AGENDA

REGULAR MEETING OF THE
WINDSOR HEIGHTS BOARD OF ADJUSTMENT
Wednesday, March 1, 2023 - 5:30 PM
WINDSOR HEIGHTS COUNCIL CHAMBERS - 1133 66th ST

1. **Call to Order/Roll Call**
2. **Approval of Agenda**
3. **Approval of Minutes**
    A. Consideration of the February 9, 2022 Minutes
4. **Public Hearing on Conditional Use Permit - Silverstar Carwash - 6300 Hickman Road**
5. **Consideration of Conditional Use Permit - Silverstar Carwash - 6300 Hickman Road**
    A. Staff Report and Application Materials
6. **Adjourn**

The agenda was posted on the official bulletin boards, posted to www.windsorheights.org, and city social media platforms in compliance with the requirements of city ordinances and the open meetings law.

REGULAR MEETING MINUTES
OF THE WINDSOR HEIGHTS BOARD OF ADJUSTMENT
Wednesday, January 12, 2022 – 5:30 p.m.
Via Zoom

1. Call to Order/Roll Call: Chair Knau called the meeting to order at 5:32 p.m.
   Present: Knau, Markley, Halfhill and Kannapel.
   Absent: Walker

   Also present: Durham, Jacobus, and Clanton

2. Approval of Agenda: Motion by Kannapel and seconded by Markley to approve the agenda. (4-0) Motion approved.

3. Approval of Minutes:
   Approval of Minutes of August 18, 2021: Motion by Markley and seconded by Halfhill. (4-0) Motion approved.

   Approval of Minutes of November 10, 2021: Motion by Markley and seconded by Halfhill. (4-0) Motion approved.

4. Public Hearings and Considerations of Requests

   A. Public Hearing on Appeal of Variance – Nu Van Nguyen, 7107 Garrison Rd. City administrator Durham summarized the variance request relative to the setback requirement for location of a carport for the Board and recommended approval. There was general discussion. Board member Kannapel expressed his concern that when the carport is constructed and more storage is utilized, it could become an eyesore for neighbors. Other Board members agreed. Chairperson Knau opened the public hearing. There were no comments from the public. Chairperson Knau closed the public hearing.

   B. Consideration of Variance Request - Motion by Kannapel to approve the variance request with the condition that the carport be screened on all sides and maintained going forward. Seconded by Markley. (4-0) Motion approved.

   C. Public Hearing on Appeal of Variance – Windsor Park Townhomes – 6750 School St. Kate Arnest appeared on behalf of the property owner to present the request for variance of the setback requirements for the property. The four-unit structure built on the property had suffered loss due to a recent fire. The property owners desire to build back as before. The neighboring structures are the same design and aesthetic. City Administrator Durham explained that due to conflicts within the code, staff recommended obtaining

the variance to minimize the potential of future challenges. And because this issue has been caused by the conflict within the code, and not an action of the property owner, staff is also recommending waiver of the fee for a variance. There was general discussion. Chairperson Knau opened the public hearing. There were no comments. Chairperson Knau closed the public hearing.

D. Consideration of Variance Request – 6750 School St. – Motion by Halfhill and seconded by Kannapel to approve the variance request. (4-0) Motion approved.

E. Public Hearing on Conditional Use Permit Application – Colby Interests – Aldi Grocery – 7100 University Avenue. City Attorney Clanton briefed the Board on the legal requirements for approval/disapproval of the requested CUP. Ryan Anderson, ISG Inc., on behalf of the applicants, provided a summary of the request for CUP and reviewed the conditions that have been met to warrant approval. There was general discussion. Chairperson Knau opened the public hearing. There were no comments. Chairperson Knau closed the public hearing.

F. Consideration of Conditional Use Permit Application – Colby Interests – Aldi Grocery – 7100 University Avenue. City Administrator Durham recommended approval as all conditions have been met by the applicant. Motion by Kannapel and seconded by Halfhill to approve the request for a Conditional Use Permit. (4-0) Motion approved.

5. Adjourn – As there was no further business before the Board, the meeting was adjourned at 6:27 p.m. Motion by Markley and seconded by Halfhill. (4-0) Motion approved.

BOLTON & MENK
Real People. Real Solutions.

430 E Grand Avenue
Suite 101
Des Moines, IA 50309

Ph: (515) 259-9190
Fax: (515) 233-4430
Bolton-Menk.com

STAFF REPORT

Date:	March 1, 2023
To:	Windsor Heights Board of Adjustment
From:	Justin Ernst, PE Rose Schroder, AICP Wyatt Archer, AICP
Subject:	Conditional Use Review: Silverstar Car Wash Staff Report (6300 Hickman Avenue)

Note: Review and recommendation of the conditional use permit and site plan requrest are synonymous, but a recommendation on the use of the property must be made before action can be taken on the site plan.

General Information

Applicant:	Houston Engineering – Stan Hanson 3900 W. Technology Circle, Suite 8 Sioux Falls, SD 58106
Property Owner:	Midwest Fidelity Partners 1610 S. Minnesota Ave. Sioux Falls, SD 57105
Proposed Use:	Auto Services
Zoning:	CC (Community Commercial District)
Location:	6300 Hickman Road

Summary

The applicant, Stand Hanson, on behalf of Midwest Fidelity Partners, is requesting a conditional use permit in CC – Community Commercial zoning district for the use of Auto Services. The CC - Community Commercial zoning district allows for the Auto Services to be approved conditionally. Staff has completed a review of the conditional use permit application and the proposed site plan. The submitted application materials are attached to this report.

Existing Conditions

The 2.07 acre lot is in the CC – Community Commercial zoning district. The lot is currently vacant and was previously a gas station and car wash.

Background

November 14, 2022:	Pre-ap meeting with applicant.
January 20, 2023:	1st submittal of documents for site plan review and conditional use permit.
January 27, 2023:	2nd submittal with revised documents for site plan review and conditional use permit.

Applicable Code Sections

167.07.2.B. Commercial Use Types

1. Auto Services: Provision of fuel, lubricants, parts and accessories, and incidental services to motor vehicles; and washing and cleaning and/or repair of automobiles, non-commercial trucks, motorcycles, motor homes, recreational vehicles, or boats, including the sale, installation, and servicing of equipment and parts. Typical uses include service stations, **car washes**, muffler shops, auto repair garages, tire sales and installation, wheel and brake shops, and similar repair and service activities but exclude dismantling, salvage, or body and fender repair services.

Table 168-2 Permitted Uses by Zoning District

Table 168-2 – Permitted Uses by Zoning District

Use Types	R-1	R-2	R-3	R-4	MH	O	CC	GC	UC	TC	LI	Additional Regulations
Commercial Uses:												
Agricultural Sales/Service							C	P			P	
Auto Rental/Sales								C			P	Sec. 171.05(3)
Auto Services						C	C	P	C	C	P	Sec. 171.05(1,2)

Chapter 180.06 Conditional Use Permits, Standards of Approval

1. The Board of Adjustment shall review the proposed development for conformance to the following Standards of Approval:
    a. Compatibility. The proposed buildings or use shall be constructed, arranged and operated so as to be compatible with the character of the zoning district and immediate vicinity, and not to interfere with the development and use of adjacent property in accordance with the applicable district regulations. The proposed development shall not be unsightly, obnoxious or offensive in appearance to abutting or nearby properties.
    b. Transition. The development shall provide for a suitable transition, and if necessary, buffer between the proposed buildings or use and surrounding properties.

c. Traffic. The development shall provide for adequate ingress and egress, with particular attention to vehicular and pedestrian safety and convenience, traffic flow and control, and emergency access.

d. Parking and Loading. The development shall provide all off-street parking and loading areas as required by this ordinance, and adequate service entrances and areas. Appropriate screening shall be provided around parking and service areas to minimize visual impacts, glare from headlights, noise, fumes or other detrimental impacts.

e. Signs and Lighting. Permitted signage shall be in accordance with the applicable district regulations and shall be compatible with the immediate vicinity. Exterior lighting, if provided, shall be with consideration given to glare, traffic safety and compatibility with property in the immediate vicinity.

f. Environmental Protection. The development shall be planned and operated in such a manner that will safeguard environmental and visual resources. The development shall not generate excessive noise, vibration, dust, smoke, fumes, odor, glare, groundwater pollution or other undesirable, hazardous or nuisance conditions, including weeds.

2. If the Board of Adjustment concludes that all of the Standards for Approval criteria will be met by the development, it shall approve the application and plans.

3. The request shall be denied if the Board of Adjustment finds any of the following with regards to the proposed development:

    a. Not adequately safeguard the health, safety and general welfare of persons residing or working in adjoining or surrounding property, or

    b. Impair an adequate supply (including quality) of light and air to surrounding property, or

    c. Unduly increase congestion in the roads, or the hazard from fire, flood or similar dangers, or

    d. Diminish or impair established property values on adjoining or surrounding property, or

    e. Not be in accord with the intent, purpose and spirit of the zoning ordinance or comprehensive plan.

Chapter 180.08 Conditional Use Permit, Standards of Approval

1. In considering whether to approve an application for a conditional use permit, the Board of Adjustment shall proceed according to the following format:
    a. The Board of Adjustment shall establish findings of fact based upon information contained in the application, the staff report and information gather at the Board of Adjustment hearings.
    b. The board shall consider such reasonable requirements or conditions to the permit as will ensure the development will satisfy the requirements of this chapter. A vote may be taken on such conditions before consideration of whether the permit should be approved or denied for any of the reasons set forth in 3 or 4.
    c. The Board of Adjustment shall consider whether the application complies with all of the applicable Standards for Approval set forth in 180.06. Separate votes may be taken with respect to each criterion. If the Board of Adjustment concludes that the application fails to meet one or more of the criteria, the application shall be denied.
    d. If the Board of Adjustment concludes that all such criteria have been met, the application shall be approved unless it adopts a motion that the application fails to meet any of the approval standard set forth in 178.06. Separate votes may be taken with respect to each standard. Any such motion regarding compliance or noncompliance of the application to the development criteria or Standards for Approval shall specify the supporting reasons for the motion. It shall be presumed the application complies with all criteria and standards not specifically found to be unsatisfied. Without limiting the foregoing, the Board of Adjustment may attach to a permit a conditions it deems necessary to protect the health, safety, and general welfare of the public. All conditions or requirements shall be entered on the permit.

Future Land Use Map

The future land use map should be used as guidance for areas throughout the City. The map identifies this location as mixed use, which is defined on page 40 of the 2017 Comprehensive Plan. "Mixed Use. This area encourages combinations of limited commercial, office, and residential uses." The comprehensive plan also identifies the corner of Hickman and 63rd as one of the Community Entrances as seen in the comprehensive plan's future land use map.

