 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **footprints** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables shown on this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the floodway data table shown on this FIRM.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.
Base map information shown on this FIRM was provided by the Douglas County GIS Department and the Town of Castle Rock GIS Department. Additional data was provided by the City of Lone Tree and Town of Parker. These data are current as of 2010.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

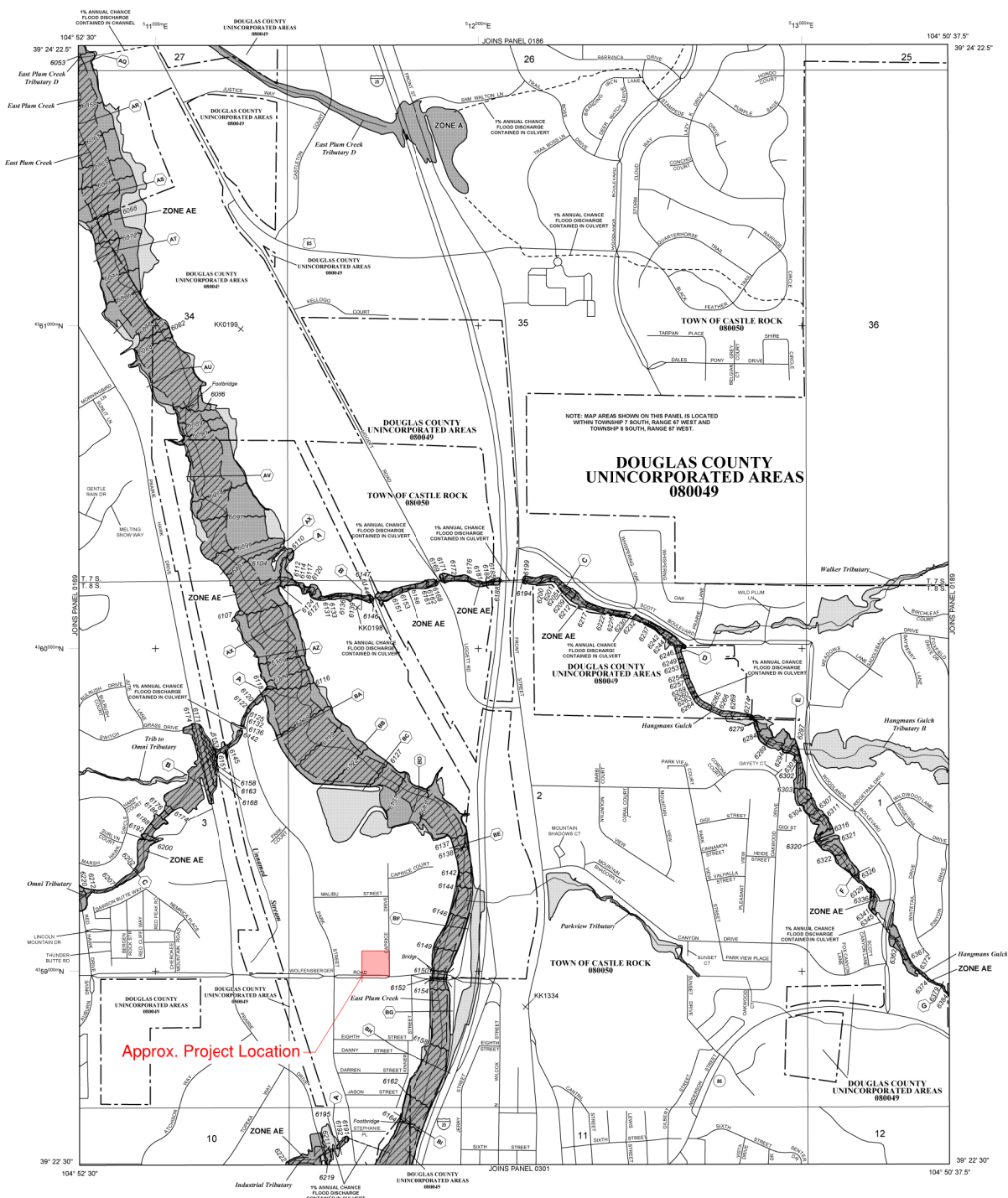
Based on updated topographic information this map reflects more detailed and up-to-date stream channel configurations and floodplain delineations than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unreviewed streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://map.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have questions about this map, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/fip>.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD.
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The base flood is the flood that is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AO, AR, AV, D, X, and V. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually shear flow on sloping terrain); average depths determined; for areas of shallow ponding, depths also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently deteriorated. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance or greater flood.
- ZONE ARV** Areas in the present of the 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

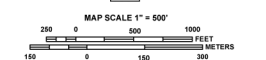
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1% annual chance flood.
- OTHER AREAS** Areas determined to be outside the 0.2% annual chance floodplain. Areas in which flood hazards are undetermined, but possible.
- ZONE D** Coastal Barrier Resources System (CBRS) Areas.
- OTHERWISE PROTECTED AREAS (OPAs)** CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 0.2% Annual Chance Floodplain Boundary**
- Floodway boundary**
- Zone D boundary**
- CBRS and OPA boundary**
- Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.**
- Base Flood Elevation line and value: elevation in feet**
- Base Flood Elevation value where uniform within zone; elevation in feet**

- *Referenced to the North American Vertical Datum of 1988**
- A** Cross section line
- B** Transient line
- 45° 02' 00", 50° 02' 12"** Geographic coordinates referenced to the North American Datum of 1988 (NAD 83) Western Hemisphere.
- 1983-1984** 1983-1984 Universal Transverse Mercator grid values, zone 13
- DA5110 X** Bench mark (see explanation in Notes to Users section of this FIRM)
- M1.5** River Mile
- MAP REPOSITORIES** Refers to Map Repositories list on Map Index.
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP** SEPTEMBER 30, 2005
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL**
- MARCH 16, 2016** to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision.
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.**
- To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-435-6620.**



NFIP

PANEL 188G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO, AND INCORPORATED AREAS

PANEL 188 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	D188	G
DOUGLAS COUNTY	080049	D188	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

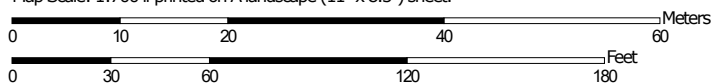
MAP NUMBER
08035C0188G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency

Hydrologic Soil Group—Castle Rock Area, Colorado (QT4273 Castle Rock)



Map Scale: 1:700 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

2/12/2025
Page 1 of 4

Hydrologic Soil Group—Castle Rock Area, Colorado
(QT4273 Castle Rock)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 17, Aug 29, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BrB	Bresser sandy loam, cool, 1 to 3 percent slopes	B	1.3	72.4%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	B	0.5	27.6%
Totals for Area of Interest			1.9	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



U.S. Fish and Wildlife Service

National Wetlands Inventory

QT4273 Castle Rock



April 10, 2025

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

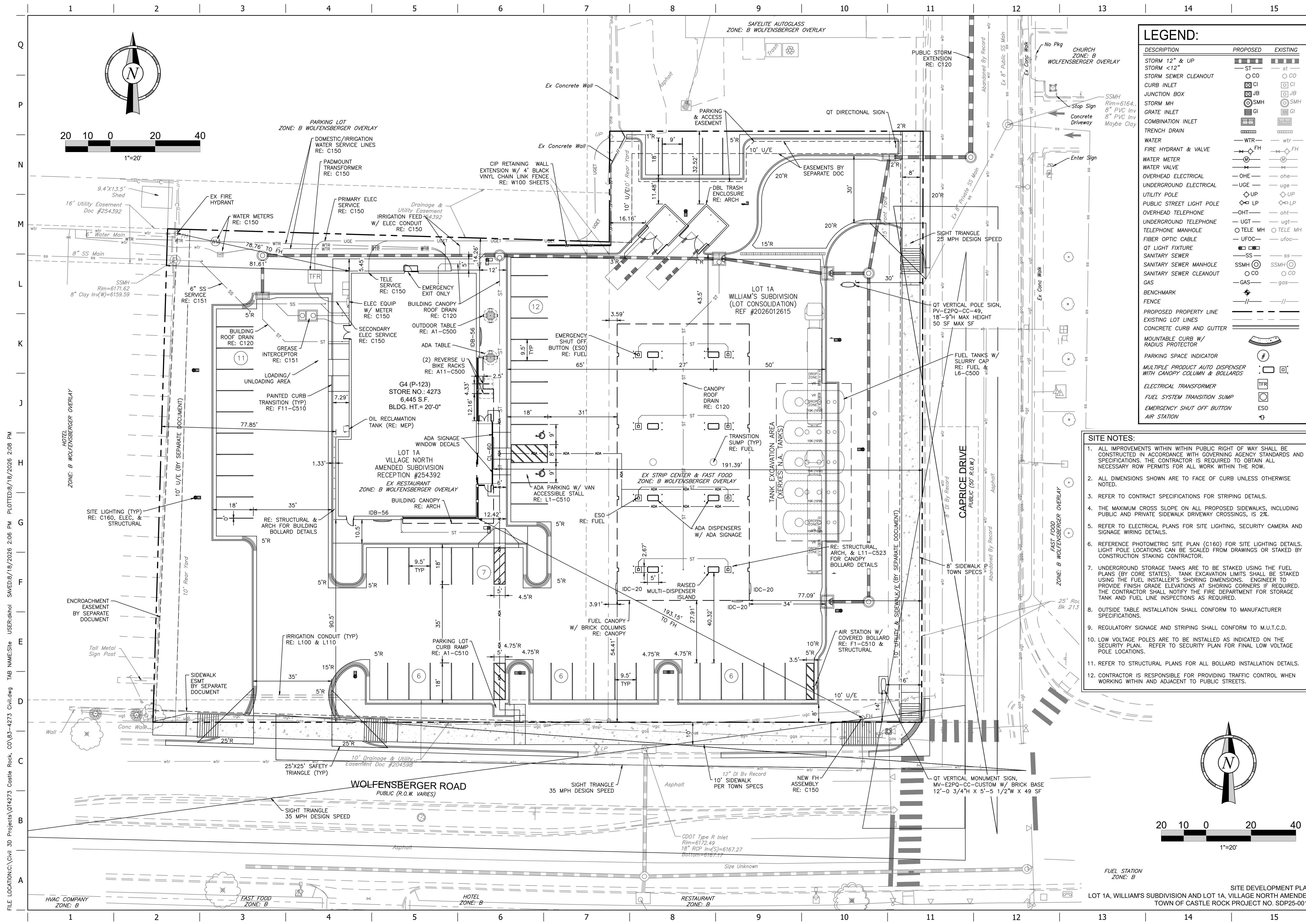
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

QuikTrip No. 4273

Plan Sheets



LEGEND:		
DESCRIPTION	PROPOSED	EXISTING
STORM 12" & UP	ST	st
STORM <12"	CO	co
STORM SEWER CLEANOUT	CO	co
CURB INLET	CI	ci
JUNCTION BOX	JB	jb
STORM MH	SMH	smh
GRATE INLET	GI	gi
COMBINATION INLET		
TRENCH DRAIN	WTR	wtr
WATER	WTR	wtr
FIRE HYDRANT & VALVE	FH	fh
WATER METER		
WATER VALVE		
OVERHEAD ELECTRICAL	OHE	ohe
UNDERGROUND ELECTRICAL	UGE	uge
UTILITY POLE	UP	up
PUBLIC STREET LIGHT POLE	LP	lp
OVERHEAD TELEPHONE	OHT	oht
UNDERGROUND TELEPHONE	UGT	ugt
TELEPHONE MANHOLE	TELE MH	tele mh
FIBER OPTIC CABLE	UFOC	ufoc
QT LIGHT FIXTURE		
SANITARY SEWER	SS	ss
SANITARY SEWER MANHOLE	SSMH	ssmh
SANITARY SEWER CLEANOUT	CO	co
GAS	GAS	gas
BENCHMARK		
FENCE		
PROPOSED PROPERTY LINE		
EXISTING LOT LINES		
CONCRETE CURB AND GUTTER		
MOUNTABLE CURB W/ RADIUS PROTECTOR		
PARKING SPACE INDICATOR		
MULTIPLE PRODUCT AUTO DISPENSER WITH CANOPY COLUMN & BOLLARDS		
ELECTRICAL TRANSFORMER	TFR	tfr
FUEL SYSTEM TRANSITION SUMP	ESO	eso
EMERGENCY SHUT OFF BUTTON		
AIR STATION		

- SITE NOTES:**
- ALL IMPROVEMENTS WITHIN PUBLIC RIGHT OF WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH GOVERNING AGENCY STANDARDS AND SPECIFICATIONS. THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY ROW PERMITS FOR ALL WORK WITHIN THE ROW.
 - ALL DIMENSIONS SHOWN ARE TO FACE OF CURB UNLESS OTHERWISE NOTED.
 - REFER TO CONTRACT SPECIFICATIONS FOR STRIPING DETAILS.
 - THE MAXIMUM CROSS SLOPE ON ALL PROPOSED SIDEWALKS, INCLUDING PUBLIC AND PRIVATE SIDEWALK DRIVEWAY CROSSINGS, IS 2%.
 - REFER TO ELECTRICAL PLANS FOR SITE LIGHTING, SECURITY CAMERA AND SIGNAGE WIRING DETAILS.
 - REFERENCE PHOTOMETRIC SITE PLAN (C160) FOR SITE LIGHTING DETAILS. LIGHT POLE LOCATIONS CAN BE SCALED FROM DRAWINGS OR STAKED BY CONSTRUCTION STAKING CONTRACTOR.
 - UNDERGROUND STORAGE TANKS ARE TO BE STAKED USING THE FUEL PLANS (BY CORE STATES). TANK EXCAVATION LIMITS SHALL BE STAKED USING THE FUEL INSTALLER'S SHORING DIMENSIONS. ENGINEER TO PROVIDE FINISH GRADE ELEVATIONS AT SHORING CORNERS IF REQUIRED. THE CONTRACTOR SHALL NOTIFY THE FIRE DEPARTMENT FOR STORAGE TANK AND FUEL LINE INSPECTIONS AS REQUIRED.
 - OUTSIDE TABLE INSTALLATION SHALL CONFORM TO MANUFACTURER SPECIFICATIONS.
 - REGULATORY SIGNAGE AND STRIPING SHALL CONFORM TO M.U.T.C.D.
 - LOW VOLTAGE POLES ARE TO BE INSTALLED AS INDICATED ON THE SECURITY PLAN. REFER TO SECURITY PLAN FOR FINAL LOW VOLTAGE POLE LOCATIONS.
 - REFER TO STRUCTURAL PLANS FOR ALL BOLLARD INSTALLATION DETAILS.
 - CONTRACTOR IS RESPONSIBLE FOR PROVIDING TRAFFIC CONTROL WHEN WORKING WITHIN AND ADJACENT TO PUBLIC STREETS.



PROJECT NO.: 83-4273

MG

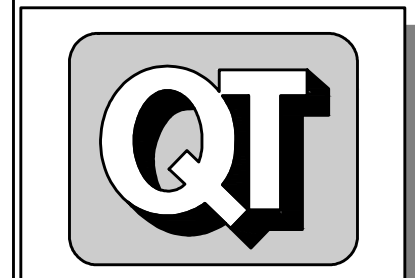
Midwest Design Group
Kansas City

PO Box 860015
Shawnee, KS 66286-0015
P 913.248.9385

SITE DEVELOPMENT PLAN

QuikTrip No. 4273

WOLFENBERGER ROAD & CAPRICE DRIVE
CASTLE ROCK, DOUGLAS COUNTY, COLORADO 80109



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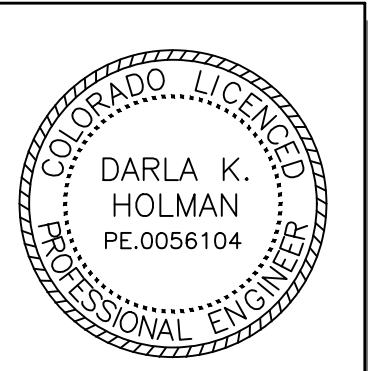
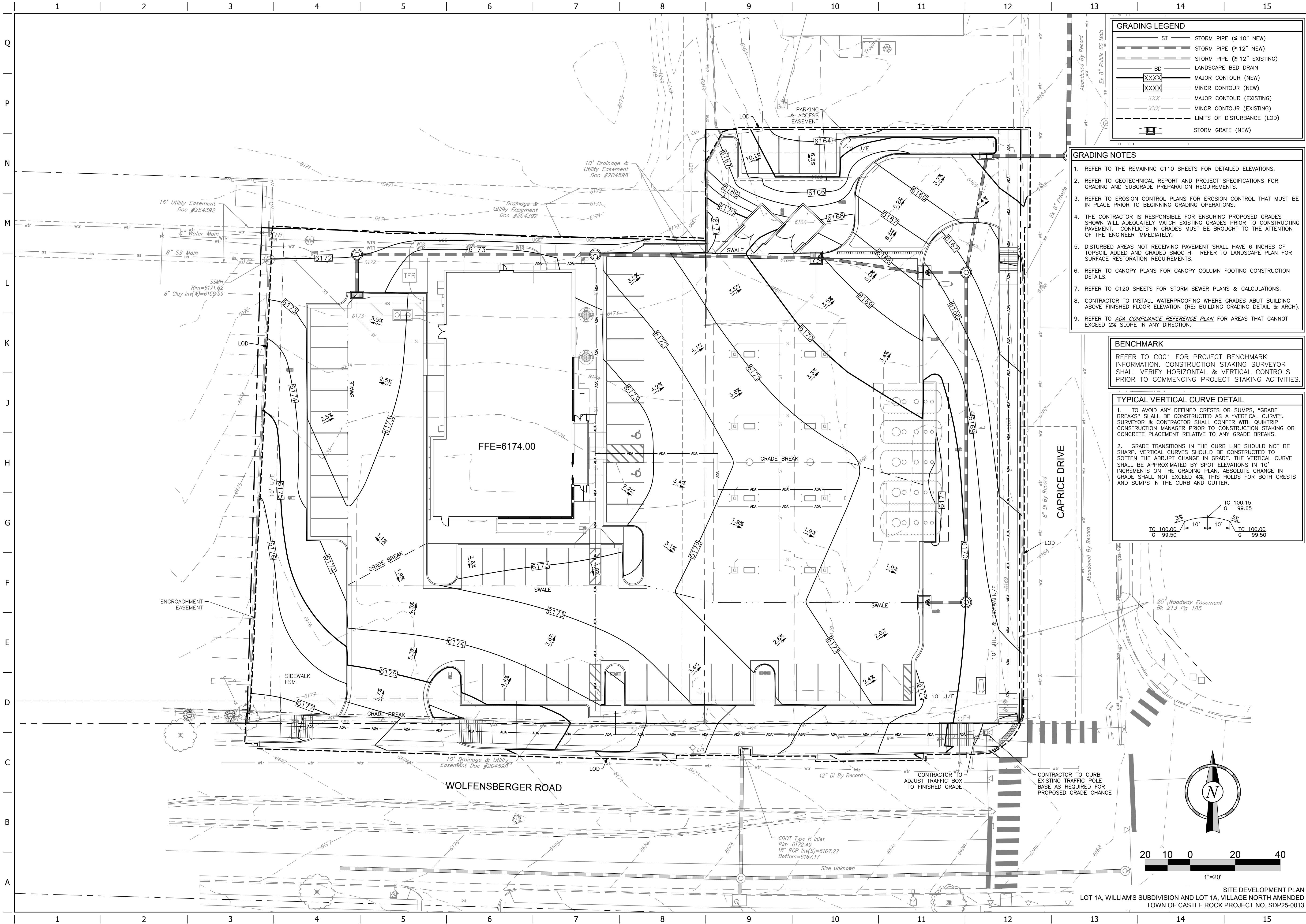
SITE DEVELOPMENT PLAN
SITE PLAN

SHEET NUMBER:

2 OF 18

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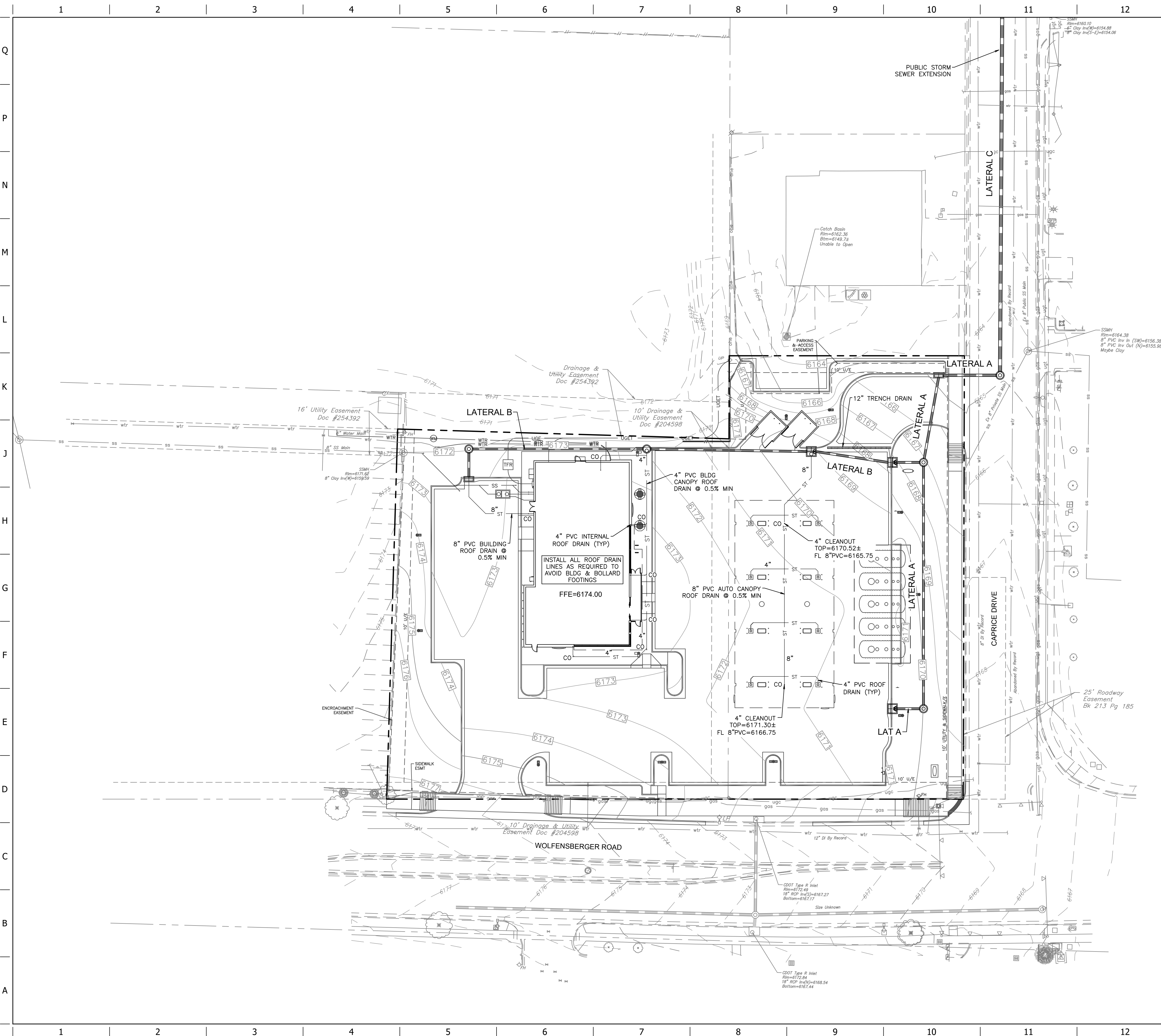
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SITE DEVELOPMENT PLAN
OVERALL GRADING PLAN