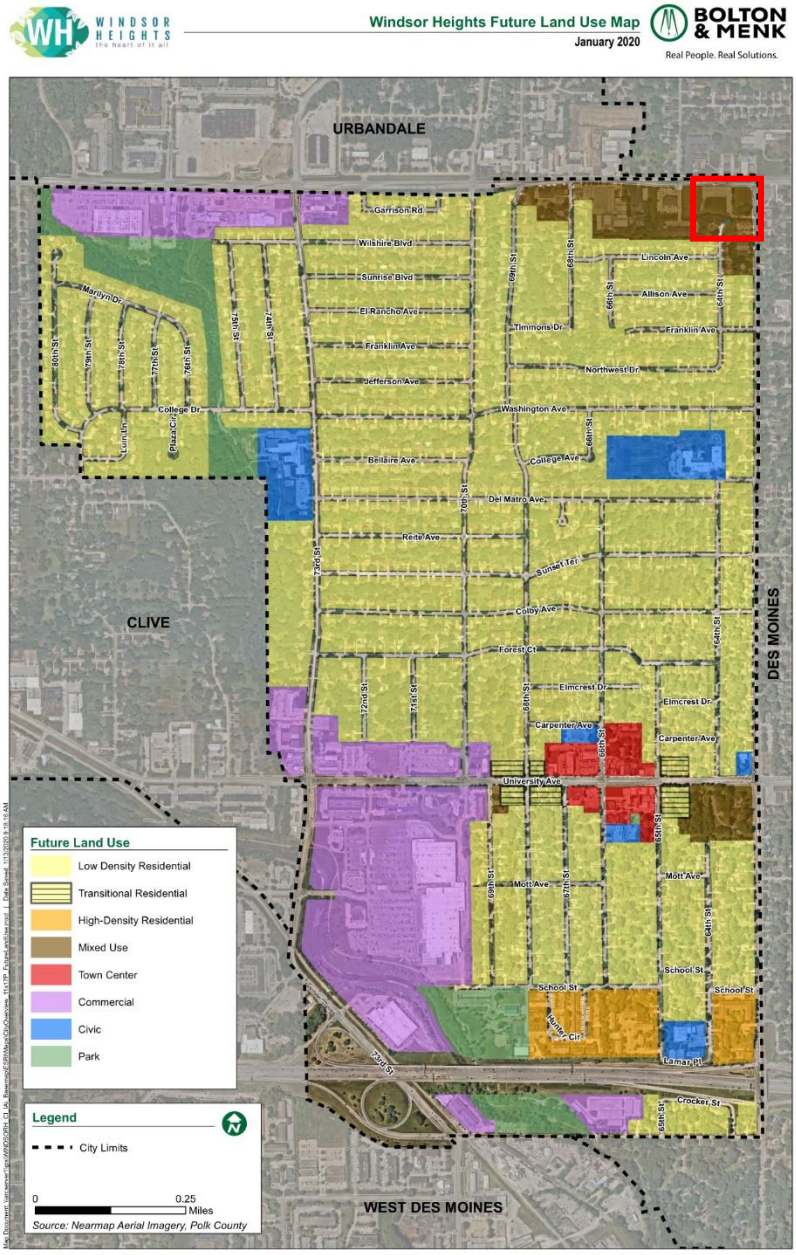


Figure 1: Current Future Land Use Map

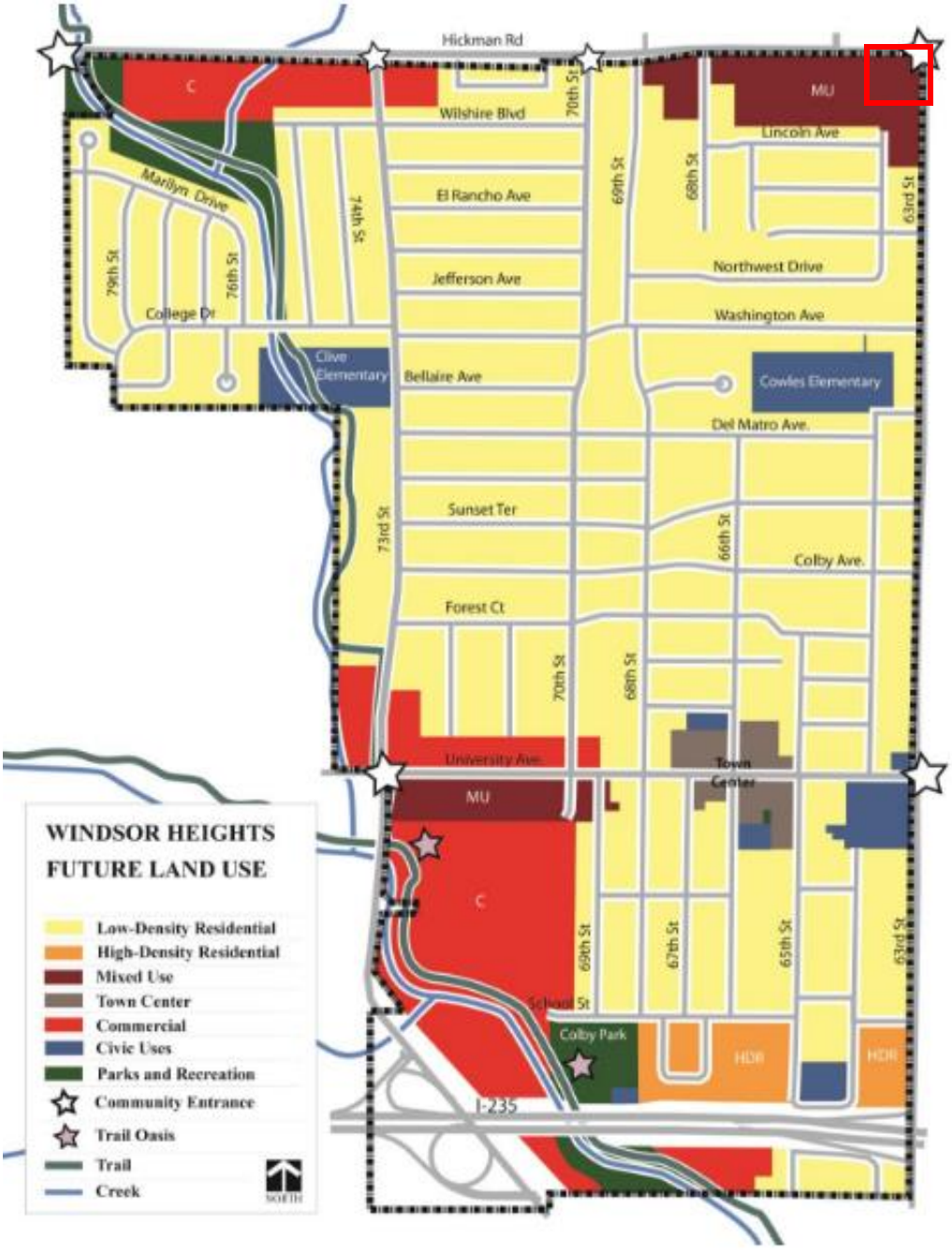


Figure 2: Windsor Heights' 2017 Comprehensive Plan's
Future Land Use Map

Zoning Map

The parcel is currently zoned for community commercial which is defined in Table 168-1 Purposes of Zoning Districts as "This district is intended for commercial facilities which serve the needs of markets ranging from several neighborhoods to the overall region. While allowed commercial and office uses are generally compatible with nearby residential areas, traffic and operating characteristics may have more negative effects on residential neighborhoods than those permitted in the O District. CC Districts are appropriate at major intersections, at the junction of several neighborhoods, or at substantial commercial sub-centers."

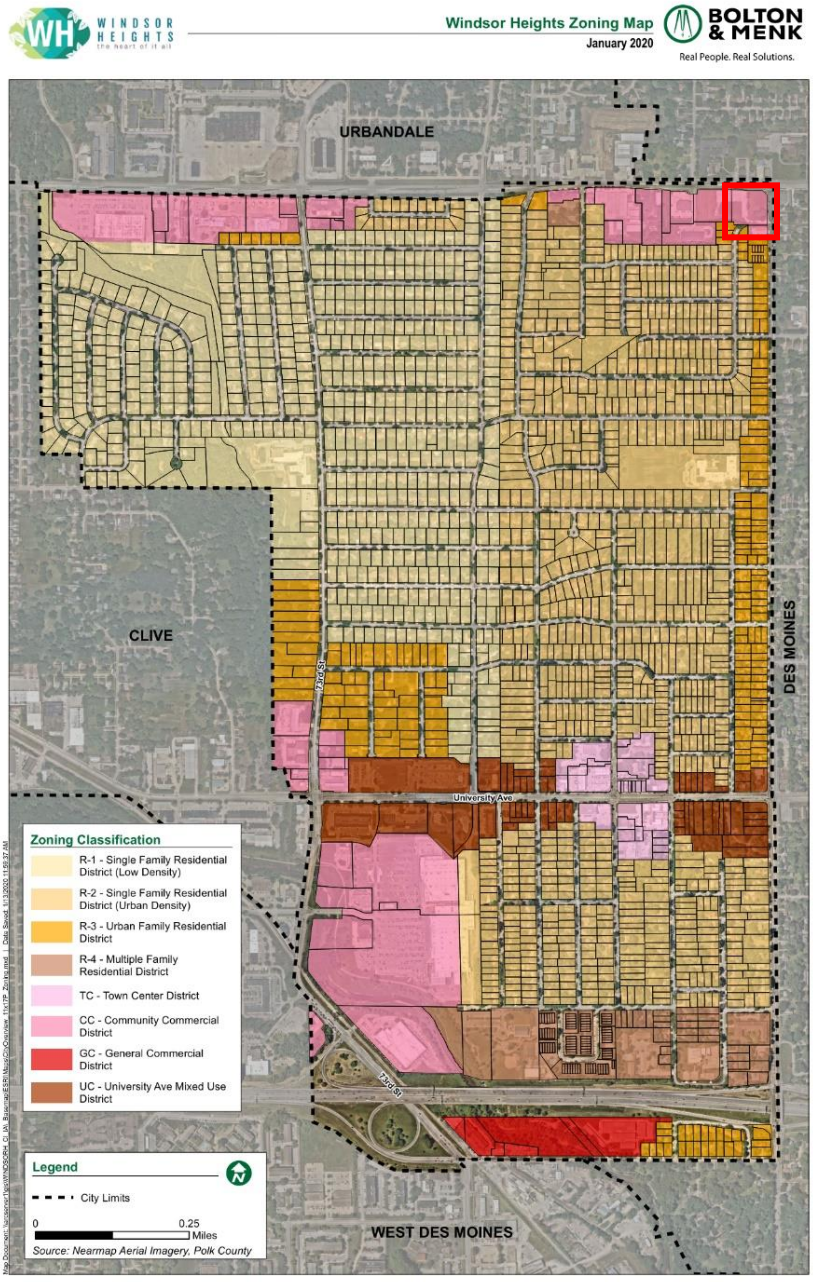


Figure 3: Current Zoning Map

Site Plan Comments

1. General Comments
    a. All permits related to the project will be held contingent to the following:
    b. Approval of a conditional use permit to allow auto services in the CC Community Commercial zoning district.
    c. Approval of signs and utility from Safe Building.
    d. Approval of streets and access from Iowa Department of Transportation.
    e. Revisions to the site plan application in accordance with the comment letter.
    f. Review of the site plan by the Planning Commission and subsequent approval of the site plan by the City Council.
2. Police Department Comments
    a. No comments
3. Fire Department Comments
    a. No comments
4. Engineering Comments
    a. General Comments
        i. Include a separate sheet showing just existing parcel information including all existing easements.
        ii. Dimension existing driveway entrances.
        iii. Need traffic control for trail closure.
        iv. Provide sanitary sewer easement for the sewer that flows from 63rd Street.
        v. Driveway approaches need to match driveway width and alignment. Confirm with IDOT that these driveways are acceptable.
        vi. Provide documentation of driveway location approval from IDOT.
        vii. 'Work within ROW' permits will need to be obtained from IDOT. Provide proof of permit.
        viii. Obtain a Construction Site Erosion & Sediment Control Ordinance Permit or COSESCO Permit from City.
    b. Sheet C1.0
        i. Label contour lines.
        ii. Hard to see the contour lines.
        iii. Show water main.
        iv. An existing light is not shown that is to the west of the driveway off Hickman Road. Light will need to be relocated.
    c. Sheet C2.0

i. Show removal of trail to make water service connection.

d. Sheet C3.0
   i. Add a note that connection to existing sanitary manhole to be water-tight.
   ii. Connection elevation shall be 0.1 feet above the out flow elevation and a new flow channel needs to be made.

e. Sheet C3.1
   i. What will happen to the existing intake?

f. Sheet C4.0
   i. It appears water is now being directed to the properties to the south. This cannot happen.
   ii. Label contours.
   iii. Show existing contours.
   iv. Show all proposed contours.

g. Sheet C5.0
   i. State the intentions of the labeled "future property line."
   ii. Dimension driveways and entrances.

h. Sheet C7.0
   i. Label all inlet controls. Note just one and say typ.

5. Drainage Comments
   a. Provide proposed contours for the entire project site.
   b. Include contour elevation labels.
   c. Page 6: Distinguish which Rev, WQv, and CPv values are the required values and which are the provided values (between Table 5 and the paragraph above).
   d. Explain how the Rev, WQv, and CPv are being provided.
   e. Reduce post-development peak flows at the Street-East outlet to the pre-settlement (allowable) peak flow rates.
   f. Reduce post-development Q50 at the STS outlet to the allowable rate.

6. Planning Comments
   a. Table 168-2 Permitted Uses by Zoning District has the use of "auto services" is a conditional use in the CC – Community Commercial zoning district and will require a conditional use permit before site plan approval.
   b. 173-2 Buffer Yard Requirements – Please label the 20ft of screening requirements for the CC to R-3.
   c. Please note if any parcel reconfiguration will be proposed.

Recommendation

The staff recommends reviewing the request. The Windsor Heights Board of Adjustments may complete one of the following:

1. Accept and approve CUP01-23 as proposed.
2. Accept and approve CUP01-23 as proposed with conditions.
    a. Revisions to the site plan application in accordance with the comment letter.
    b. Review of the site plan by the Planning Commission and subsequent approval of the site plan by the City Council.
    c. Approval of signs and utility from Safe Building.
    d. Approval of streets and access from Iowa Department of Transportation.
    e. Provide documentation of driveway location approval from IDOT.
    f. Obtain an access easement for the proposed driveway through private property off Hickman Road.
    g. Relocation of light west of the driveway off Hickman Road.
    h. Provide sanitary sewer easement for the sewer that flows from 63rd Street.
    i. Obtain a Construction Site Erosion & Sediment Control Ordinance Permit or COSESCO Permit from City.
    j. Reduce post-development peak flows at the Street-East outlet to the pre-settlement (allowable) peak flow rates.
    k. Reduce post-development Q50 at the STS outlet to the allowable rate.
    l. Provide 20ft of screening between the site and adjacent R-3 districts.
3. Deny CUP01-23 as proposed.

Attachments

Application Materials (as submitted)

City of Windsor Heights
www.windsorheights.org
1145 66th Street, Suite 1 • Windsor Heights, Iowa 50324 • 515-279-3662 • Fax 515-279-3664

CONDITIONAL USE PERMIT APPLICATION

Date of Submission: 01/20/2023 Fee Amount: $200 Application No. _____

The Conditional Use and Special Use Permit Procedures provide for Planning and Zoning Commission review and discretionary Board of Adjustment action for uses within zoning districts which have unusual site development or operating characteristics that could adversely affect surrounding properties.

***** Attach any graphic information, including site plans, elevations, other drawings, or other materials determined by the Zoning Administrator to be necessary to describe the proposed use to approving agencies.***

***** Provide names, property addresses, and mailing addresses of all surrounding property owners within 200 feet for residential projects or 300 feet for commercial projects of the subject property. Intervening streets and alleys are not to be included in computing the 200 and 300 feet requirement. Names and mailing addresses can be obtained by contacting the Polk County Recorder and providing the property addresses. You do not need to obtain these property owners' permission.***

Applicant Name: Midwest Fidelity Partners

Applicant Address: 1610 S. Minnesota Ave., Sioux Falls, SD 57105

Applicant Phone Number: 605-361-3557

Property Owner: Midwest Fidelity Partners

Property Address, Zoning Classification, & Legal Description: 6300 Hickman Road

Parcel 201-24 - Lot 1 & 2 of Windsor Crossing Plat 1

A description of the nature and operating characteristics of the proposed use.

High quality car wash providing customers with a consistent experience that is quick and convenient. The proposed car wash will consist of 3 drive lanes to enter the car wash; the kiosk lane where patrons are greeted by a customer service associate, a lane for the unlimited pass customers, and a lane for the unlimited pass customer/bypass lane. Upon entering the car wash, cars get cleaned using state-of-the-art wash equipment and dried with high-powered dryers upon exit. Outside the building is a row of vacuums available to patrons at no cost.

A written statement as to how the proposed project fits within the character of the neighborhood and that meets the intent of the City's Comprehensive Plan.

The property is located on the eastern edge of a land that is in the redevelopment process. This redevelopment is bringing new commercial, multi-family, mixed use opportunities to this corridor that support the development of a service centered use such as car wash development. The car wash brings jobs, provides a needed service to the area and meets all of the city requirements for this type of development with in this neighborhood oriented commercial center.

Abutting Property Owner Names and Addresses:

1. Names and Address list attached.
2.
3.
4.

The undersigned hereby certifies that all information provided is complete and accurate to the best of undersigned's knowledge, and that all information required by this application or by the Board's staff on its behalf has been provided.

Printed name of applicant: Dan Nelson

Signature of applicant: Dan Nelson Date: 1/19/2023

Note: The Applicant or an authorized agent must personally be present for the request before the Planning and Zoning Commission and Board of Adjustment meetings.

Please contact the Zoning Administrator to obtain a list of meeting dates and submittal deadlines. 515-645-6826.