SHEET NUMBER:

3 OF 18

ORIGINAL ISSUE DATE: 08/17/2026

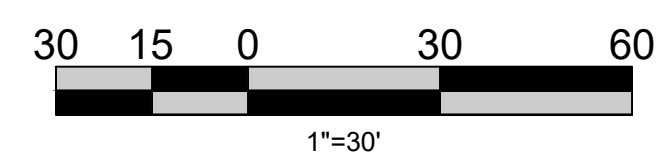
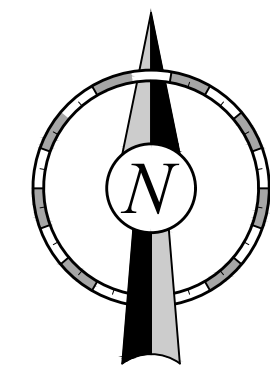
SITE DEVELOPMENT PLAN
LOT 1A, WILLIAM'S SUBDIVISION AND LOT 1A, VILLAGE NORTH AMENDED
TOWN OF CASTLE ROCK PROJECT NO. SDP25-0013



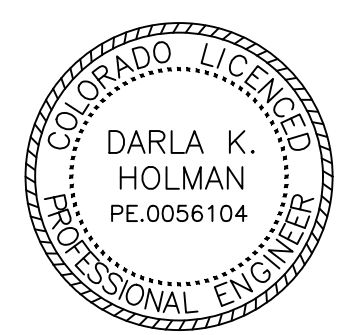
STORM SEWER LEGEND

	ST	STORM PIPE (< 10" NEW)
	BD	LANDSCAPE BED DRAIN
		STORM PIPE (> 12" NEW)
		STORM PIPE (> 12" EXISTING)
		MAJOR CONTOUR (NEW)
		MINOR CONTOUR (NEW)
		MAJOR CONTOUR (EXISTING)
		MINOR CONTOUR (EXISTING)
		STORM GRATE (NEW)
		STORM SEWER JUNCTION BOX/MH

- STORM SEWER NOTES:**
1. GAS CANOPY INSTALLER SHALL INSTALL THE CANOPY COLUMN DRAIN PIPE AND OVERFLOW FITTING. THE STORM WATER INSTALLER SHALL CONNECT THEIR PIPING TO THE GAS INSTALLER'S OVERFLOW FITTING.
 2. PRIVATE STORM SEWER PIPE AND TRENCHING SHALL CONFORM TO CONTRACT SPECIFICATIONS.
 3. PRIOR TO THE CONSTRUCTION OF, OR CONNECTION TO ANY STORM DRAIN, SANITARY SEWER, OR ANY OTHER ELEVATION SENSITIVE UTILITY, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTIONS AND ALL UTILITY CHANGES. THE CONTRACTOR SHALL INFORM THE ENGINEER AND THE OWNER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLAN. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER IS NOT NOTIFIED OF A DESIGN CONFLICT.
 4. CARE MUST BE TAKEN WHEN INSTALLING THE BUILDING ROOF DRAINAGE SYSTEMS TO AVOID UTILITY/FUEL CROSSING CONFLICTS, BUILDING FOOTINGS, AND BOLLARDS. UTILITY CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING ALL FITTINGS REQUIRED FOR INSTALLATION. ROOF DRAINAGE LAYOUT OR OTHER SCHEMATIC DOES NOT REPRESENT ALL FITTINGS REQUIRED FOR CONSTRUCTION.
 5. STORM SEWER STRUCTURES ON-GRADE ARE TO MATCH GRADE. ELEVATION CALLOUTS ARE TO CENTER OF STRUCTURE. STRUCTURES ON GRADE ARE TO BE CAST IN PLACE AS NECESSARY.
 6. ALL STORM SEWER CLEANOUTS ARE TO BE 4" DIAMETER UNLESS OTHERWISE NOTED. REFER TO C500 & PROJECT SPECIFICATIONS FOR DETAILS.
 7. ALL EXTERIOR PVC STORM PIPE SHALL BE SDR35 WITH WATERTIGHT FITTINGS.
 8. REFER TO REMAINING C120 SHEETS FOR STORM SEWER PROFILES AND DETENTION DETAILS.
 9. REFER TO C540 SHEETS FOR STORM SEWER CONSTRUCTION DETAILS.
 10. RCP STORM SEWER PIPE SHALL BE CLASS III (WALL B).
 11. SNOUT WATER QUALITY UNITS ARE TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS. WQY UNITS ARE TO BE INSTALLED WITH BIO-SKIRTS PER MANUFACTURER SPECIFICATIONS. REFER TO C540 SHEETS FOR DETAILS. STORM PIPE AT SNOUT LOCATIONS SHALL BE INSTALLED FLAT WITH STRUCTURE WALL SO AS NOT TO IMPED THE SNOUT INSTALLATION PER MANUFACTURER SPECIFICATIONS.
 12. STORM SEWER MANHOLES & JUNCTION BOXES SHALL CONFORM TO TOWN SPECIFICATIONS.
 13. TRENCH DRAINS SHALL BE HYDROBLOCK TRENCH DRAINS PER PLAN. NO SUBSTITUTIONS ARE ALLOWED. REFER TO C540 SHEETS FOR DETAILS.
 14. ALL TRENCH DRAIN LENGTHS ARE SCHEMATIC AND ARE SUBJECT TO CHANGE PER MANUFACTURER. MANUFACTURER TO MINIMIZE TRENCH DRAIN LENGTH ADJUSTMENTS TO AVOID PLAN CONFLICTS.
 15. ALL HYDROBLOCK TRENCH DRAIN RUNS SHALL RECEIVE MAINTENANCE SECTIONS AT 50' MAXIMUM INTERVALS AND/OR PER MANUFACTURER RECOMMENDATIONS.
 16. REFER TO CANOPY PLANS FOR TRUCK CANOPY ROOF DRAIN LOCATIONS. CANOPY PLANS SHALL GOVERN.



SITE DEVELOPMENT PLAN
LOT 1A, WILLIAM'S SUBDIVISION AND LOT 1A, VILLAGE NORTH AMENDED
TOWN OF CASTLE ROCK PROJECT NO. SDP25-0013



PROJECT NO.:83-4273



PO Box 860015
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SITE DEVELOPMENT PLAN

QuikTrip No. 4273

WOLFENBERGER ROAD & CAPRICE DRIVE
CASTLE ROCK, DOUGLAS COUNTY, COLORADO 80109



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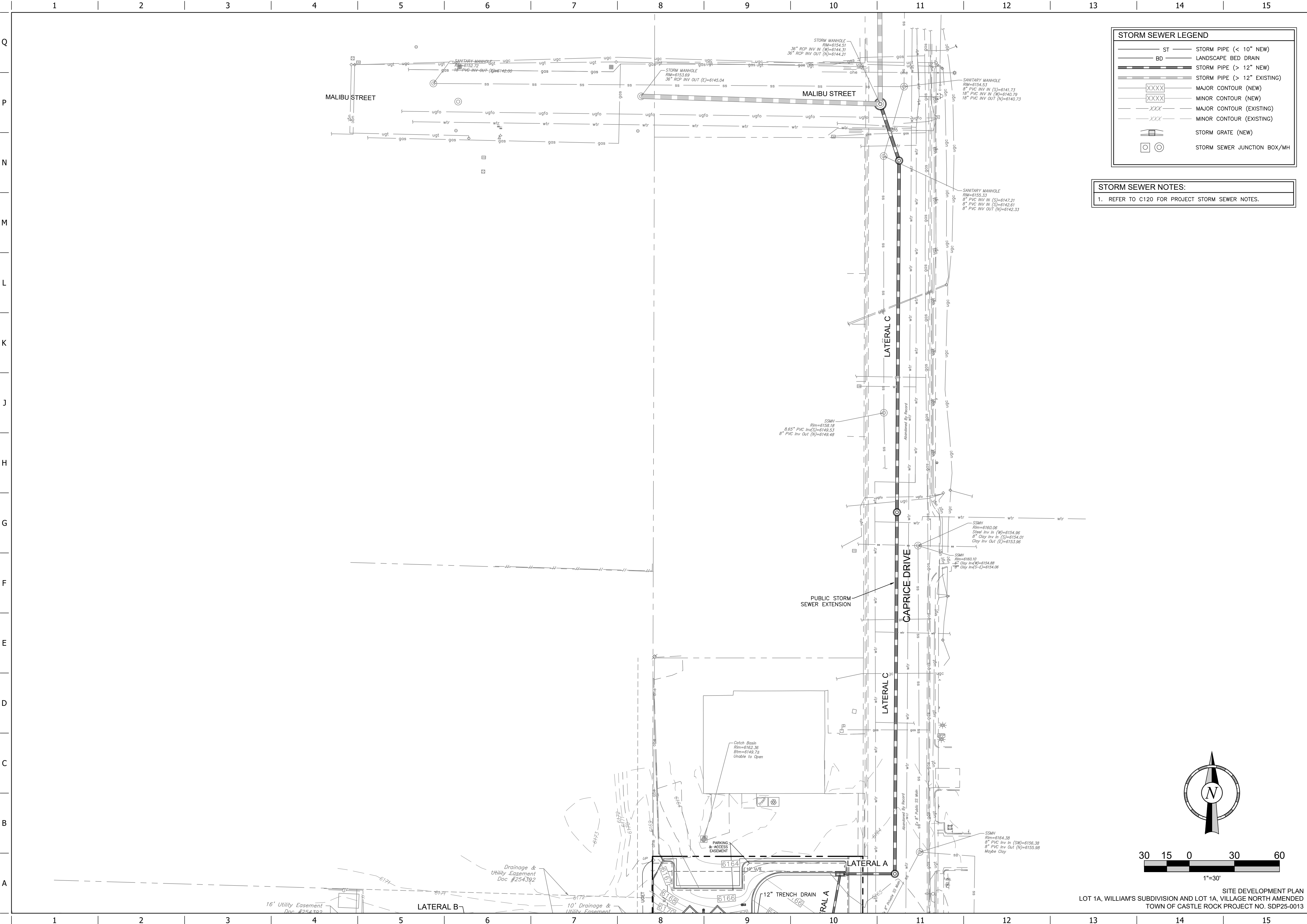
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SHEET TITLE:
SITE DEVELOPMENT PLAN OVERALL STORM PLAN (SOUTH)

SHEET NUMBER:

4 OF 18

FILE LOCATION: \\DESKTOP-HMC68B\Civil 3D Projects\QT4273 Castle Rock, CO\83-4273 Civil.dwg TAB NAME: Storm (2) USER: jonathon.smith SAVED: 8/26/2026 5:34 PM PLOTTED: 8/27/2026 8:52 AM



STORM SEWER LEGEND

ST	STORM PIPE (< 10" NEW)
BD	LANDSCAPE BED DRAIN
	STORM PIPE (> 12" NEW)
	STORM PIPE (> 12" EXISTING)
XXXX	MAJOR CONTOUR (NEW)
XXXX	MINOR CONTOUR (NEW)
XXX	MAJOR CONTOUR (EXISTING)
XXX	MINOR CONTOUR (EXISTING)
	STORM GRATE (NEW)
	STORM SEWER JUNCTION BOX/MH

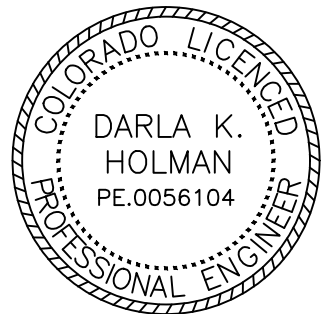
STORM SEWER NOTES:

1. REFER TO C120 FOR PROJECT STORM SEWER NOTES.

30 15 0 30 60

1"=30'

SITE DEVELOPMENT PLAN
LOT 1A, WILLIAM'S SUBDIVISION AND LOT 1A, VILLAGE NORTH AMENDED
TOWN OF CASTLE ROCK PROJECT NO. SDP25-0013



PROJECT NO.: 83-4273

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SITE DEVELOPMENT PLAN
QuikTrip No. 4273

WOLFENBERGER ROAD & CAPRICE DRIVE
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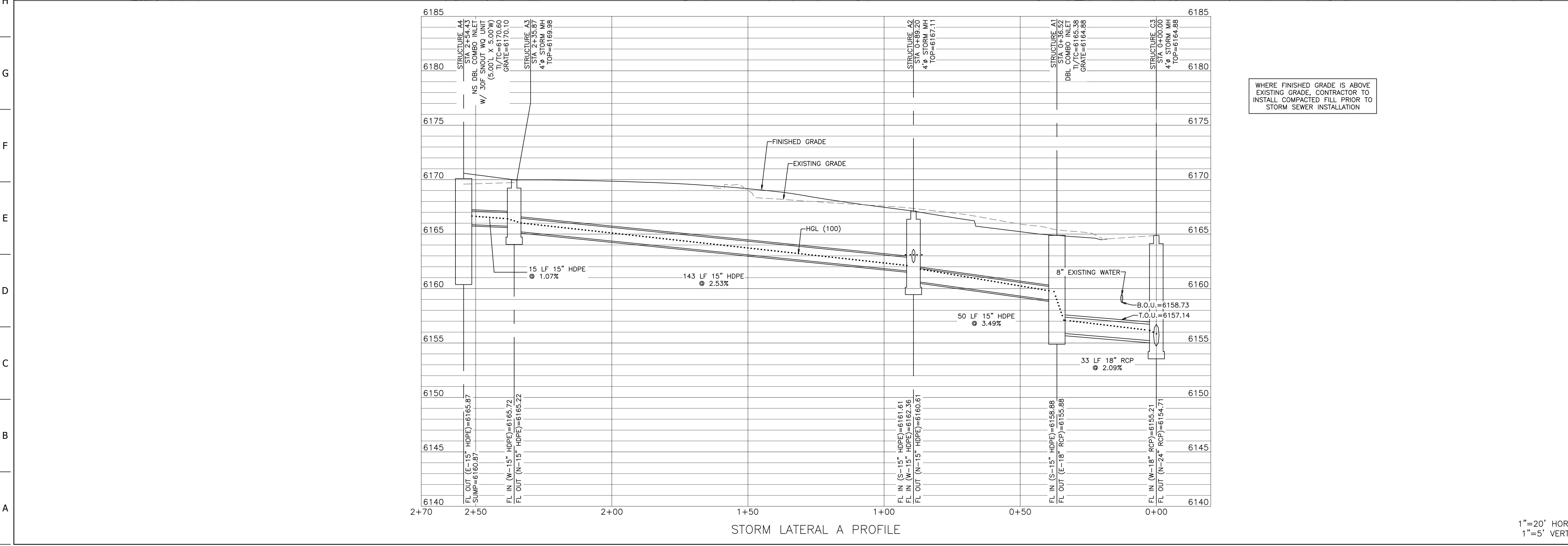
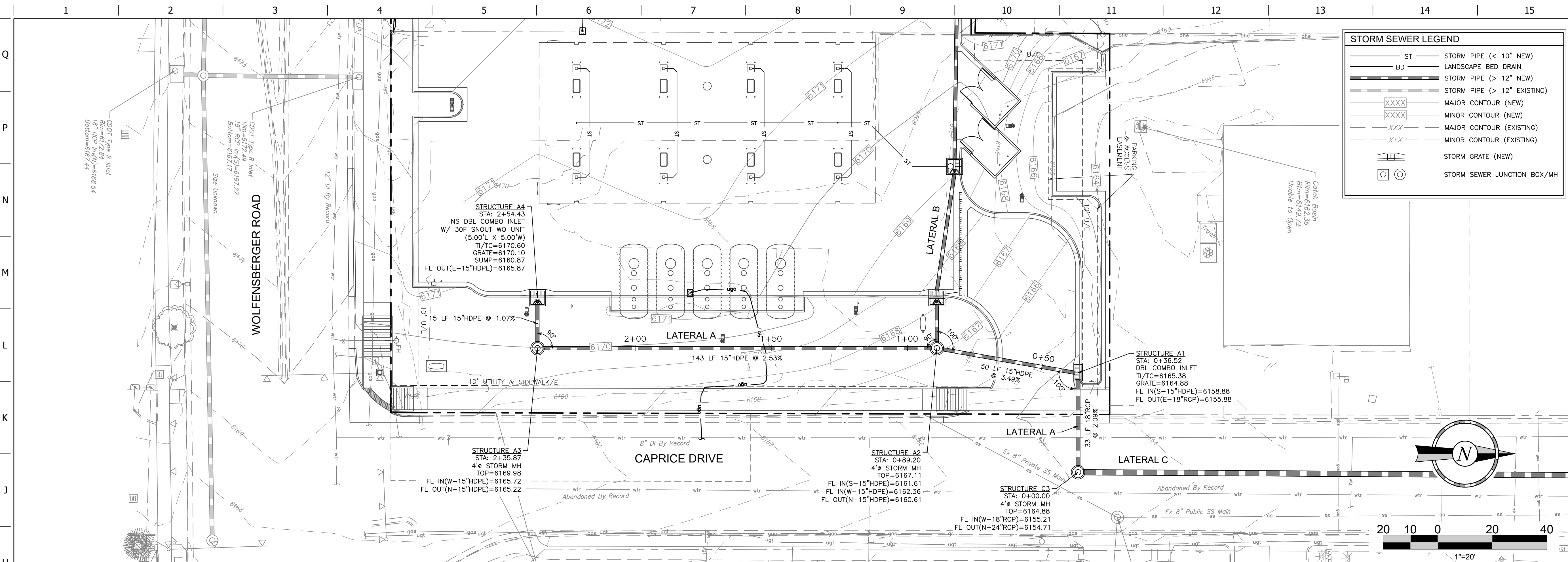
REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 08/17/2026

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SITE DEVELOPMENT PLAN
OVERALL STORM PLAN
(NORTH)

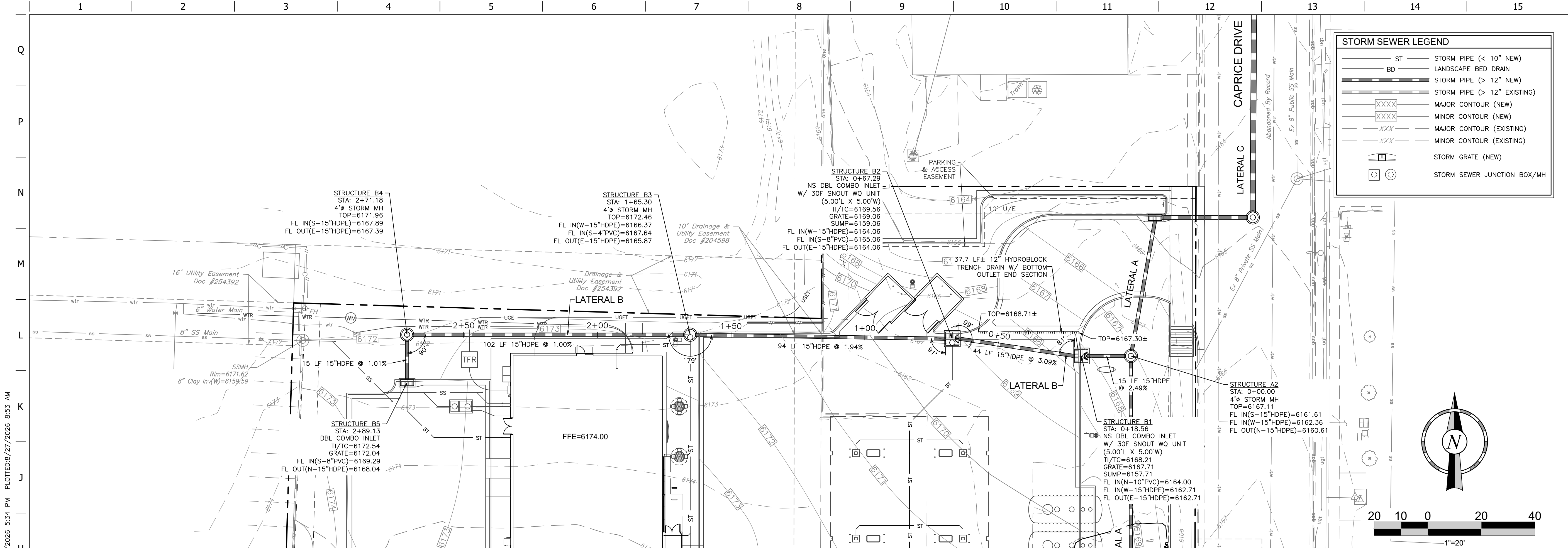
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5 OF 18