CITY OF WINDSOR HEIGHTS
1145 66TH St, Suite 1,
Windsor Heights, IA 50324
Phone (515)279-3662
Fax (515) 279-3664

APPLICATION FOR DEVELOPMENT REVIEW SITE PLAN/SITE PLAN AMENDMENT

DATE SUBMITTED: January 27, 2023

PROJECT TITLE: Silverstar Carwash

PROJECT ADDRESS: 6300 Hickman Rd

LOT #: 1 & 2

SUBDIVISION: Windsor Crossing Plat 1

APPLICANT INFORMATION

APPLICANT NAME & EMAIL: Midwest Fidelity Partners

ADDRESS: 1610 S. Minnesota Avenue

CITY, STATE, ZIP: Sioux Falls, SD 57105

PHONE: 605361-3557

FAX:

Acceptance of Applicant

I, the undersigned, certify that the information on this application to the best of my knowledge, is true and correct. I further certify that I have a legal interest in the property in question, and/or that I am legally able to represent all other persons or entities with interest in this property.

In addition to the application fee, I understand I am responsible for all development review costs invoiced on a Monthly basis for services performed by City staff or City consultants on my behalf.

Dan Nelson

Print Applicant's Name

Dan Nelson Dan Nelson 1/19/2023

Applicant's Signature Date

DEVELOPMENT TEAM

Project Manager

Stan Hanson

Address: 3900 W. Technology Circle, Suite 8, Sioux Falls SD 58106

Phone: 605-271-0378 Fax: 605

E-Mail Address: sthanson@houstoneng.com

Attorney/Other

Address

Phone Fax

E-Mail Address

Please provide seven copies (24"x36" maximum) of all plans and one copy of the project drainage report. In addition, a digital copy (.pdf format preferred) of all plan sheets and drainage report shall be provided.

In order for a submittal to be determined as complete, the following basic information should be provided:

	Submitted	Accepted
Traffic Study (as required by City Engineer)	☐	☐
Site Survey	☒	☐
Dimension Plan	☒	☐
Grading Plan	☒	☐
Utility Plan	☒	☐
Landscape Plan	☒	☐
Drainage Report	☒	☐
Architectural Plans	☒	☐
Lighting Plans	☒	☐
Name & Address of All Properties within 200 ft	☒	☐

For additional detail on the type of information necessary for each of the items above can be found on the back of this form or by contacting the City Administrator.

Additional Information:

Application Approval

- ☐ **Approved**
- ☐ **Denied**

Planner or Authorized Representative Date

LEGEND

WATER MAIN	W
SANITARY SEWER MAIN	SS
STORM SEWER MAIN	STS
STORM INLET	
SANITARY MANHOLE	SS
STORM MANHOLE	ST
UTILITY MANHOLE	
FIRE HYDRANT	
GATE VALVE	
CLEANOUT	SS CO
UNDERGROUND FIBER OPTIC	FO
SIGN	
GUARD RAIL	
SPOT ELEVATION	x497.1605
STANDARD CURB & GUTTER	
BUILDING	
PROPERTY LINE	
EASEMENT LINE	
BUILDING SETBACK LINE	SBL
IRON MONUMENT FOUND	
IRON MONUMENT SET	

COORDINATE SYSTEM: NAD83 IOWA STATE PLANE SYSTEM, SOUTH ZONE, US FOOT

THE UNDERGROUND UTILITIES HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AS-BUILT MAPS AS PROVIDED BY MUNICIPALITIES OR UTILITY COMPANIES, AND/OR EXISTING DRAWINGS. THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED, NOR IS THERE A GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ANY AND ALL EXISTING UTILITIES. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY RESULT FROM ITS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.

No.	Revision	Date	By

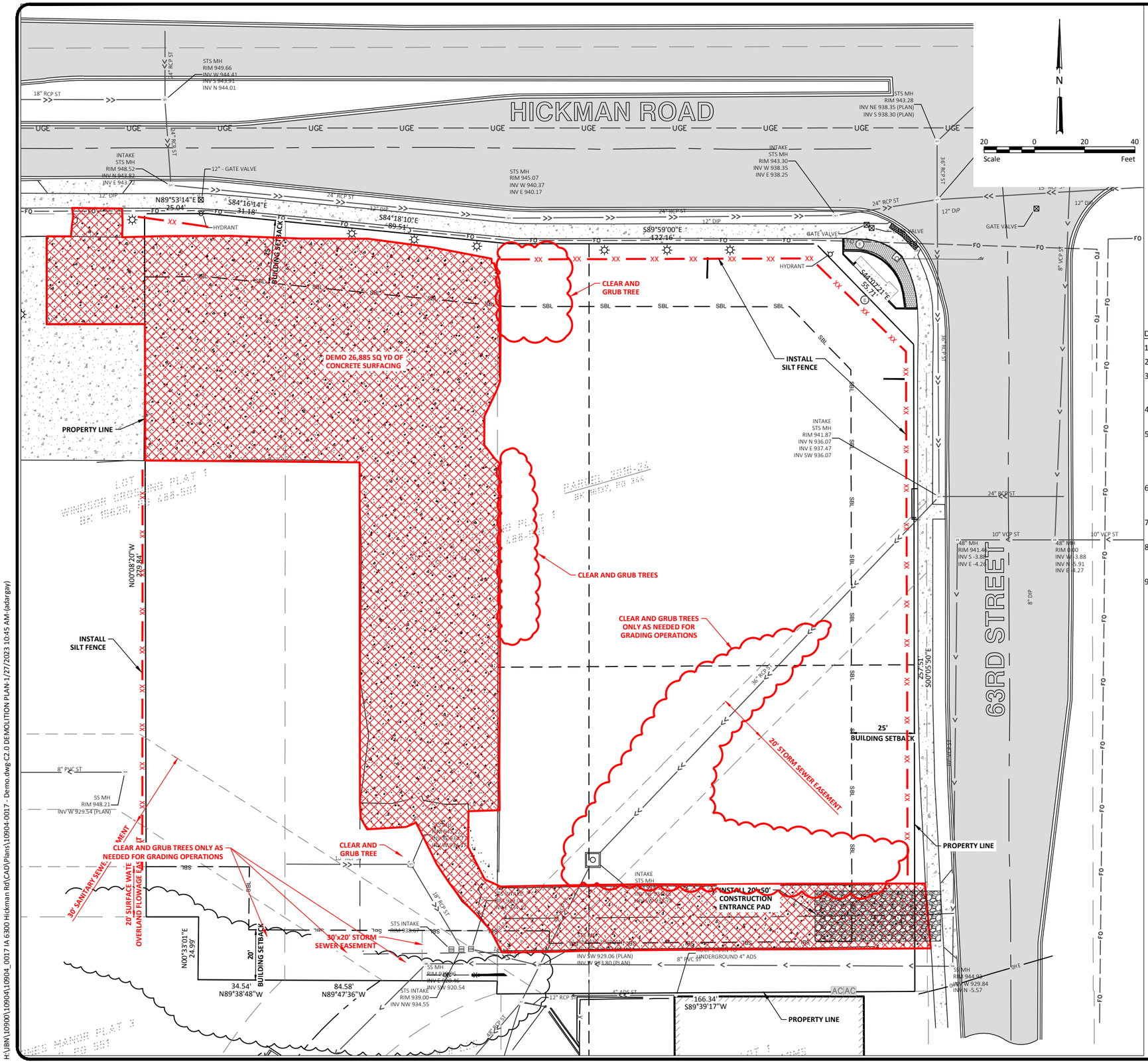
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

TOPOGRAPHIC SURVEY

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C1.0

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Topo.dwg-C1.0 TOPOGRAPHIC SURVEY-1/27/2023 11:04 AM-(adargay)



LEGEND

- WATER MAIN — W
- SANITARY SEWER MAIN — SS
- STORM SEWER MAIN — STS
- OVERHEAD POWER LINE — OHP
- UNDERGROUND FIBER OPTIC — FO
- STANDARD CURB & GUTTER
- SILT FENCE — XX
- NATURAL GAS LINE — G
- STORM INLET
- SANITARY MANHOLE — SS
- STORM MANHOLE — ST
- FIRE HYDRANT
- GATE VALVE
- DECIDUOUS TREE
- BUILDING
- IRON MONUMENT FOUND
- IRON MONUMENT SET
- SIGN
- CONCRETE REMOVAL

DEMOLITION NOTES:

1. PRE-EXISTING BUILDING FOUNDATIONS AND FOOTINGS SHALL BE REMOVED IN THEIR ENTIRETY.
2. TYPICAL CLEAR AND GRUB FOR EACH TREE REMOVAL.
3. EXISTING GAS UTILITIES TO BE DISCONNECTED AT THE MAIN LINE BY UTILITY COMPANY. CONTRACTOR SHALL VERIFY THE LINES HAVE BEEN DISCONNECTED PRIOR TO BEGINNING CONSTRUCTION AND OR DEMOLITION.
4. ALL EXISTING UTILITIES SHALL BE REMOVED IN ACCORDANCE WITH THE CITY OF WINDSOR HEIGHTS'S CONSTRUCTION SPECIFICATIONS.
5. EXISTING WATER SERVICES SHALL BE SHUT OFF AT THE CORP STOP AT THE WATERMAIN. CONTRACTOR SHALL REMOVE AND REPLACE THE MINIMUM AMOUNT OF EXISTING PAVEMENT, AND CURB AND GUTTER AS NECESSARY TO PERFORM THE WORK. CUTTING OF PANELS SHALL NOT BE ALLOWED, ONLY FULL PANELS WILL BE ALLOWED TO BE DEMOLISHED. CONTRACTOR SHALL MATCH EXISTING PAVEMENT SECTION FOR STREET PATCH.
6. EXISTING SEWER SERVICES CALLED OUT TO BE REMOVED SHALL BE REMOVED AS CLOSE AS POSSIBLE TO THE STREET AND CAPPED. SERVICES TO BE REMOVED/ABANDONED PER CITY OF WINDSOR HEIGHTS STANDARD SPECIFICATIONS.
7. CITY OF WINDSOR HEIGHTS STAFF SHALL INSPECT ALL UTILITY TERMINATIONS PRIOR TO BACKFILL OF TRENCH.
8. WORK IN THE RIGHT-OF-WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT-OF-WAY WILL BE ISSUED.
9. SANITARY SEWER AND WATER SERVICES FOR THE EXISTING BUILDING SHOWN ON THE PLANS WERE LOCATED BASED ON CITY UTILITY TAP RECORDS AND SHOULD BE CONSIDERED APPROXIMATE. CONTRACTOR SHALL FIELD LOCATE LINES CALLED OUT FOR REMOVAL/ABANDONMENT.

THE UNDERGROUND UTILITIES HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AS-BUILT MAPS AS PROVIDED BY MUNICIPALITIES OR UTILITY COMPANIES, AND/OR EXISTING DRAWINGS. THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED, NOR IS THERE A GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ANY AND ALL EXISTING UTILITIES. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY RESULT FROM ITS FAILURE TO LOCATE AND PRESERVE ANY AND ALL UTILITIES.

No.	Revision	Date	By

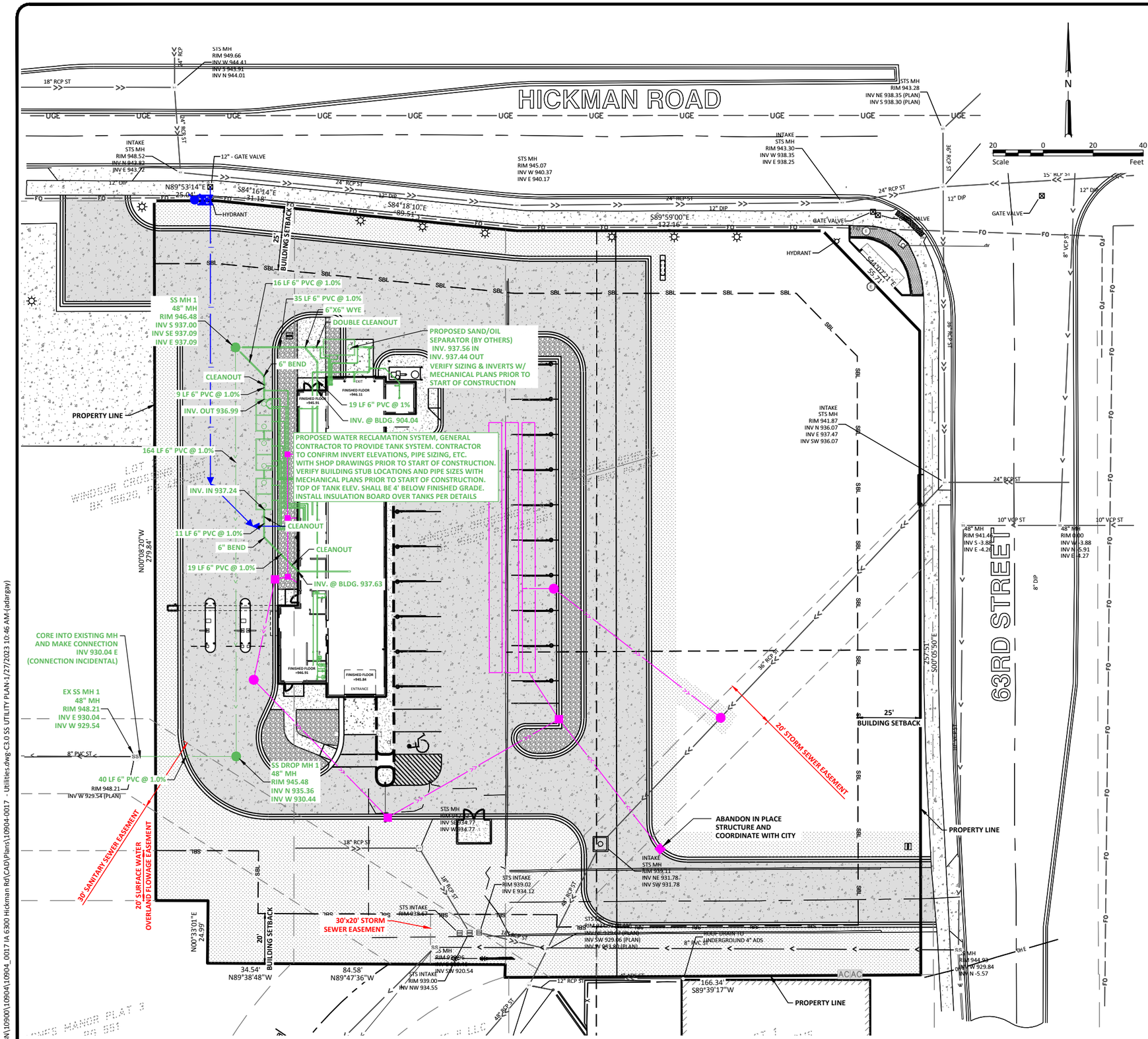
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DEMOLITION PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C2.0