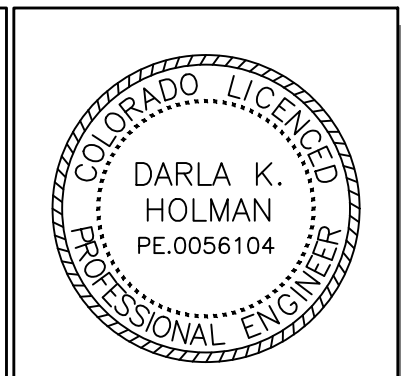
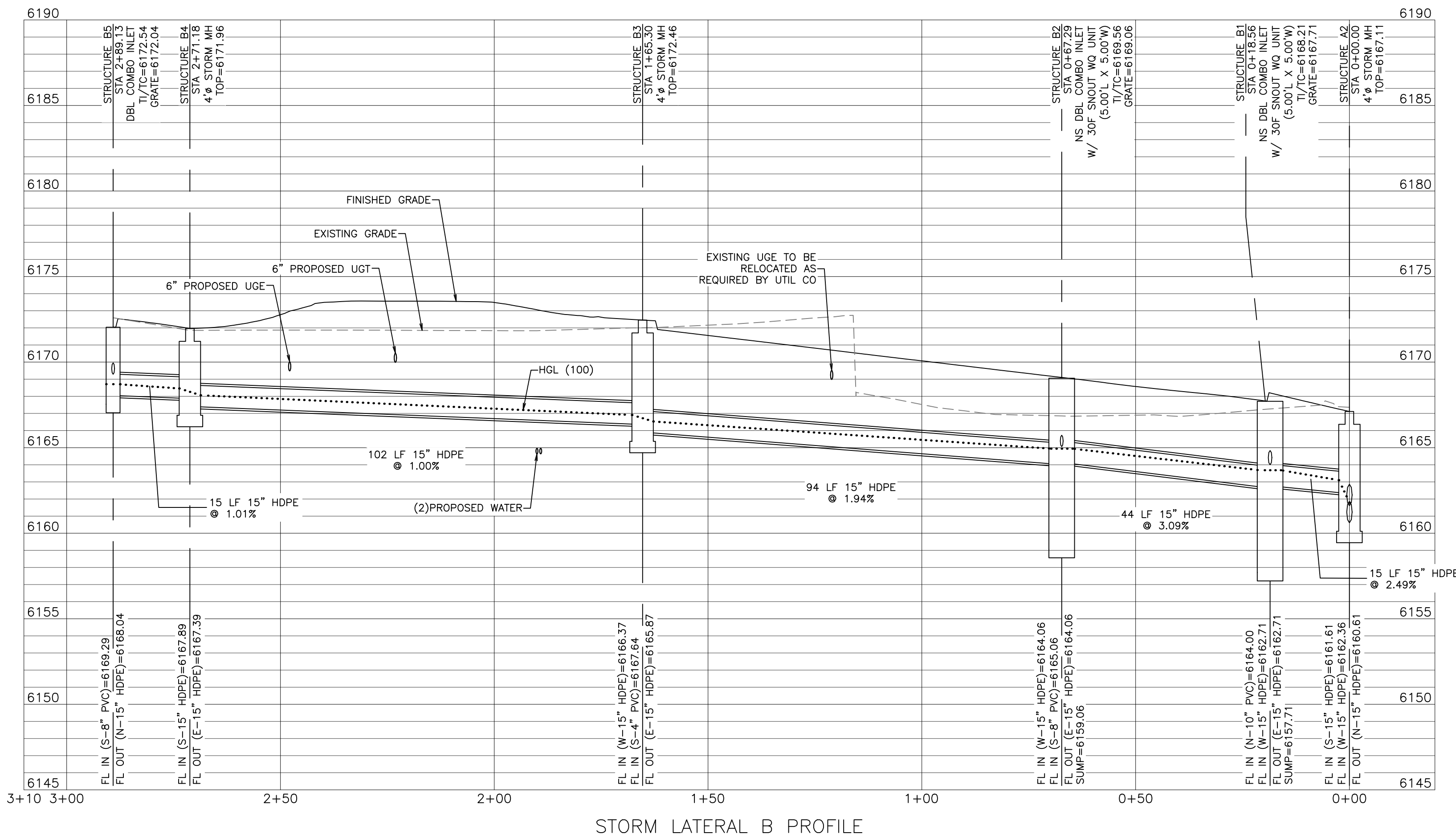


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MDG Midwest Design Group Kansas City PO Box 850015 Shawnee, KS 66266-0015 P 913.248.9385	
SITE DEVELOPMENT PLAN QuikTrip No. 4273 WOLFENBERGER ROAD & CAPRICE DRIVE CASTLE ROCK, DOUGLAS COUNTY, COLORADO 80109	

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QuikTrip No. 4273
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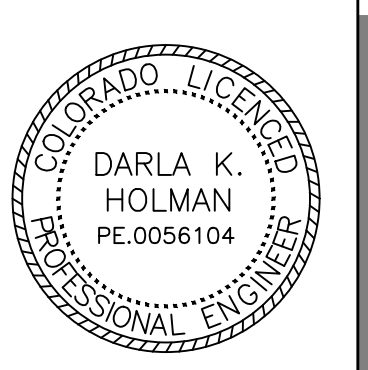
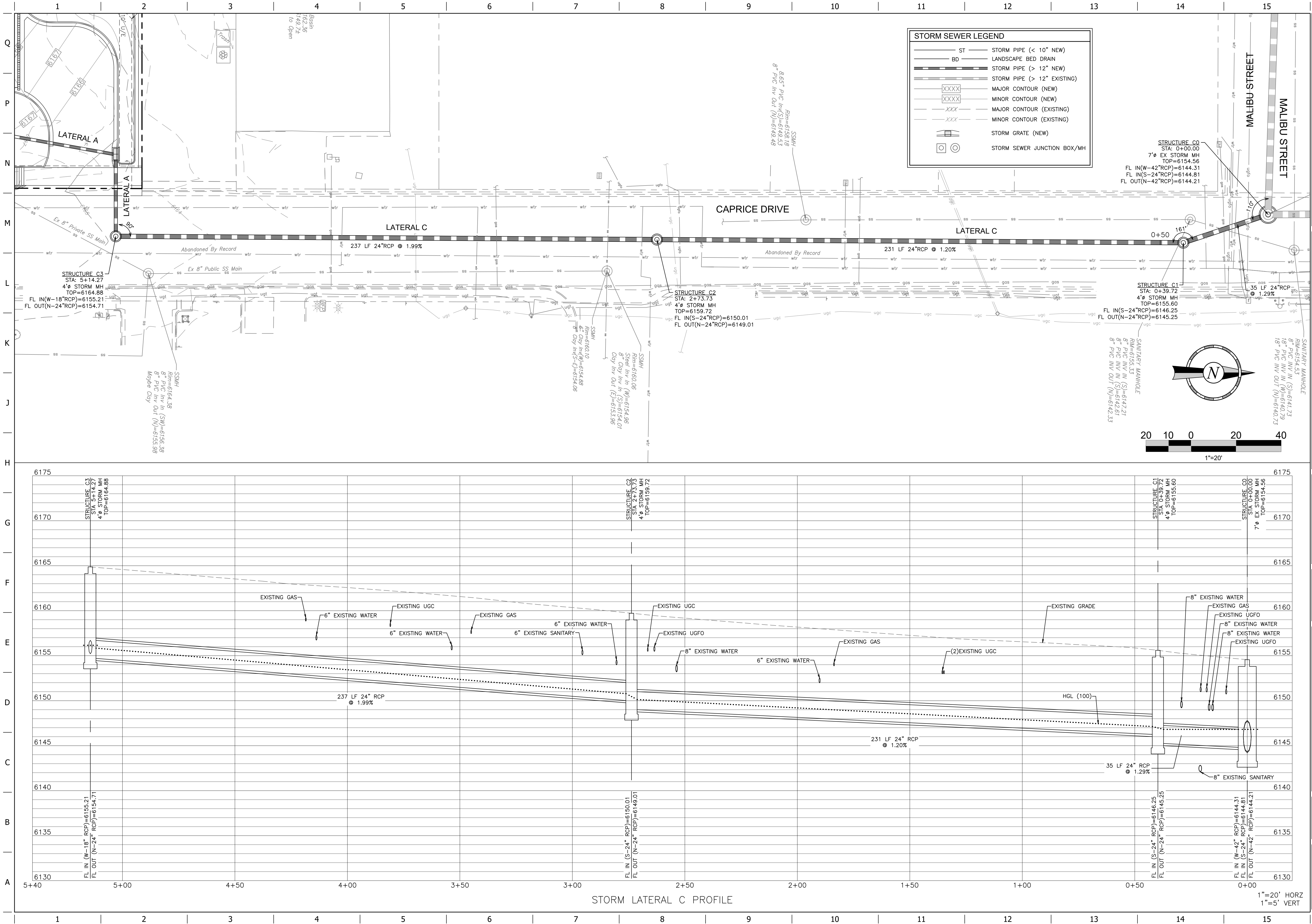
ORIGINAL ISSUE DATE: 08/17/2026

SHEET TITLE:
STORM LATERALS B & C
PLAN & PROFILE

SHEET NUMBER:

C123

FILE LOCATION: \\DESKTOP-HMC68B\Civil 3D Projects\QT4273 Castle Rock, CO\83-4273 Civi.dwg TAB NAME: Storm (S) USER: jonathon.smithn SAVED: 8/26/2026 5:34 PM PLOTTED: 8/27/2026 6:53 AM



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SITE DEVELOPMENT PLAN

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SHEET TITLE:
STORM LATERAL D PLAN & PROFILE