H:\UBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Demo.dwg C2.0 DEMOLITION PLAN-1/27/2023 10:45 AM (adargay)



LEGEND

	EXISTING	NEW
WATER MAIN		
SANITARY SEWER MAIN		
STORM SEWER MAIN		
STORM INLET		
SANITARY MANHOLE		
STORM MANHOLE		
FIRE HYDRANT		
GATE VALVE		
AC UNIT		
GAS METER		
TRANSFORMER		
UNDERGROUND FIBER OPTIC	FO	
DECIDUOUS TREE		
GUARD POST		
GUARD RAIL		
SPOT ELEVATION	x897.165	898.55TC 898.05G
STANDARD CURB & GUTTER		
MOUNTABLE CURB & GUTTER		
CURB & INVERTED GUTTER		
BUILDING		
NEW 4" CONCRETE		
NEW 5" CONCRETE		
NEW 8" HEATED CONCRETE		
NEW 12" MEDIAN ISLAND CONCRETE		
THICKENED EDGE SIDEWALK		
DRAINAGE DIRECTION		
IRON MONUMENT FOUND	●	
IRON MONUMENT SET	○	

UTILITY NOTES:

1. ALL DISTANCES AND SLOPES ARE CALCULATED ON CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
2. EITHER MONOLITHIC MANHOLE STYLE BOOT CONNECTOR FACTORY INSTALLED OR CONCRETE TO PVC PIPE ADAPTORS SHALL BE USED TO CONNECT PVC PIPE TO THE MANHOLE. PVC MANHOLE ADAPTER SHALL BE A GPK PRODUCT OR APPROVED EQUIVALENT.
3. THE CONTRACTOR SHALL CONFIRM EXACT LOCATION, INVERT, AND SIZE OF BUILDING SERVICES WITH MECHANICAL ENGINEER PRIOR TO THE START OF CONSTRUCTION.
4. ALL WORK DONE IN THE RIGHT-OF-WAY SHALL CONFORM TO THE CITY OF WINDSOR HEIGHTS STANDARD SPECIFICATIONS.
5. THE CITY OF WINDSOR HEIGHTS INSPECTIONS DEPARTMENT MUST BE NOTIFIED TO INSPECT THE CONNECTION OF THE SITE SANITARY SEWER SYSTEM TO THE CITY STORM WATER SYSTEM. ENSURE THE EXCAVATION IS KEPT OPEN FOR THIS INSPECTION.
6. REMOVE AND REPLACE EXISTING PAVEMENT, CURB AND GUTTER, AND SIDEWALK AS NECESSARY TO INSTALL UTILITIES.
7. EXCAVATION OR OTHER WORK IN THE RIGHT OF WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT OF WAY WILL BE ISSUED.
8. ALL HDPE STORM SEWER SHALL BE ADS N-12 WITH WATERTIGHT JOINTS OR APPROVED EQUIVALENT.
9. ALL PVC SANITARY SEWER SHALL BE SDR26 PVC.

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

SS UTILITY PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C3.0

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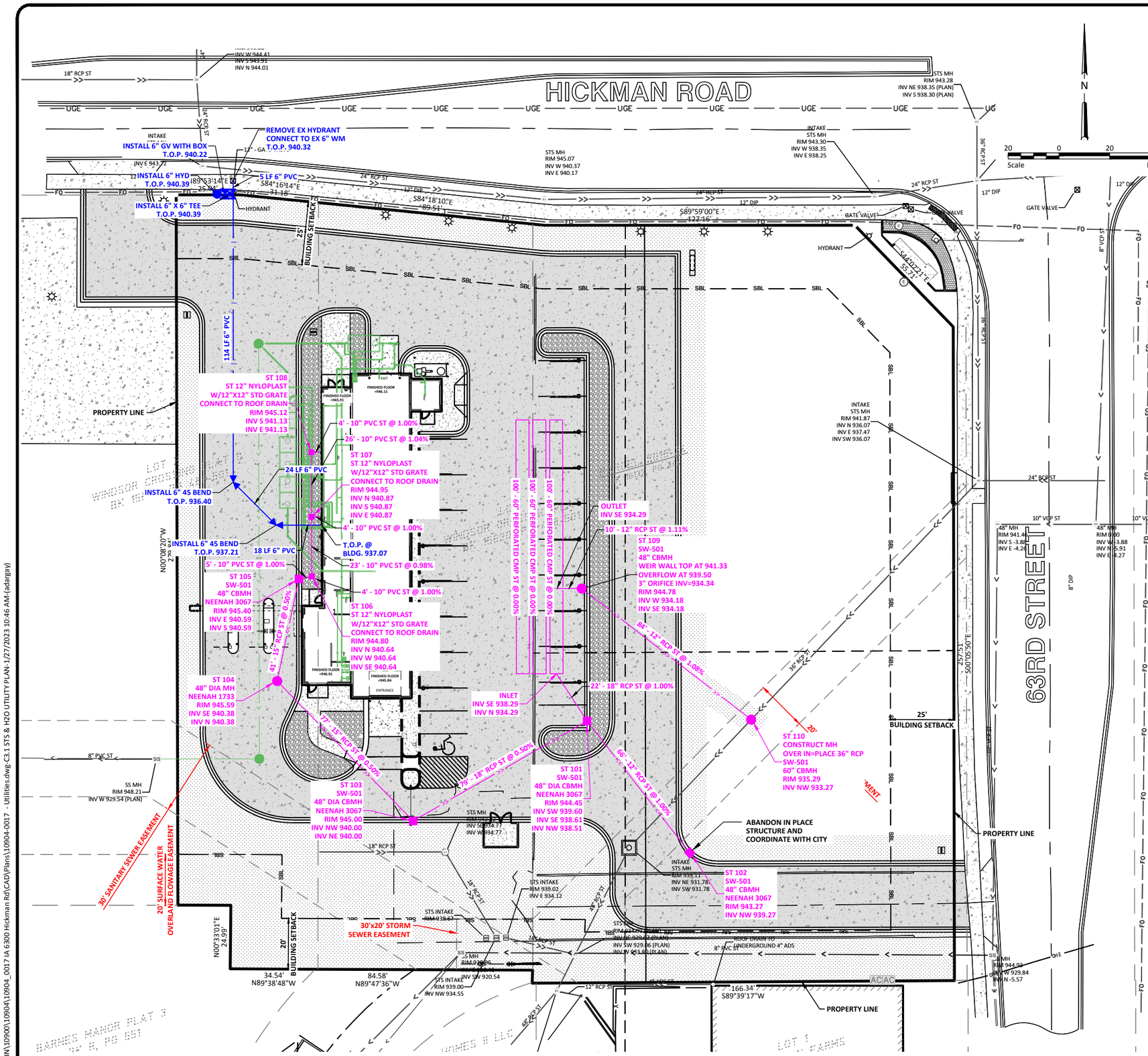

LEGEND

	EXISTING	NEW
WATER MAIN		
SANITARY SEWER MAIN		
STORM SEWER MAIN		
STORM INLET		
SANITARY MANHOLE		
STORM MANHOLE		
FIRE HYDRANT		
GATE VALVE		
AC UNIT		
GAS METER		
TRANSFORMER		
UNDERGROUND FIBER OPTIC	FO	
DECIDUOUS TREE		
GUARD POST		
GUARD RAIL		
SPOT ELEVATION		
STANDARD CURB & GUTTER		
MOUNTABLE CURB & GUTTER		
CURB & INVERTED GUTTER		
BUILDING		
NEW 4" CONCRETE		
NEW 5" CONCRETE		
NEW 8" HEATED CONCRETE		
NEW 12" MEDIAN ISLAND CONCRETE		
THICKENED EDGE SIDEWALK		
DRAINAGE DIRECTION		
IRON MONUMENT FOUND		
IRON MONUMENT SET		

898.55TC
898.05G

UTILITY NOTES:

1. ALL DISTANCES AND SLOPES ARE CALCULATED ON CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
2. ALL CONNECTIONS TO STORM SEWER STRUCTURES SHALL BE GROUTED ON BOTH THE INTERIOR AND EXTERIOR OF THE STRUCTURE.
3. EITHER MONOLITHIC MANHOLE STYLE BOOT CONNECTOR FACTORY INSTALLED OR CONCRETE TO PVC PIPE ADAPTORS SHALL BE USED TO CONNECT PVC PIPE TO THE MANHOLE. PVC MANHOLE ADAPTER SHALL BE A GPK PRODUCT OR APPROVED EQUIVALENT.
4. ALL WATERLINES SHALL HAVE THRUST BLOCKING INSTALLED ON ALL BENDS, TEES, AND PLUGS. REFER TO DETAIL FOR SIZING. RESTRAINED JOINTS SHALL ALSO BE ALLOWED IN LIEU OF THRUST BLOCKS; REFER TO DETAIL.
5. ALL WATERLINES SHALL HAVE A MINIMUM DEPTH OF COVER THAT MEETS CITY SPECIFICATIONS.
6. ALL FIRE HYDRANTS SHALL HAVE MARKER POSTS INSTALLED PER DETAIL.
7. THE CONTRACTOR SHALL CONFIRM EXACT LOCATION, INVERT, AND SIZE OF BUILDING SERVICES WITH MECHANICAL ENGINEER PRIOR TO THE START OF CONSTRUCTION.
8. THE CONTRACTOR MAY SUBSTITUTE CORRUGATED HDPE PIPE FOR RCP EXCEPT AT CONNECTION TO ANY EXISTING RCP, IN THE CITY RIGHT-OF-WAY, AND AT INLETS AND OUTLET TO PONDS.
9. STORM SEWER PIPE MATERIAL MAY ONLY BE CHANGED AT STRUCTURES. CHANGES OF PIPE MATERIAL AT LOCATIONS OTHER THAN STRUCTURES SHALL NOT BE ALLOWED.
10. HDPE PIPE SHALL HAVE A MINIMUM OF 18" OF COVER OVER THE TOP OF THE PIPE PRIOR TO ALLOWING CONSTRUCTION TRAFFIC OVER THE TOP OF THE PIPE.
11. ALL WORK DONE IN THE RIGHT-OF-WAY SHALL CONFORM TO THE CITY OF WINDSOR HEIGHTS STANDARD SPECIFICATIONS.
12. THE CONTRACTOR SHALL COORDINATE WITH CITY OF WINDSOR HEIGHTS TO TAP EXISTING WATERMAIN.
13. REMOVE AND REPLACE EXISTING PAVEMENT, CURB AND GUTTER, AND SIDEWALK AS NECESSARY TO INSTALL UTILITIES.
14. EXCAVATION OR OTHER WORK IN THE RIGHT OF WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT OF WAY WILL BE ISSUED.
15. TRENCH DRAIN SHALL BE ACO POWERDRAIN S200K LOAD CLASS D, WITH DUCTILE IRON SLOTTED GRATE, OR APPROVED EQUIVALENT.
16. FIRE HYDRANT TOP OF NUT (T.O.N.) ELEVATIONS ARE BASED ON A WATEROUS PACER WB-67 HYDRANT WITH PUMPER NOZZLE SET 24" ABOVE FINISHED GRADE.
17. ALL HDPE STORM SEWER SHALL HAVE WATERTIGHT JOINTS.
18. ALL PVC WATER PIPE SHALL BE DR-18 C900 PVC.
19. ALL PVC STORM SEWER SHALL BE SDR35 PVC, UNLESS OTHERWISE NOTED.
20. ALL RCP STORM SEWER SHALL BE AS FOLLOWS:
    - 12" - 18" = CLASS V
    - 21" - 36" = CLASS III
    - 42" & LARGER = CLASS II

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

STS & H2O UTILITY PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C3.1

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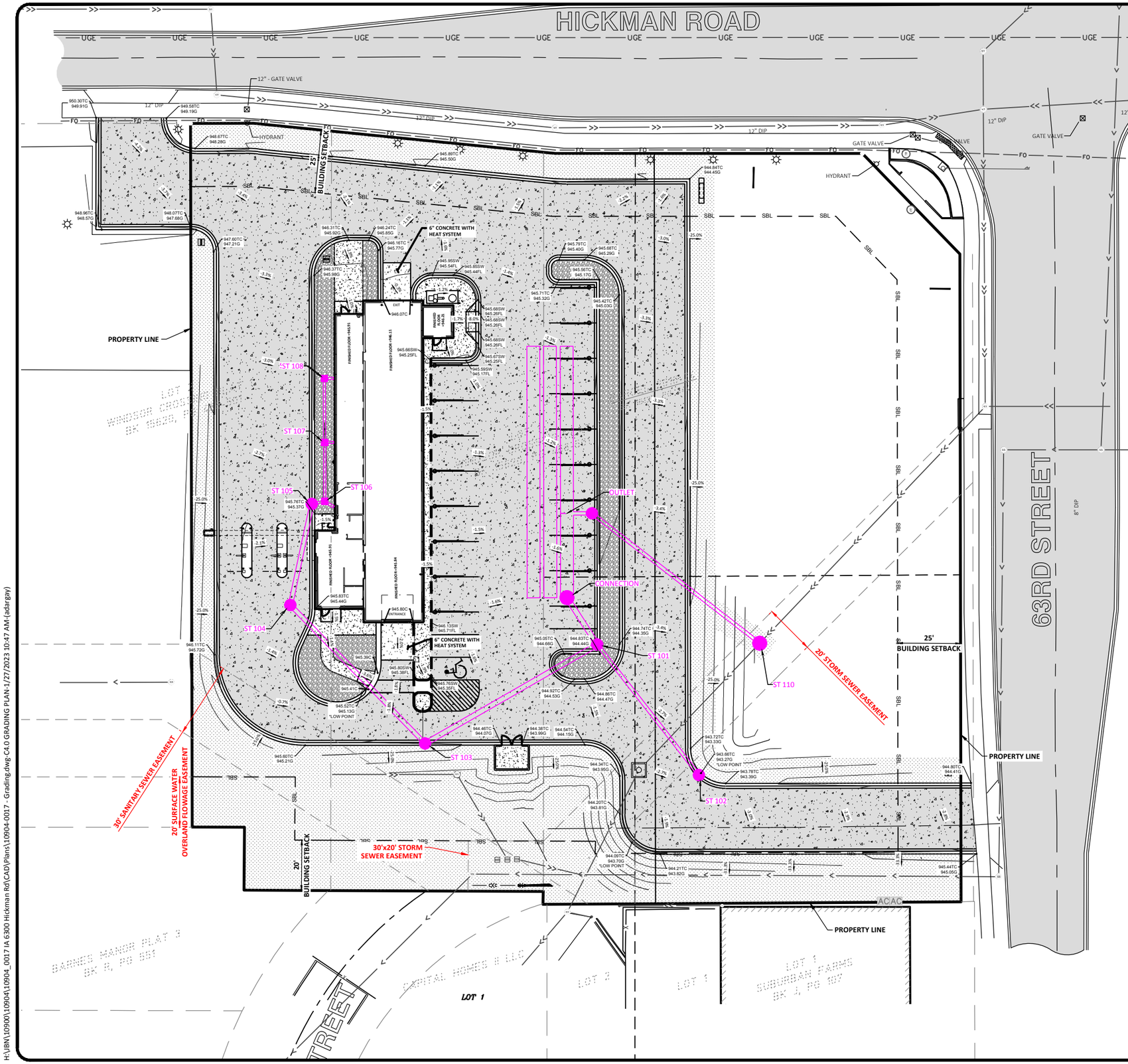
REVIEW ONLY - NOT FOR CONSTRUCTION