SHEET NUMBER:
C124

ORIGINAL ISSUE DATE: 08/17/2026

STORM SEWER PIPE CALCULATIONS - 100-YEAR STORM (Tc = 5 MIN)																							
Line	Size	Type of Pipe	Q	Upstream								Len	Downstream								Line Slope	Pipe Capacity (Full)	Headloss
				Invert Elev (ft)	HGL Elev (ft)	Upstream Structure Top Elev	Pipe Cover (ft)	Depth (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)		Invert Elev (ft)	HGL Elev (ft)	Downstream Structure Top Elev	Pipe Cover (ft)	Depth (ft)	Vel (ft/s)	Vel Head (ft)	EGL Elev (ft)			
	(in)		(cfs)									(ft)									(%)	(cfs)	(ft)
A1-C3	18	RCP	10.04	6155.88	6157.10	6164.80	7.42	1.22	6.52	0.66	6157.76	32.02	6155.21	6156.16	6164.59	7.88	0.95	8.55	1.14	6157.29	2.09	15.19	0.95
A2-A1	15	HDPE	9.52	6160.61	6161.78	6167.24	5.38	1.17	7.96	0.99	6167.77	49.55	6158.88	6159.72	6164.80	4.67	0.84	10.89	1.84	6161.56	3.49	13.08	2.06
A3-A2	15	HDPE	3.93	6165.22	6166.02	6169.98	3.51	0.80	4.72	0.35	6166.37	142.68	6161.61	6162.12	6167.24	4.38	0.51	8.28	1.07	6163.19	2.53	11.13	3.90
A4-A3	15	HDPE	3.94	6165.87	6166.67	6170.60	3.48	0.80	4.73	0.35	6167.02	14.06	6165.72	6166.41	6169.98	3.01	0.69	5.65	0.50	6166.91	1.07	7.23	0.26
B1-A2	15	HDPE	5.7	6162.71	6163.68	6167.71	3.75	0.97	5.60	0.49	6164.16	14.06	6162.36	6163.10	6167.24	3.63	0.74	7.57	0.89	6163.99	2.49	11.04	0.58
B2-B1	15	HDPE	4.66	6164.06	6164.94	6169.06	3.75	0.88	5.08	0.40	6165.34	43.73	6162.71	6163.68	6167.71	3.75	0.97	4.58	0.33	6164.00	3.09	12.30	1.26
B3-B2	15	HDPE	2.71	6165.87	6166.53	6172.46	3.34	0.66	4.12	0.26	6166.79	93.51	6164.01	6164.94	6169.06	3.80	0.93	2.78	0.12	6165.06	1.99	9.87	1.60
B4-B3	15	HDPE	2.75	6167.39	6168.06	6171.96	3.32	0.67	4.14	0.27	6168.32	101.88	6166.37	6166.91	6172.46	4.84	0.54	5.36	0.45	6167.36	1.01	7.00	1.14
B5-B4	15	HDPE	2.75	6168.04	6168.71	6172.04	2.75	0.67	4.14	0.27	6168.97	14.83	6167.89	6168.46	6171.96	2.82	0.57	5.10	0.40	6168.86	1.00	7.04	0.25
C1-C0	24	RCP	9.61	6145.25	6146.81	6155.74	8.49	1.56	3.67	0.21	6147.01	34.22	6144.81	6146.81	6155.20	8.39	2.00	3.06	0.15	6146.96	1.29	25.65	0.00
C2-C1	24	RCP	9.83	6149.01	6150.13	6160.17	9.16	1.12	5.42	0.46	6150.59	230.01	6146.25	6147.13	6155.74	7.49	0.88	7.43	0.86	6147.98	1.20	24.78	3.01
C3-C2	24	RCP	10.01	6154.71	6155.84	6164.59	7.88	1.13	5.46	0.46	6156.31	236.54	6150.01	6150.78	6160.17	8.16	0.77	8.98	1.25	6152.03	1.99	31.89	5.06

Notes:

1. Tailwater Conditions at Structure D0 are assumed to be at the Pipe Crown.

Storm Sewer Inlet Calculations (100-Yr Storm Event)												
Label	Inlet Drainage Area (acres)	Inlet C	Total Inlet Intensity (in/h)	Elevation (Grate) (ft)	Elevation (Invert) (ft)	Total Rational Flow to Inlet (cfs)	Capture Efficiency (Calculated) (%)	Flow (Captured) (cfs)	Flow (Total Bypassed) (cfs)	Spread / Top Width (ft)	Gutter Depth (ft)	Hydraulic Grade Line (ft) (ft)
A1	0.046	0.89	8.82	6164.80	6155.38	0.69	82	0.56	0.12	5.80	0.12	6157.10
A4	0.050	0.82	8.82	6170.60	6160.87	3.94	100	3.94	0.00	15.80	0.36	6166.67
B1	0.549	0.89	8.82	6167.71	6157.71	0.46	84	0.39	0.07	3.82	0.08	6163.68
B2	0.122	0.88	8.82	6169.06	6159.06	0.96	74	0.71	0.25	5.09	0.10	6164.94
B5	0.230	0.74	8.82	6172.04	6167.54	1.51	100	1.51	0.00	8.72	0.22	6168.71



PROJECT NO.:83-4273



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Kansas City

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SITE DEVELOPMENT PLAN

QuikTrip No. 4273

WOLFENBERGER ROAD & CAPRICE DRIVE
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DRAWN BY: GCU

REVIEWED BY: AMO

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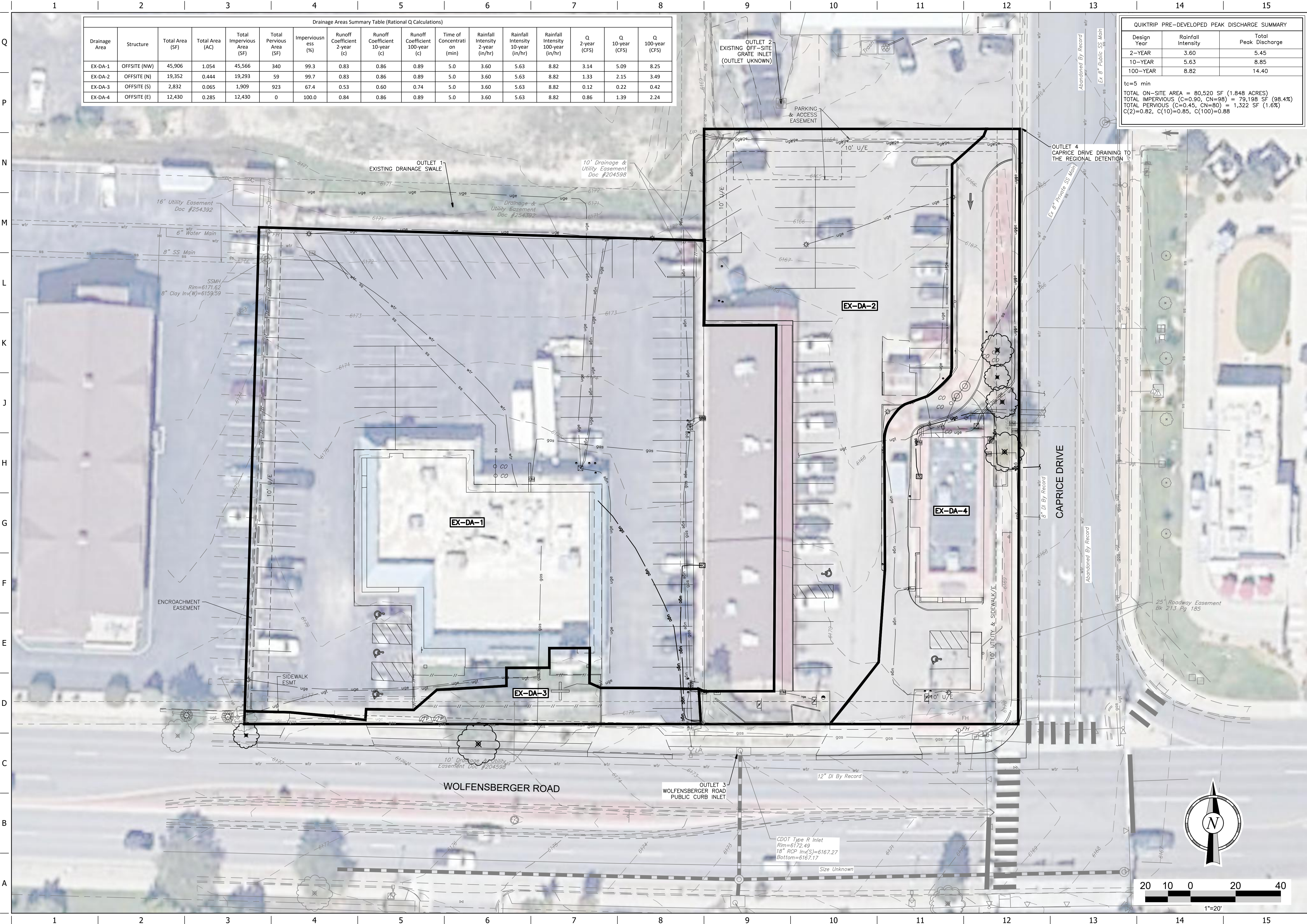
SHEET TITLE:

STORM SEWER CALCULATIONS

SHEET NUMBER:

C125

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Drainage Areas Summary Table (Rational Q Calculations)																
Drainage Area	Structure	Total Area (SF)	Total Area (AC)	Total Impervious Area (SF)	Total Pervious Area (SF)	Impervious ess (%)	Runoff Coefficient 2-year (c)	Runoff Coefficient 10-year (c)	Runoff Coefficient 100-year (c)	Time of Concentration (in min)	Rainfall Intensity 2-year (in/hr)	Rainfall Intensity 10-year (in/hr)	Rainfall Intensity 100-year (in/hr)	Q 2-year (CFS)	Q 10-year (CFS)	Q 100-year (CFS)
EX-DA-1	OFFSITE (NW)	45,906	1.054	45,566	340	99.3	0.83	0.86	0.89	5.0	3.60	5.63	8.82	3.14	5.09	8.25
EX-DA-2	OFFSITE (N)	19,352	0.444	19,293	59	99.7	0.83	0.86	0.89	5.0	3.60	5.63	8.82	1.33	2.15	3.49
EX-DA-3	OFFSITE (S)	2,832	0.065	1,909	923	67.4	0.53	0.60	0.74	5.0	3.60	5.63	8.82	0.12	0.22	0.42
EX-DA-4	OFFSITE (E)	12,430	0.285	12,430	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.86	1.39	2.24

QUIKTRIP PRE-DEVELOPED PEAK DISCHARGE SUMMARY		
Design Year	Rainfall Intensity	Total Peak Discharge
2-YEAR	3.60	5.45
10-YEAR	5.63	8.85
100-YEAR	8.82	14.40
tc=5 min		
TOTAL ON-SITE AREA = 80,520 SF (1.848 ACRES)		
TOTAL IMPERVIOUS (C=0.90, CN=98) = 79,198 SF (98.4%)		
TOTAL PERVIOUS (C=0.45, CN=60) = 1,322 SF (1.6%)		
C(2)=0.82, C(10)=0.85, C(100)=0.88		



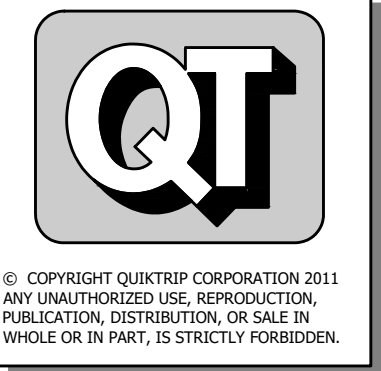
PROJECT NO.: 83-4273

MDG
Midwest Design Group
Kansas City
PO Box 860015
Shawnee, KS 66286-0015
P 913.248.9385