N

Scale 20 0 20 40 Feet

LEGEND

	EXISTING	NEW
WATER MAIN	W	W
SANITARY SEWER MAIN	SS	SS
STORM SEWER MAIN	STS	STS
STORM INLET		
SANITARY MANHOLE	SS	
STORM MANHOLE	ST	
FIRE HYDRANT		
GATE VALVE		
AC UNIT	AC	
GAS METER	GM	
TRANSFORMER	T	
UNDERGROUND FIBER OPTIC	FO	
DECIDUOUS TREE		
GUARD POST		
GUARD RAIL		
SPOT ELEVATION	x897.16G	898.55TC 898.05G
STANDARD CURB & GUTTER		
MOUNTABLE CURB & GUTTER		
CURB & INVERTED GUTTER		
BUILDING		
NEW 4" CONCRETE		
NEW 5" CONCRETE		
NEW 8" HEATED CONCRETE		
NEW 12" MEDIAN ISLAND CONCRETE		
THICKENED EDGE SIDEWALK		
DRAINAGE DIRECTION		
IRON MONUMENT FOUND	●	
IRON MONUMENT SET	○	

GRADING NOTES:

1. ALL SIDEWALKS SHALL HAVE A MAXIMUM 2% CROSS SLOPE AND LONGITUDINAL SLOPE OF 5% EXCEPT CURB RAMPS WHICH SHALL HAVE A MAXIMUM SLOPE OF 1:12; REFER TO DETAIL.
2. ALL CURB RAMPS SHALL HAVE DETECTABLE WARNING PANELS INSTALLED.
3. ALL WORK DONE IN THE RIGHT-OF-WAY SHALL CONFORM TO THE CITY OF WINDSOR HEIGHTS STANDARD SPECIFICATIONS.
4. ALL HANDICAPPED STALLS SHALL HAVE SIGNING INSTALLED PER DETAILS.
5. ALL HANDICAPPED STALLS SHALL BE STRIPED PER DETAIL.
6. EXCAVATION OR OTHER WORK IN THE RIGHT OF WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT OF WAY WILL BE ISSUED.
7. BUILDING HAS MULTIPLE FINISHED FLOOR ELEVATIONS. REFER TO ARCHITECTURAL & STRUCTURAL PLANS FOR DETAILS
8. FINISHED FLOOR ELEVATION AT NORTH TUNNEL ENTRANCE SHALL BE AT 911.60 MINIMUM PER GRADING PLAN.
9. BUILDING FINISH FLOOR ELEVATION SHOWN (100'0" ARCHITECTURAL ELEVATION) IS THAT OF THE LOBBY & MECHANICAL ROOM AREAS. FINISH FLOOR OF THE TUNNEL VARIES FROM ENTRANCE TO EXIT. TUNNEL FLOOR SHALL SLOPE UP FROM ENTRANCE AT A RATE OF ½" PER 10' TOWARDS THE TUNNEL EXIT. TUNNEL EXIT FFE SHALL BE 912.00.

1	GRADING PLAN REVISION	11-2-2022 APD
2	GRADING PLAN REVISION	11-16-2022 JEN

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

GRADING PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C4.0

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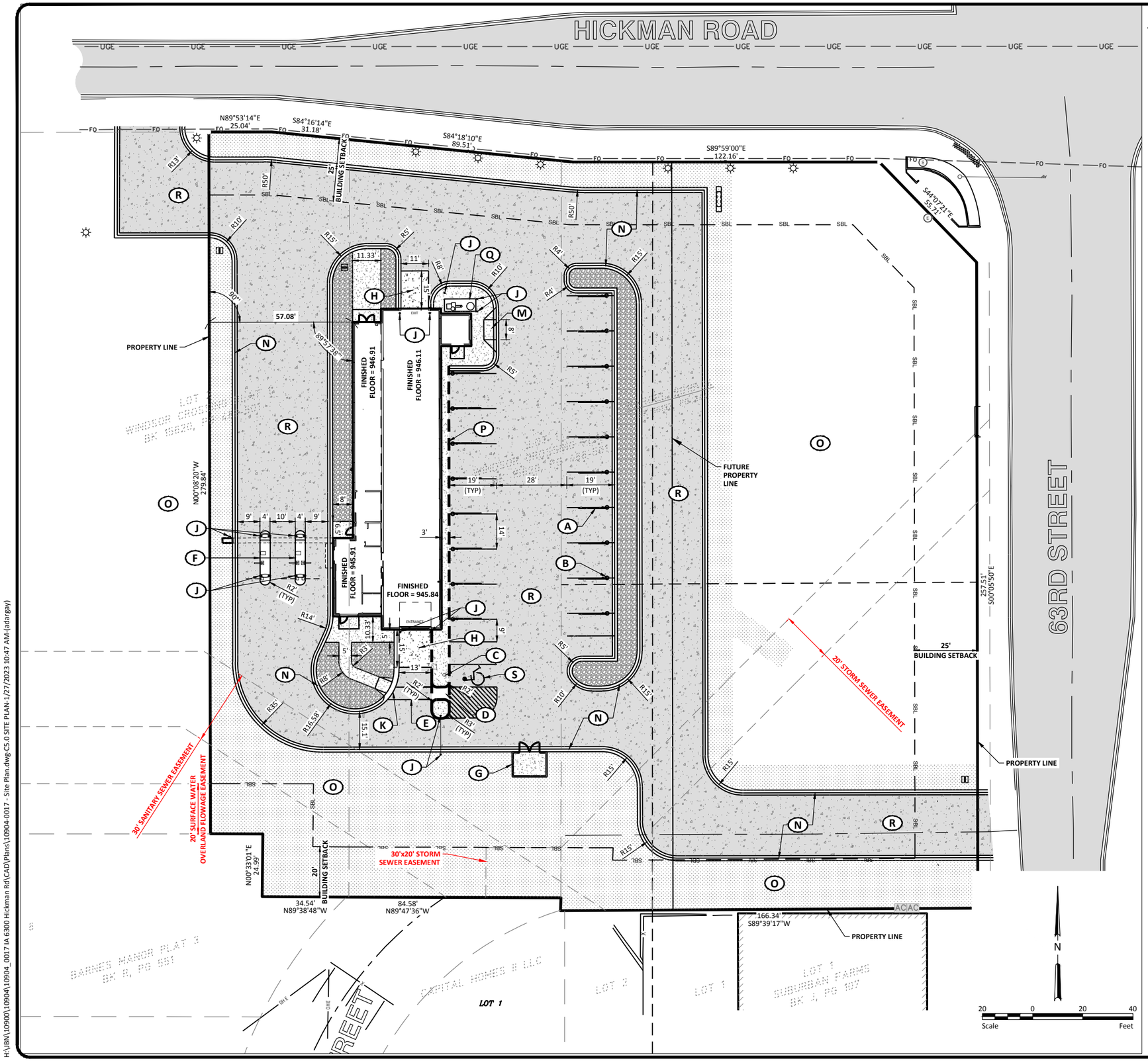

LEGEND

	EXISTING	NEW
WATER MAIN	W	W
SANITARY SEWER MAIN	SS	SS
STORM SEWER MAIN	STS	STS
STORM INLET		
SANITARY MANHOLE	SS	
STORM MANHOLE	ST	
FIRE HYDRANT		
GATE VALVE		
AC UNIT	AC	
GAS METER	GM	
TRANSFORMER	T	
UNDERGROUND FIBER OPTIC	FO	
DECIDUOUS TREE		
SIGN		
STANDARD CURB & GUTTER		
MOUNTABLE CURB & GUTTER		
CURB & INVERTED GUTTER		
BUILDING		
NEW 4" CONCRETE		
NEW 5" CONCRETE		
NEW 8" HEATED CONCRETE		
NEW 12" MEDIAN ISLAND CONCRETE		
THICKENED EDGE SIDEWALK		
DRAINAGE DIRECTION		
IRON MONUMENT FOUND		
IRON MONUMENT SET		

PAVING NOTES:

1. ALL WORK DONE IN THE RIGHT OF WAY SHALL CONFORM TO THE CITY OF WINDSOR HEIGHTS STANDARD SPECIFICATIONS.
2. ALL HANDICAPPED STALLS SHALL HAVE SIGNING INSTALLED PER DETAIL.
3. HANDICAPPED STALLS SHALL BE STRIPED PER DETAIL.
4. SLOPE IN HANDICAP LOADING/UNLOADING ZONES SHALL NOT EXCEED 2% CROSS SLOPE AND ON ANY HANDICAP ACCESSIBLE ROUTE SHALL NOT EXCEED 2%.
5. ALL CURB RAMPS SHALL HAVE DETECTABLE WARNING PANELS INSTALLED.
6. ALL MANHOLES AND STORM SEWER INLETS LOCATED IN THE PAVEMENT SHALL HAVE CONCRETE COLLARS INSTALLED PER THE DETAILS.
7. ALL DISTANCES SHOWN ARE TO BACK OF CURB.
8. EXCAVATION OR OTHER WORK IN THE RIGHT OF WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT OF WAY WILL BE ISSUED.
9. ALL SIGNING SHALL CONFORM WITH THE CURRENT VERSION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

KEYNOTES:

- (A) VACUUM SYSTEM, REFER TO PLANS AND DETAILS (BY OTHERS) FOR EXACT SIZE AND LOCATION.
- (B) CONCRETE FOUNDATION FOR VACUUM POST, INSTALL ISOLATION JOINT AT FOUNDATION PER DETAILS.
- (C) HANDICAPPED SIGN AT 1'-0" BEHIND EDGE OF SIDEWALK, PER DETAILS.
- (D) DROPPED SIDEWALK AT HANDICAPPED ACCESS AISLE.
- (E) 4" WHITE PAINTED MARKINGS AT CROSSWALKS.
- (F) RAISED ISLAND SECTION, CONTRACTOR SHALL COORDINATE INSTALLATION OF ALL CONDUITS, FOOTINGS, AND STRUCTURES IN PROPOSED ISLANDS. ISLAND SECTION TO BE POURED SEPARATELY FROM PAVEMENT SECTION AND INSTALL ISOLATION JOINT AROUND ISLAND SECTION.
- (G) SCREENING AT TRASH ENCLOSURE, REFER TO ARCHITECTURAL PLANS AND DETAILS.
- (H) 8" HEATED CONCRETE, SEE DETAILS.
- (J) BOLLARD, SEE DETAILS.
- (K) RIBBON CURB.
- (L) LIGHT POLE - SEE LIGHTING PLAN
- (M) INSTALL CURB RAMP PER DETAILS.
- (N) MOUNTABLE CURB AND GUTTER.
- (O) LAWN AREA, SEE LANDSCAPING PLANS
- (P) INTEGRAL CONCRETE SIDEWALK - SEE DETAILS
- (Q) VACUUM PRODUCER, SEE DETAILS
- (R) NEW CONCRETE
- (S) ADA SYMBOL PER LOCAL ZONING REQUIREMENTS. PAINT COLOR: SILVERSTAR RED

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

SITE PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C5.0

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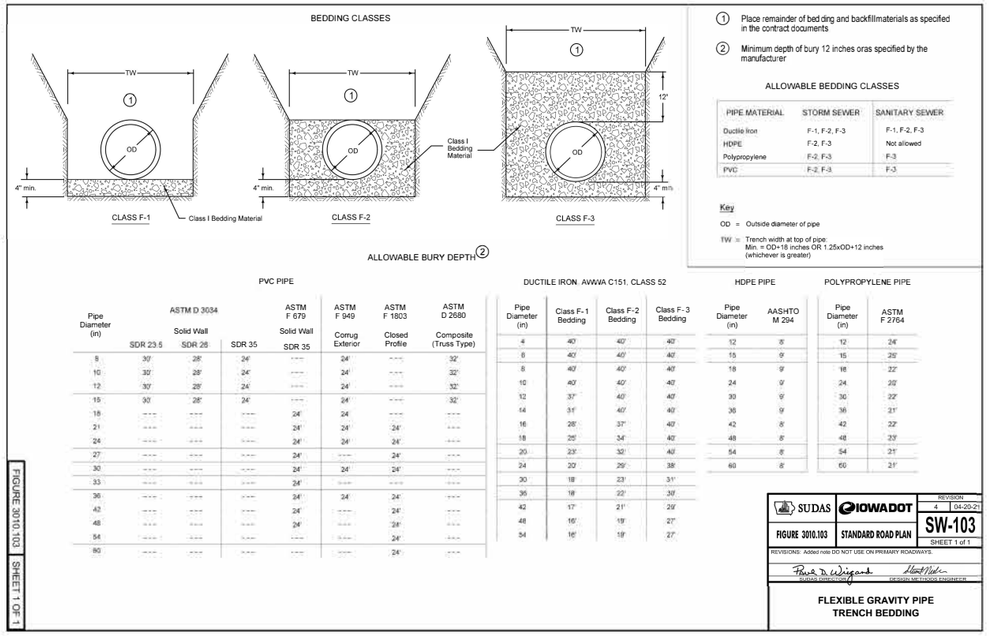

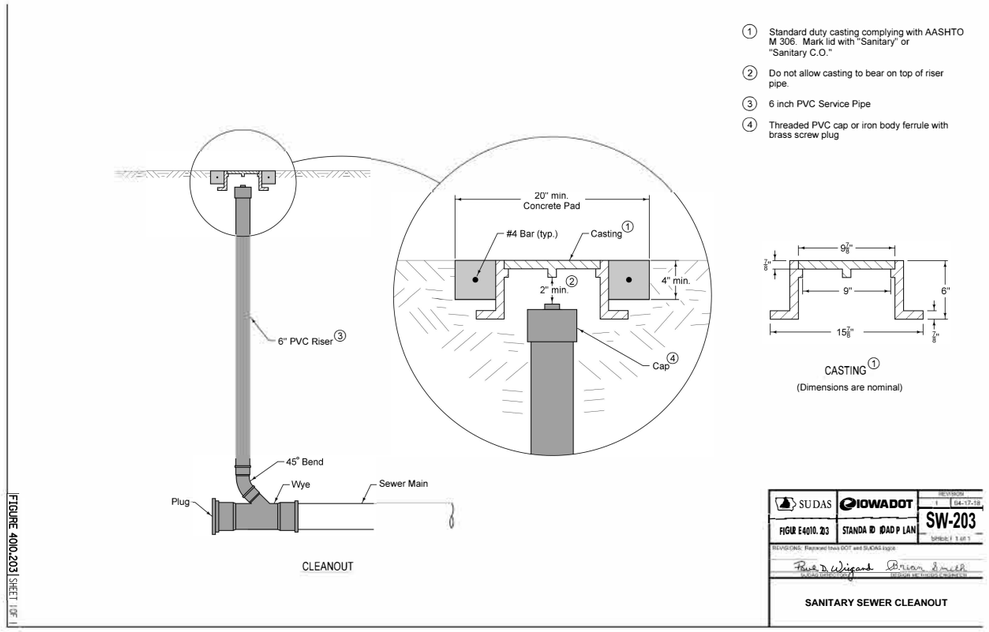

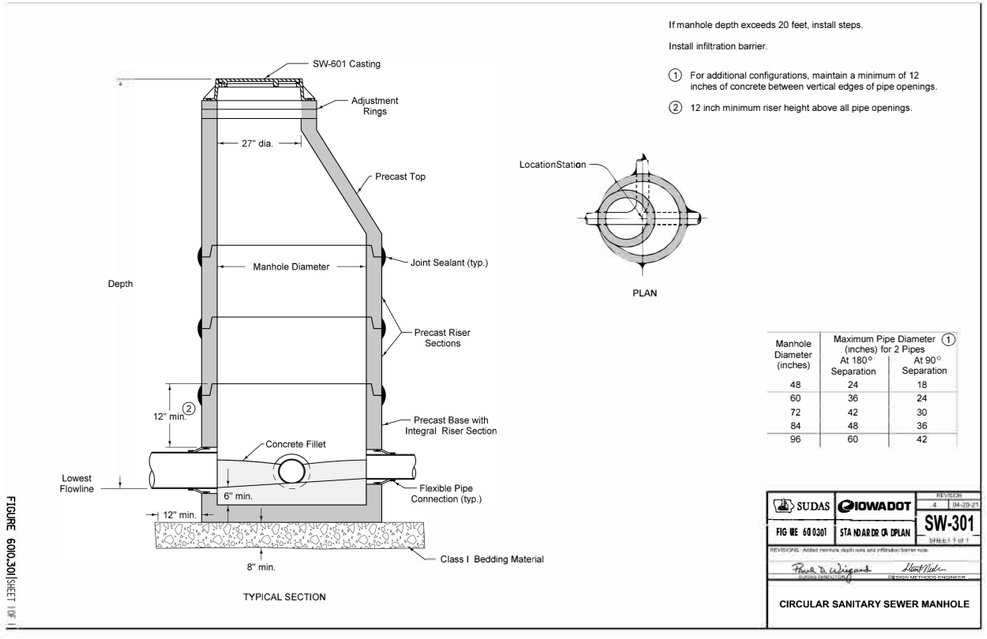

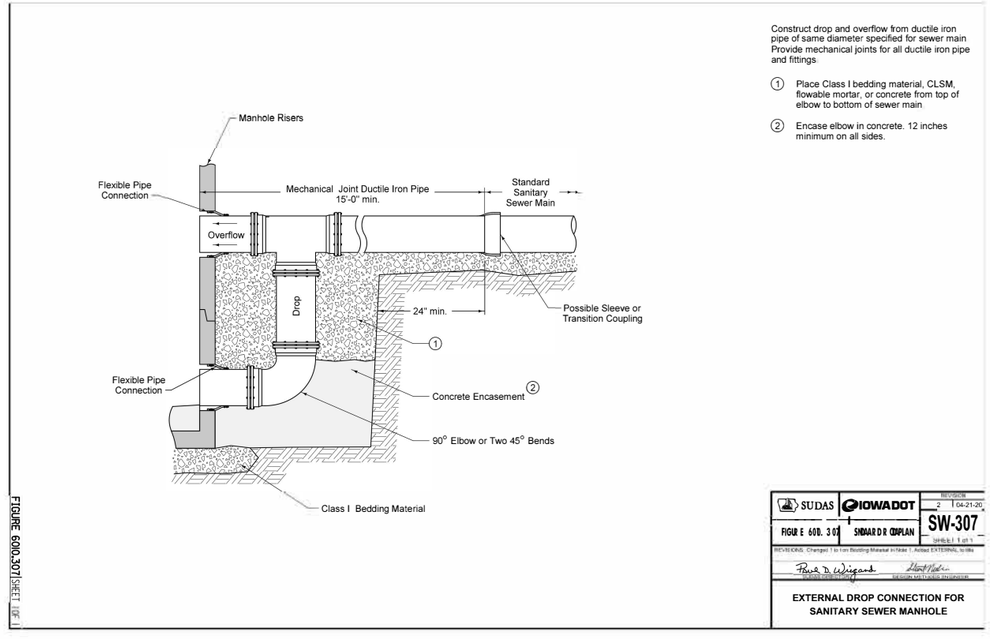

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD.
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.0

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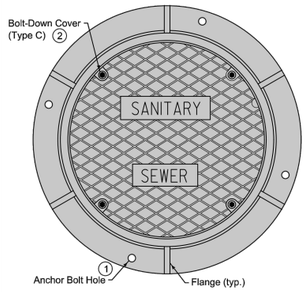
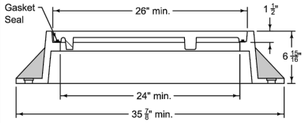
TYPE A
Two-piece fixed casting

TYPE C
Two-piece fixed casting with bolt-down cover (2)



PLAN

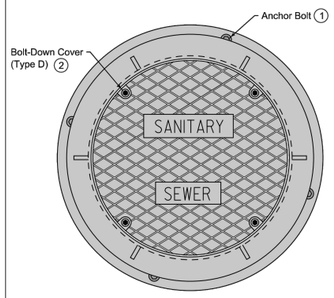


TYPICAL SECTION

FIGURE 6010.601 | SHEET 1 OF 2

TYPE B: HMA
Three-piece floating casting for use in HMA paving

TYPE D: HMA
Three-piece floating casting with bolt-down cover for use in HMA paving (2)



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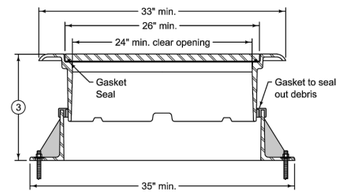


TYPICAL SECTION

Frame Notes:
Size, spacing, and number of lugs and flanges may vary.

Cover Notes:
Roughness pattern and text style may vary. Minimum one concealed pickhole.

(1) Anchor the lower frame of all three-piece castings to the manhole structure. When specified in the contract documents, anchor the frame of two-piece castings to the manhole structure. If casting frame does not include anchor holes or slots, drill four 7/8 inch diameter holes, equally spaced around the frame.

(2) If specified, furnish bolt down frame and cover with four 1/2 inch minimum diameter stainless steel, hex nut, recessed cap screws. Secure cover with screws, washers, and rubber gasket seals.

(3) Casting height varies. Minimum adjustment range of 4 inches.

SUDAS	IOWADOT	REVISION 4 04-21-20
FIGURE 6010.601	STANDARD ROAD PLAN	SW-601 SHEET 1 of 2

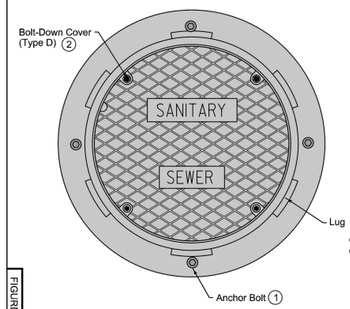
REVISIONS: Add option for 3-piece HMA casting

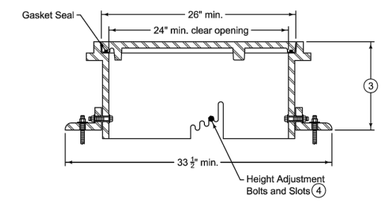
Ryan D. Wiegand — RURAL DESIGN ENGINEER
Mark Nahra — DESIGN METHODS ENGINEER

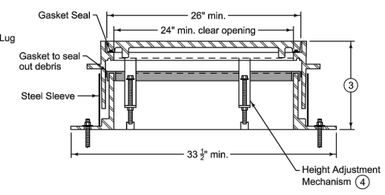
CASTINGS FOR SANITARY SEWER MANHOLES

TYPE B: PCC
Three-piece floating casting for use in PCC paving and PCC boxouts

TYPE D: PCC
Three-piece floating casting with bolt-down cover for use in PCC paving and PCC boxouts







TYPICAL SECTION (5)

Frame Notes:
Size, spacing, and number of lugs and flanges may vary.

Cover Notes:
Roughness pattern and text style may vary. Minimum one concealed pickhole.

(1) Anchor the lower frame of all three-piece castings to the manhole structure. When specified in the contract documents, anchor the frame of two-piece castings to the manhole structure. If casting frame does not include anchor holes or slots, drill four 7/8 inch diameter holes, equally spaced around the frame.

(2) If specified, furnish bolt down frame and cover with four 1/2 inch minimum diameter stainless steel, hex nut, recessed cap screws. Secure cover with screws, washers, and rubber gasket seals.

(3) Casting height varies. Minimum adjustment range of 4 inches.

(4) Set casting at proper grade using the adjustment slots or adjustment mechanism. Remove bolts or mechanism upon completion of paving.

(5) Height adjustment method may vary; two options are shown.

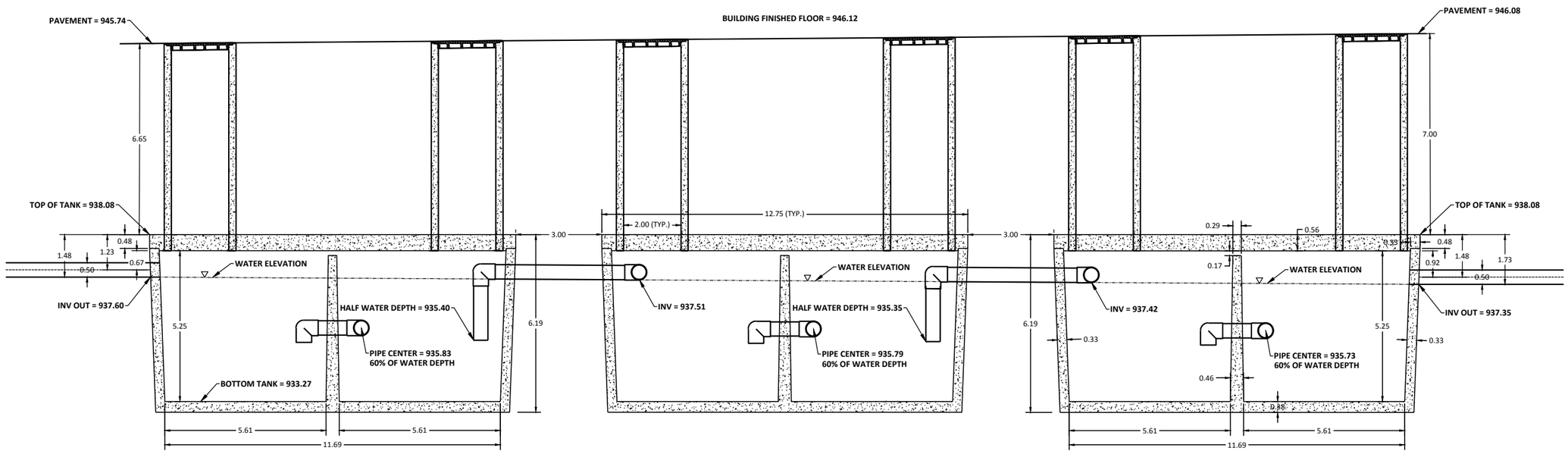
SUDAS	IOWADOT	REVISION 4 04-21-20
FIGURE 6010.601	STANDARD ROAD PLAN	SW-601 SHEET 2 of 2

REVISIONS: Add option for 3-piece HMA casting

Ryan D. Wiegand — RURAL DESIGN ENGINEER
Mark Nahra — DESIGN METHODS ENGINEER

CASTINGS FOR SANITARY SEWER MANHOLES

FIGURE 6010.601 | SHEET 2 OF 2



RECLAIM TANK DETAIL
NOT TO SCALE

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD.
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.1