SITE DEVELOPMENT PLAN

QuikTrip No. 4273

WOLFENSBERGER ROAD & CAPRICE DRIVE
CASTLE ROCK, DOUGLAS COUNTY, COLORADO 80109



PROTOTYPE: P-123
DIVISION: 83
VERSION: 001
DESIGNED BY: DKH
DRAWN BY: CSH
REVIEWED BY: AMG

REV	DATE	DESCRIPTION

SHEET TITLE:
PRE-DEVELOPED DRAINAGE
AREA MAP

SHEET NUMBER:
C126

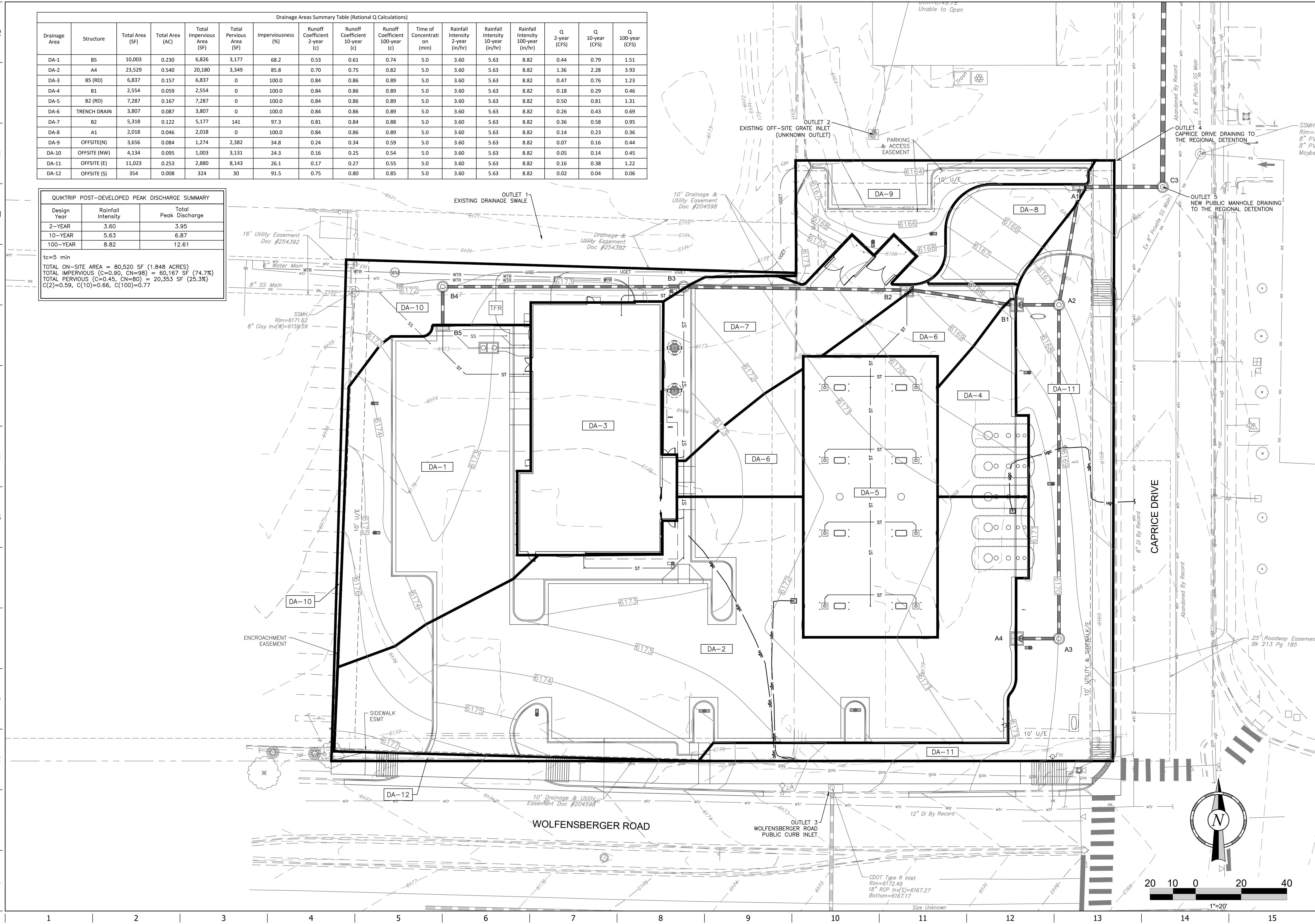
ORIGINAL ISSUE DATE: 08/17/2026

FILE LOCATION: \\DESKTOP-HM0608\Civil 3D Projects\QT4273 Castle Rock, CO\83-4273 Civil.dwg TAB NAME: Post Dev Map USER: Jonathan Smith SAVED: 8/26/2026 5:34 PM PLOTTED: 8/27/2026 8:53 AM

Drainage Areas Summary Table (Rational Q Calculations)														
Drainage Area	Structure	Total Area (SF)	Total Area (AC)	Total Impervious Area (SF)	Total Pervious Area (SF)	Imperviousness (%)	Runoff Coefficient 2-year (c)	Runoff Coefficient 10-year (c)	Runoff Coefficient 100-year (c)	Time of Concentration (min)	Rainfall Intensity 2-year (in/hr)	Rainfall Intensity 10-year (in/hr)	Rainfall Intensity 100-year (in/hr)	Q 2-year (CFS)
DA-1	B5	10,003	0.230	6,826	3,177	68.2	0.53	0.61	0.74	5.0	3.60	5.63	8.82	0.44
DA-2	A4	23,529	0.540	20,180	3,349	85.8	0.70	0.75	0.82	5.0	3.60	5.63	8.82	1.36
DA-3	B5 (RD)	6,837	0.157	6,837	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.47
DA-4	B1	2,554	0.059	2,554	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.18
DA-5	B2 (RD)	7,287	0.167	7,287	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.50
DA-6	TRENCH DRAIN	3,807	0.087	3,807	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.26
DA-7	B2	5,318	0.122	5,177	141	97.3	0.81	0.84	0.88	5.0	3.60	5.63	8.82	0.36
DA-8	A1	2,018	0.046	2,018	0	100.0	0.84	0.86	0.89	5.0	3.60	5.63	8.82	0.14
DA-9	OFFSITE(N)	3,656	0.084	1,274	2,382	34.8	0.24	0.34	0.59	5.0	3.60	5.63	8.82	0.07
DA-10	OFFSITE (NW)	4,134	0.095	1,003	3,131	24.3	0.16	0.25	0.54	5.0	3.60	5.63	8.82	0.05
DA-11	OFFSITE (E)	11,023	0.253	2,880	8,143	26.1	0.17	0.27	0.55	5.0	3.60	5.63	8.82	0.16
DA-12	OFFSITE (S)	354	0.008	324	30	91.5	0.75	0.80	0.85	5.0	3.60	5.63	8.82	0.02

QUIKTRIP POST-DEVELOPED PEAK DISCHARGE SUMMARY		
Design Year	Rainfall Intensity	Total Peak Discharge
2-YEAR	3.60	3.95
10-YEAR	5.63	6.87
100-YEAR	8.82	12.61

tc=5 min
TOTAL ON-SITE AREA = 80,520 SF (1.848 ACRES)
TOTAL IMPERVIOUS (C=0.90, CN=98) = 60,167 SF (74.7%)
TOTAL PERVIOUS (C=0.45, CN=80) = 20,353 SF (25.3%)
C(2)=0.59, C(10)=0.66, C(100)=0.77



PROJECT NO.: 83-4273

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SITE DEVELOPMENT PLAN
QuikTrip No. 4273
WOLFENSBERGER ROAD & CAPRICE DRIVE
CASTLE ROCK, DOUGLAS COUNTY, COLORADO 80109



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PROTOTYPE: P-123
DIVISION: 83
VERSION: 001
DESIGNED BY: DKH
DRAWN BY: CSH
REVIEWED BY: AMG

REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 08/17/2026

SHEET TITLE:
POST-DEVELOPED
DRAINAGE AREA MAP

SHEET NUMBER:

C127

Excerpts from
Phase III Drainage Report
for
Village North Drainage and Infrastructure
Improvements

November, 2, 2020

PHASE III DRAINAGE REPORT
VILLAGE NORTH DRAINAGE AND INFRASTRUCTURE IMPROVEMENTS
Castle Rock, Colorado

November 2, 2020

Owner/Developer:
Castle Rock Water
175 Kellogg Court
Castle Rock, Colorado 80109

Prepared by:



1120 Lincoln Street, Suite 1000
Denver, CO 80203
303-623-6300
Contact: Mark A. West, PE, CFM
HKS Project No. 180604

I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

The Village North Subdivision property is part of the west half of Section 2, Township 8 South, Range 67 West of the Sixth Principal Meridian. The location of the site is shown on the Vicinity Map (Figure 1) in Appendix A. The site is an industrial and commercial subdivision bounded by undeveloped land to the North, Castle Rock Central Service Center project to the Northeast, Caprice Drive to the East, Wolfensberger Road to the South, and an existing railway line to the West.

B. Description of Property

The project site is developed commercial and industrial facilities covered primarily with impervious surfaces. The site includes sparse landscaped and graveled areas scattered throughout. Flows are generally routed from facilities to the nearest roadway to be conveyed along curb and gutter to storm sewer inlets. The project includes storm sewer and sanitary sewer improvements. Along with these improvements roadway paving reconstruction is proposed for the areas disturbed.

A Geotechnical Report herein referred to as the “Geotechnical Report” prepared by Kumar & Associates, Inc. “Geotechnical Engineering Study Village North Drainage and Infrastructure Improvements Castle Rock, Colorado” (November 1st, 2018) presented criteria for planning, site development, and structures. In the Geotechnical Report the soils for the site were determined to consist of man-placed fill, sands, clays, and bedrock. The native clays encountered were medium stiff to stiff moist to very moist clay. This clay is considered to possess low swell potential with poor support characteristics. The native sands encountered were generally medium dense with some loose zones. These sands were found to be highly permeable with estimated Hydrologic Soil Group classification of “A” below the vegetated zone. The native claystone and sandstone bedrock varied in elevation and may be deep along historic stream channels on site. For a full report of the soils encountered within the Site, an excerpt of the Geotechnical Report is included in Appendix A.

The site borders an area located in a regulatory 100-year floodplain for East Plum Creek. Please refer to FEMA FIRM Map 08035C0188G, revised March 16, 2016. A FEMA FIRMette specific to the site is included in Appendix A.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The project site is tributary to East Plum Creek; the outfall system plan and major drainage concepts are found in the East Plum Creek Watershed Master Plan, CH2M Hill January 2009.

Basin A8 (4.72 acres) consists of roofs, roads, right of way, and landscaped areas. Flows are gathered by the roofs gutter system and then discharged to the surrounding landscaped and parking areas. Flows then gather from east to west toward the Park St. corridor. Flows follow the existing curb and gutter along Park St. flowing from northwest to southeast where they are conveyed to the existing storm sewer inlet at DP 8.

Basin A9 (0.24 acres) consists of roads and right of way. Flows gather along the Park St. corridor in to existing curb and gutter. Flows are conveyed from northwest to southeast along this curb and gutter system to where they are intercepted by the existing storm sewer inlet at DP 9.