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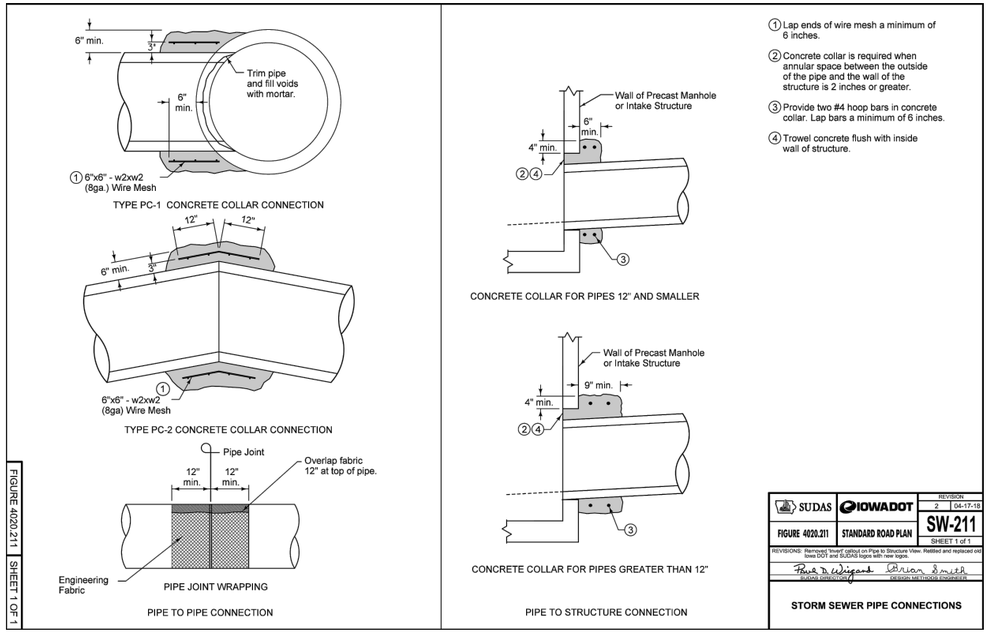
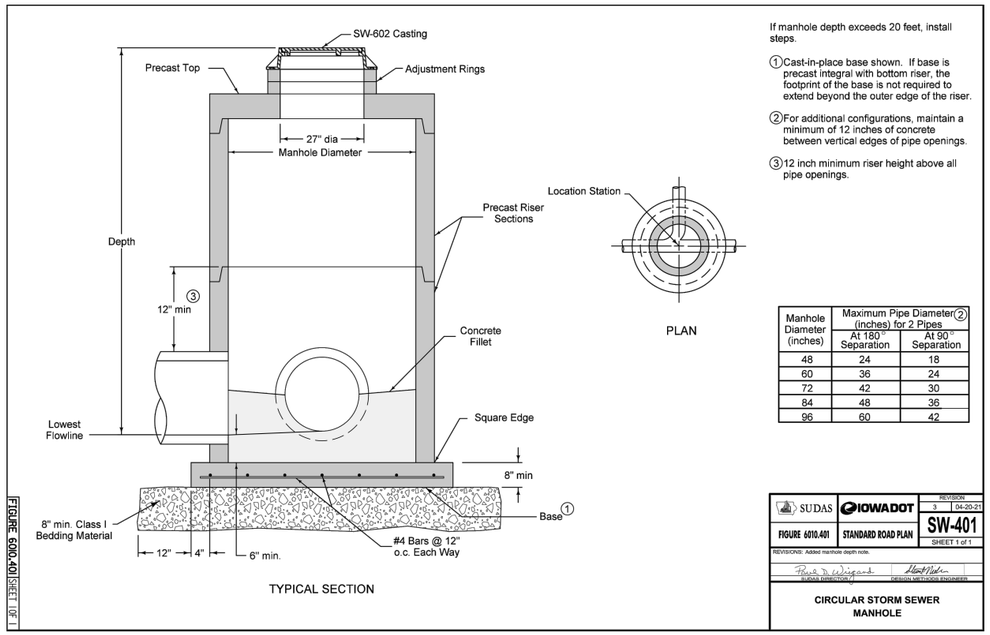
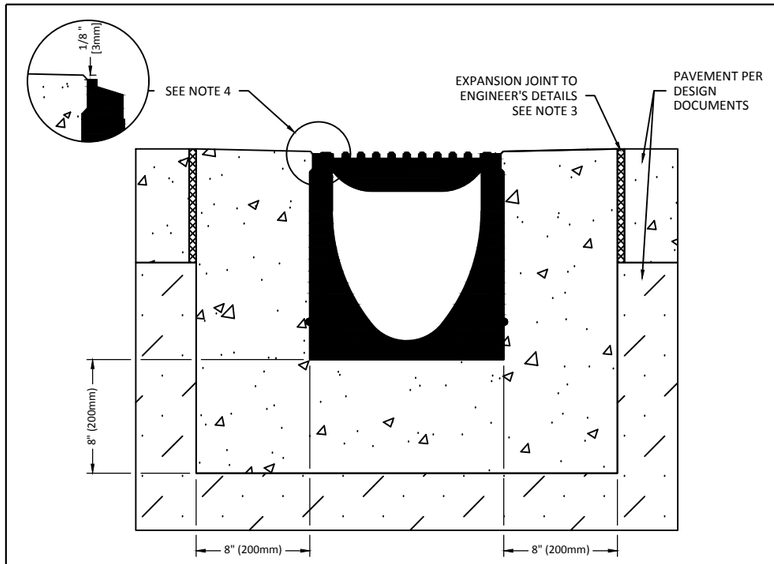




Manhole Diameter (inches)	Maximum Pipe Diameter (2) (inches) for 2 Pipes	
	At 180° Separation	At 90° Separation
48	24	18
60	36	24
72	42	30
84	48	36
96	60	42

NOTE:

ACO TRENCH DRAIN DETAIL SHOW FOR REFERENCE ONLY. CONTRACTOR SHALL SUBMIT FINAL SPECIFICATIONS & DETAILS TO ENGINEER FOR REVIEW & APPROVAL PRIOR TO START CONSTRUCTION.



NOTES:
1. IT IS NECESSARY TO ENSURE MINIMUM DIMENSIONS SHOWN ARE SUITABLE FOR EXISTING GROUND CONDITIONS. *ENGINEERING ADVICE MAY BE REQUIRED.*
2. MINIMUM CONCRETE STRENGTH OF 4,000 PSI IS RECOMMENDED. CONCRETE SHOULD BE VIBRATED TO ELIMINATE AIR POCKETS.
3. EXPANSION AND CONTRACTION CONTROL JOINTS AND REINFORCEMENT ARE RECOMMENDED TO PROTECT CHANNEL AND CONCRETE SURROUND. *ENGINEERING ADVICE MAY BE REQUIRED.*
4. THE FINISHED LEVEL OF THE CONCRETE SURROUND MUST BE APPROX. 1/8" [3mm] ABOVE THE TOP OF THE CHANNEL EDGE.
5. CONCRETE BASE THICKNESS SHOULD MATCH SLAB THICKNESS. ENGINEERING ADVICE MAY BE REQUIRED TO DETERMINE PROPER LOAD CLASS.
6. REFER TO ACO'S LATEST INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS.

SPECIFICATION CLAUSE

S200K POWERDRAIN - LOAD CLASS D

GENERAL
THE SURFACE DRAINAGE SYSTEM SHALL BE POLYMER CONCRETE S200K CHANNEL SYSTEM WITH DUCTILE IRON EDGE RAILS AS MANUFACTURED BY ACO POLYMER PRODUCTS, INC.

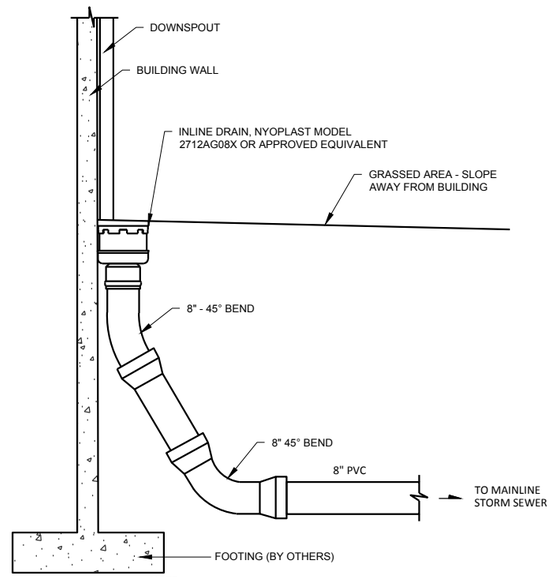
MATERIALS
CHANNELS SHALL BE MANUFACTURED FROM POLYESTER RESIN POLYMER CONCRETE WITH AN INTEGRALLY CAST-IN DUCTILE IRON EDGE RAIL. MINIMUM PROPERTIES OF POLYMER CONCRETE WILL BE AS FOLLOWS:

COMPRESSIVE STRENGTH:	14,000 PSI
FLEXURAL STRENGTH:	4,000 PSI
TENSILE STRENGTH:	1,500 PSI
WATER ABSORPTION:	0.07%
FROST PROOF	YES
DILUTE ACID AND ALKALI RESISTANT	YES
B117 SALT SPRAY TEST COMPLIANT	YES

THE SYSTEM SHALL BE 8" (200mm) NOMINAL INTERNAL WIDTH WITH A 10.2" (260mm) OVERALL WIDTH AND A BUILT-IN SLOPE OF 0.5%. CHANNEL INVERT SHALL HAVE DEVELOPED "V" SHAPE. ALL CHANNELS SHALL BE INTERLOCKING WITH A MALE/FEMALE JOINT.

THE COMPLETE DRAINAGE SYSTEM SHALL BE BY ACO POLYMER PRODUCTS, INC. ANY DEVIATION OR PARTIAL SYSTEM DESIGN AND/OR IMPROPER INSTALLATION WILL VOID ANY AND ALL WARRANTIES PROVIDED BY ACO POLYMER PRODUCTS, INC.

CHANNEL SHALL WITHSTAND LOADING TO PROPER LOAD CLASS AS OUTLINED BY EN 1433. GRATE TYPE SHALL BE APPROPRIATE TO MEET THE SYSTEM LOAD CLASS SPECIFIED AND INTENDED APPLICATION. GRATES SHALL BE SECURED USING 'POWERLOK' BOLTLESS LOCKING SYSTEM. CHANNEL AND GRATE SHALL BE CERTIFIED TO MEET THE SPECIFIED EN 1433 LOAD CLASS. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.



NOTE:

VERIFY EXACT LOCATIONS WITH ARCHITECTURAL DRAWING, I.E. DOWNSPOUT LOCATIONS

DOWNSPOUT INLETS

NOT TO SCALE

SILVERSTAR CARWASH
6300 HICKMAN RD.
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET C6.2

No. | Revision | Date | By

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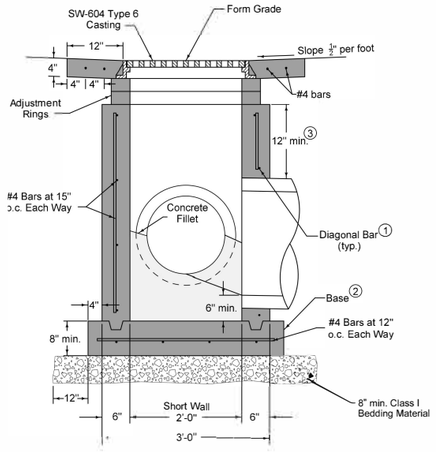
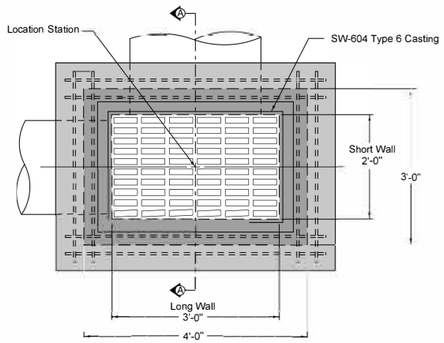


SECTION A-A



PLAN

① Install four #4 diagonal bars at all pipe openings.

② Cast-in-place base shown. If base is precast integral with walls, the footprint of the base is not required to extend beyond the outer edge of the walls.

③ 12 inch minimum wall height above all pipes.

MAXIMUM PIPE DIAMETERS

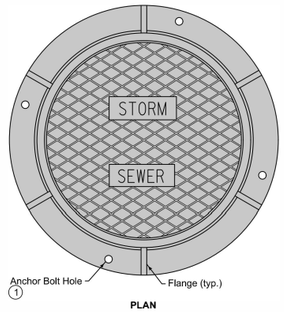
Pipe Location	Precast Structure	Cast-in-place Structure
Short Wall	15"	18"
Long Wall	24"	30"

SUDAS | IOWA DOT | REVISION 2 04-21-20
FIGURE 6010.511 | STANDARD ROAD PLAN | SW-511 | SHEET 1 OF 1
REVISIONS: Added Class I Bedding Material.
RUDAS DIRECTOR | DESIGN METHODS ENGINEER

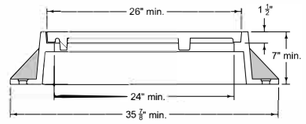
RECTANGULAR AREA INTAKE

FIGURE 6010.511 | SHEET 1 OF 1

TYPE E
Two-piece fixed casting

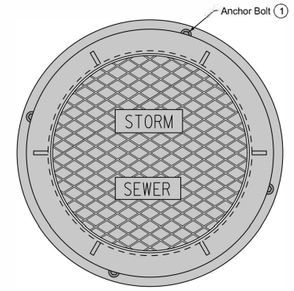


PLAN

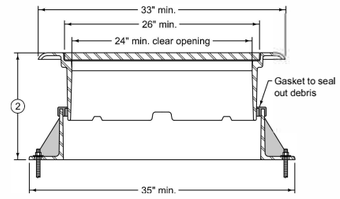


TYPICAL SECTION

TYPE F: HMA
Three-piece floating casting for use in HMA paving



PLAN



TYPICAL SECTION

Frame Notes:
Size, spacing, and number of lugs and flanges may vary.

Cover Notes:
Roughness pattern and text style may vary. Minimum one pickhole.

① Anchor the lower frame of all three-piece castings to the manhole structure. When specified in the contract documents, anchor the frame of two-piece castings to the manhole structure. If casting frame does not include anchor holes or slots, drill four 7/8 inch diameter holes, equally spaced around the frame.

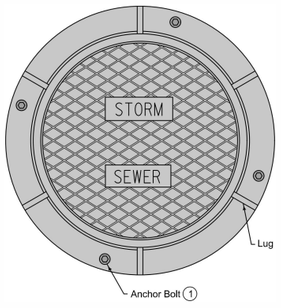
② Casting height varies. Minimum adjustment range of 4 inches.