Basin A10-A (0.73 acres) consists of roofs, roads, right of way, sidewalks, parking lots, and landscaped areas. Flows are collected by the roof gutter system and then discharged to the surrounding parking area. Flows travel across the parking area from west to east where they meet with the existing curb and gutter along Park St. Flows then travel from south to north along Park St. where they are intercepted by the proposed storm sewer inlet at DP 6.

Basin A10-B (1.21 acres) consists of roofs, roads, right of way, sidewalks, and parking lots. Flows are collected by the roof rain gutter system and then discharges to the surrounding parking areas. Flows travel along the parking areas from southwest to northeast where they meet Park St. corridor. Along Park St. corridor flows are conveyed by existing curb and gutter from south to north until they are intercepted by the existing storm sewer inlet at DP 8.

Basin A11 (1.85 acres) consists of roofs, roads, right of way, sidewalks, and parking lots. Flows are collected by the roof rain gutter system and then discharges to the surrounding parking areas. Flows travel across the parking areas from southwest to northeast where they meet the Park St. corridor. Along the Park St. corridor flows are conveyed by existing curb and gutter from southeast to northwest where it is intercepted by the proposed storm sewer inlet at DP 2.

Basin A12 (0.70 acres) consists of roofs, roads, right of way, sidewalks, parking lots, and landscaped areas. Flows collected on roofs by rain gutter systems are discharged to the surrounding parking areas. Flows travel across the parking areas from southwest to northeast toward the Park St. corridor. Along the Park St. corridor flows travel along existing curb and gutter from southeast to northwest to where it is intercepted by the proposed storm sewer inlet at DP 3.

Basin A13 (0.98 acres) consists of roofs, sidewalks, and parking lots. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking area. Flows travel across the parking area from southeast to northwest where it meets the Park St. corridor. Flows travel along the existing curb and gutter in the Park St. corridor from south to north where it is intercepted by the proposed storm sewer inlet at DP 4.

Basin B3 (3.12 acres) consists of roofs, sidewalks, parking lots, and landscaped areas. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking and landscape areas. Flows travel across the parking and landscaped areas from southwest to northeast where it is intercepted by the existing concrete channel at DP11.

Basin B4 (0.43 acres) consists of roads and right of way. Flows gather along the existing curb and gutter in the Malibu St. corridor. Flows on the eastern side of the basin travel from east to west being partially intercepted by the proposed storm sewer inlet at DP 12 and then fully intercepted by the proposed storm sewer inlet at DP 14. Flows on the western side of the basin travel from west to east where it is intercepted by the proposed storm sewer inlet at DP 14.

Basin B8 (1.25 acres) consists of roofs, sidewalks, parking lots, and landscaped areas. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking areas. Flows travel across the parking areas from southwest to northeast across the site. Flows then converge in to landscaped area traveling from southwest to northeast where they are intercepted by the existing concrete channel at DP 11.

Basin B9 (1.00 acres) consists of roofs, sidewalks, parking lots, and landscaped areas. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking area. Flows travel across the parking area from southwest to northeast where it is collected in a landscaped area. Flows travel across the landscaped area from southwest to northeast where it meets the Malibu St. corridor. Flows then travel along the existing curb and gutter corridor from west to east where it is intercepted by the proposed storm sewer inlet at DP 14.

Basin B10 (0.93 acres) consists of roofs, sidewalks, parking lots, and landscaped areas. Flows are gathered on roofs by rain and gutter systems are discharged to the surrounding parking lot areas. Flows are then conveyed across the parking lot areas from south to north where they meet the Malibu St. corridor. Once in the Malibu St. corridor flows are conveyed by existing curb and gutter from west to east where it is intercepted by the proposed storm sewer inlet at DP 14.

Basin B11 (0.68 acres) consists of sidewalks, and parking lots. Flows gather along the parking lot area from south to north where it is intercepted by an existing concrete channel and eventually discharged to the proposed type-D inlet at DP 21.

Basin B12 (0.21 acres) consists of roads and right of way. Flows gather in the existing curb and gutter of the Malibu St. corridor and are conveyed from west to east where they are intercepted by the proposed storm sewer inlet at DP 15.

Basin B13 (0.84 acres) consists of roofs, parking lots, and sidewalks. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking area. Flows

in the parking area travel from east to west to the western border of the basin where they are conveyed from south to north where they meet the Malibu St. corridor. Once in the Malibu St. corridor flows are conveyed by existing curb and gutter to the proposed storm sewer inlet at DP 12.

Basin B14 (0.13 acres) consists of roads and right of way. Flows are collected by the existing curb and gutter in the Malibu St. corridor and are conveyed from west to east where they are intercepted by the proposed storm sewer inlet at DP 13. Carryover flows that are not captured are conveyed via curb and gutter and are intercepted at DP 15.

The following basins are conveyed on-site by existing drainage features and infrastructure to Omni Tributary or East Plum Creek:

Basin A7 (1.74 acres) consists of roofs, roads, right of way, sidewalks, parking lots, and landscaped areas. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking and landscaped areas. Flows travel across the parking and landscaped areas from southwest to northeast where they are then discharged off site to the north via the existing curb and gutter of the Park St. corridor.

Basin B1 (1.01 acres) consists of roads, right of way, sidewalks, and landscaped areas. Flows are conveyed by the existing curb and gutter of the Caprice Dr. corridor from south to north where it is then discharged off site to the Castle Rock Service Center property.

Basin B2 (0.50 acres) consists of roads, right of way, and sidewalks. Flows are conveyed by the existing curb and gutter of the Caprice Dr. corridor from south to north where it is then discharged off site to the Castle Rock Service Center property.

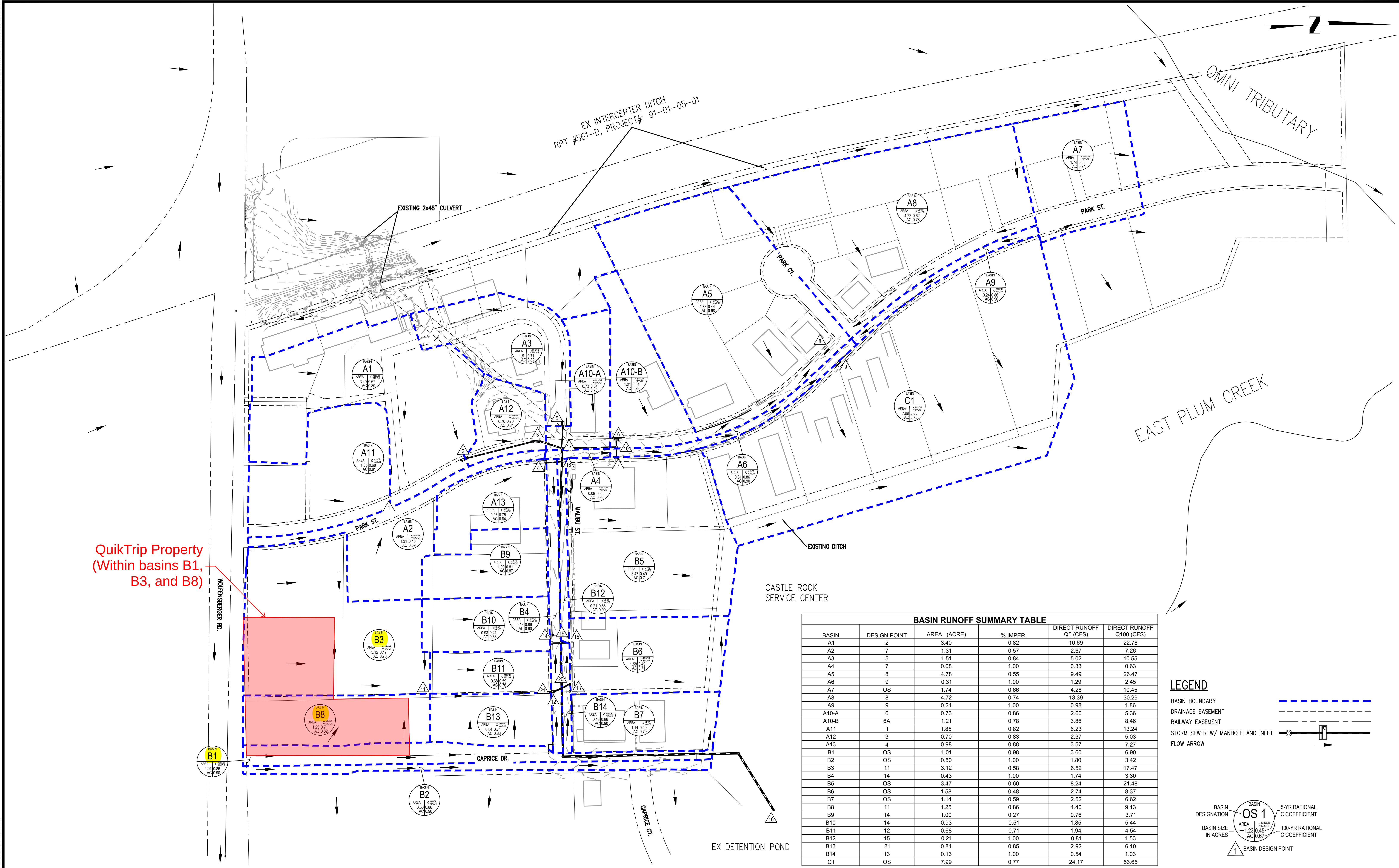
Basin B5 (3.47 acres) consists of roofs, sidewalks, and parking lots. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking areas. Flows travel along the parking areas from southwest to northeast where they are discharged to an existing drainage ditch to the northeast.

Basin B6 (1.58 acres) consists of roofs, sidewalks, and parking lots. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking area. Flows travel along the parking area from southwest to northeast. Flows are intercepted by an existing drainage ditch on the northern side of the basin and are then conveyed off site to the northwest.

Basin B7 (1.14 acres) consists of roofs, sidewalks, and parking lots. Flows gathered on roofs by rain gutter systems are discharged to the surrounding parking area. Flows travel along the parking area from southwest to northeast. Flows are intercepted by an existing drainage ditch on the northern side of the basin and are then conveyed off site to the northwest.

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

FILEPATH: P:\180604\ENGINEERING\DRAINAGE\CD - DRAINAGE PLANNING LAYOUT LAYOUT1
PLOTTER: FRODO 05/10/19 11:17:17A BY: MICHAEL WALTON



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CHECKED BY: MAW
DRAWN BY: TMW

HKS HARRIS KOCHER SMITH

1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

TOWN OF CASTLE ROCK COLORADO

VILLAGE NORTH
DRAINAGE & INFRASTRUCTURE IMPROVEMENTS
DRAINAGE MAP

ISSUE DATE: ##-##-201#	PROJECT #: 180604
DATE	REVISION COMMENTS
12-07-2018	60% DESIGN PLANS
02-18-2019	90% DESIGN PLANS

PRELIMINARY
NOT FOR
CONSTRUCTION

SHEET NO.
ST-10
22 OF 44