SUDAS | IOWA DOT | REVISION 4 04-21-20
FIGURE 6010.602 | STANDARD ROAD PLAN | SW-602 | SHEET 1 of 3
REVISIONS: Add option for 3-piece HMA casting
RUDAS DIRECTOR | DESIGN METHODS ENGINEER

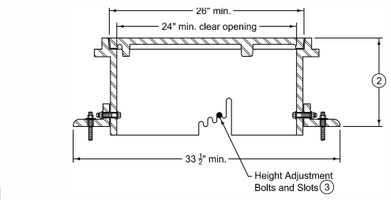
CASTINGS FOR STORM SEWER MANHOLES

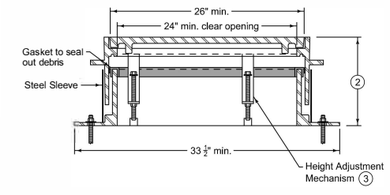
FIGURE 6010.602 | SHEET 1 OF 3

TYPE F: PCC
Three-piece floating casting for use in PCC paving and PCC boxouts



PLAN





TYPICAL SECTION ④

Frame Notes:
Size, spacing, and number of lugs and flanges may vary.

Cover Notes:
Roughness pattern and text style may vary. Minimum one pickhole.

① Anchor the lower frame of all three-piece castings to the manhole structure. When specified in the contract documents, anchor the frame of two-piece castings to the manhole structure. If casting frame does not include anchor holes or slots, drill four 7/8 inch diameter holes, equally spaced around the frame.

② Casting height varies. Minimum adjustment range of 4 inches.

③ Set casting at proper grade using the adjustment slots or adjustment mechanism. Remove bolts or mechanism upon completion of paving.

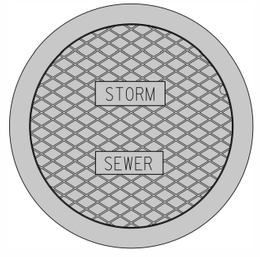
④ Height adjustment method may vary; two options are shown.

SUDAS | IOWA DOT | REVISION 4 04-21-20
FIGURE 6010.602 | STANDARD ROAD PLAN | SW-602 | SHEET 2 of 3
REVISIONS: Add option for 3-piece HMA casting
RUDAS DIRECTOR | DESIGN METHODS ENGINEER

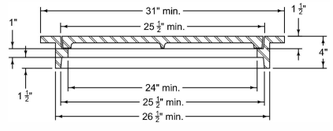
CASTINGS FOR STORM SEWER MANHOLES

FIGURE 6010.602 | SHEET 2 OF 3

TYPE G
Two piece fixed casting



PLAN



TYPICAL SECTION

Cover Notes:
Roughness pattern and text style may vary. Minimum one pickhole.

SUDAS | IOWA DOT | REVISION 4 04-21-20
FIGURE 6010.602 | STANDARD ROAD PLAN | SW-602 | SHEET 3 of 3
REVISIONS: Add option for 3-piece HMA casting
RUDAS DIRECTOR | DESIGN METHODS ENGINEER

CASTINGS FOR STORM SEWER MANHOLES

FIGURE 6010.602 | SHEET 3 OF 3

SILVERSTAR CARWASH
6300 HICKMAN RD.
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C6.3

No. | Revision | Date | By

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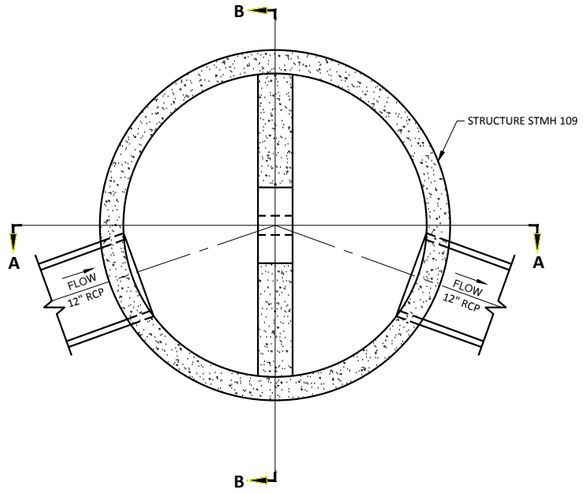
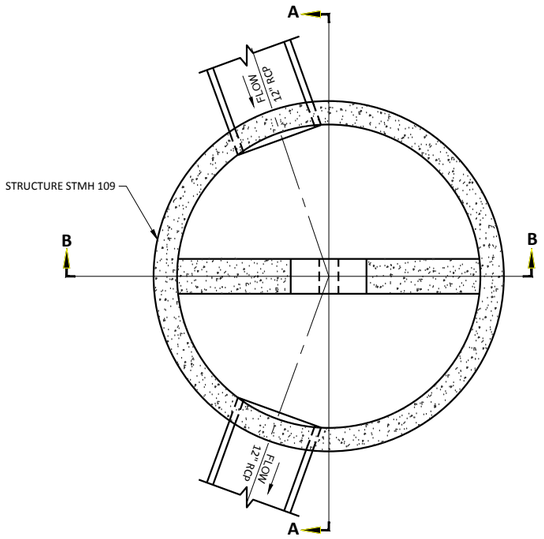


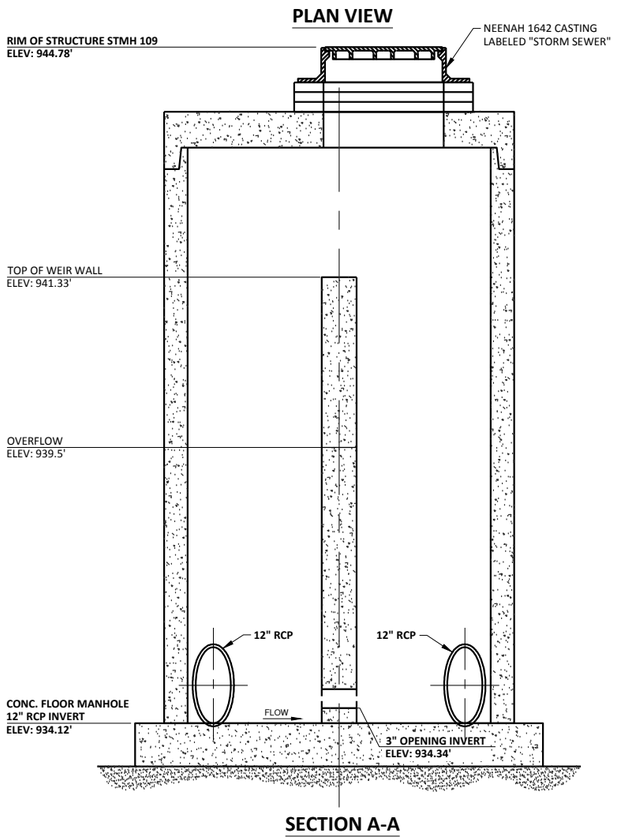


NOTES:

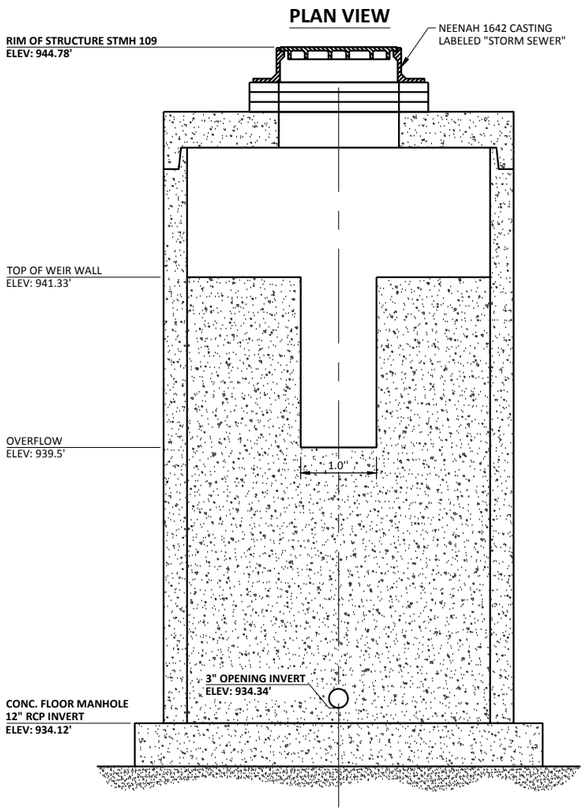
1. PRECAST CONCRETE MANHOLE AND BASE SECTIONS SHALL MEET THE REQUIREMENTS OF ASTM C-478 WITH "O" RING RUBBER GASKET JOINTS.
2. PRECAST TOP SLAB SHALL BE DESIGNED FOR AASHTO HS-25 HIGHWAY LOADING PLUS DEAD LOAD.
3. CONCRETE OR MORTAR IN KNOCK-OUTS AND ABOVE THE MANHOLE FLOOR SHALL MEET THE REQUIREMENTS OF ASTM C 270 AND MNDOT 2506.2B.
4. NON-SHRINK GROUT SHALL MEET THE REQUIREMENTS OF ASTM C 1107.
5. FRAME GUIDES, INVERT AND STOP LOGS SHALL BE 6061-T6 ALUMINUM.
6. FASTENERS, NUTS AND BOLTS SHALL BE STAINLESS STEEL, TYPE 304, ASTM A276.
7. THE CONTRACTOR SHALL PROVIDE 10-EACH, 6-INCH HIGH, ALUMINUM STOP LOGS.

STAINLESS STEEL ANCHOR BOLT NOTES:

1. ALL ANCHOR BOLTS SHALL BE STAINLESS STEEL STUD ANCHORS AND HAVE A MINIMUM DIAMETER OF 1/2-INCH.
2. ANCHOR HOLES SHALL BE DRILLED TO PROPER DEPTHS AND DIAMETERS AS PER MANUFACTURER'S RECOMMENDATIONS AND CLEANED FREE OF CONCRETE DUST USING AIR HOSE.
3. "RED HEAD EPOXY" OR OTHER ENGINEER APPROVED EPOXY ADHESIVE SHALL BE PLACED IN HOLE PRIOR TO SETTING ANCHORS. CONTRACTOR WILL USE EPOXY IN EVERY LOCATION OF STAINLESS STEEL ANCHOR BOLTS.
4. ANCHOR NUTS SHALL BE TIGHTENED TO MANUFACTURER'S RECOMMENDED TORQUE SPECIFICATION.



SECTION A-A



SECTION B-B

48" CBMH DETAIL - STRUCTURE STMH 109

1:1 SCALE

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.4

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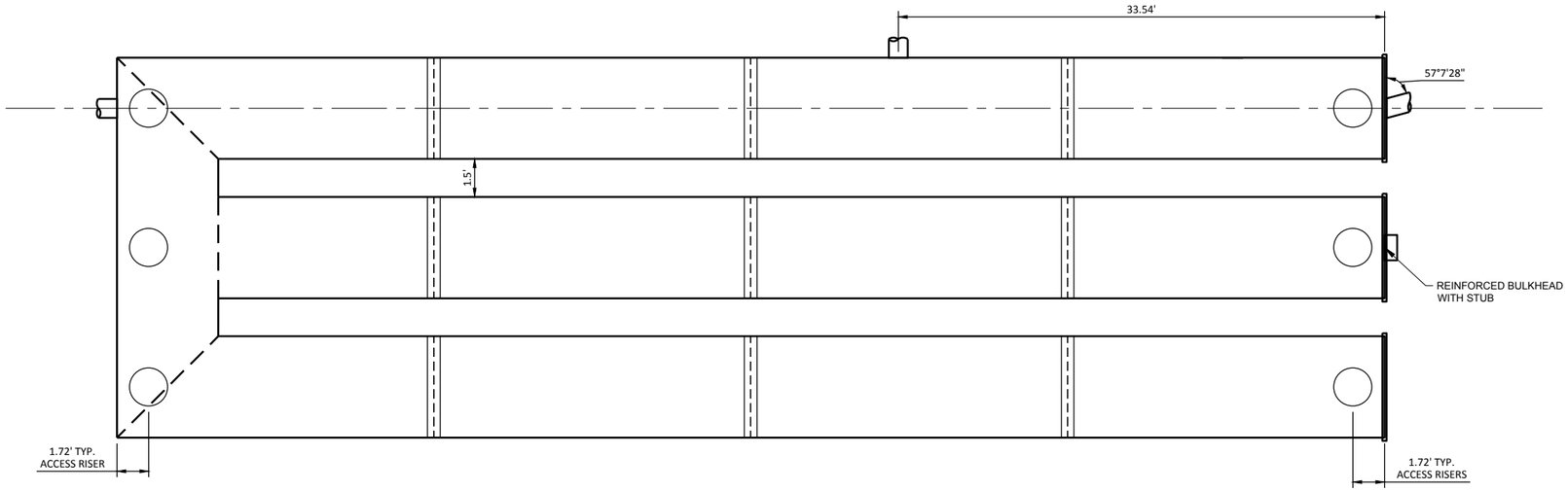
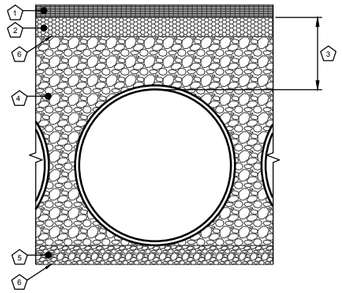




KEY

1.) RIGID OR FLEXIBLE PAVEMENT

2.) GRANULAR ROAD BASE

3.) 12" MIN. MEASURED TO TOP OF RIGID OR BOTTOM OF FLEXIBLE PAVEMENT.

4.) FREE DRAINING ANGULAR WASHED STONE 3/4" - 2" MIN. PARTICLE SIZE.

5.) GRANULAR BEDDING, ROUGHLY SHAPED TO FIT THE BOTTOM OF PIPE, 4"- 6" IN DEPTH.

6.) CONTECH C-40 OR C-45 NON-WOVEN GEOTEXTILE REQUIRED, WRAPPING TRENCH ONLY.

FOUNDATION/BEDDING PREPARATION

PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, THE 4 INCHES OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

TESTING SHALL BE COMPLETED TO VERIFY THAT INFILTRATION RATES EXCEED 0.45 IN/HR. CONTRACTOR SHALL NOTIFY THE CITY IN ADVANCE OF TESTING AND PROVIDE RESULTS TO CITY PRIOR TO CHAMBER INSTALLATION. IF INFILTRATION RATES DO NOT MEET OR EXCEED 0.45 IN/HR, THE ENGINEER AND CITY SHALL BE NOTIFIED. SOIL AMENDMENTS (SANDY BACKFILL) UP TO 5' IN DEPTH MAY BE REQUIRED WHERE UNSUITABLE INFILTRATION RATES EXISTS.

BACKFILL

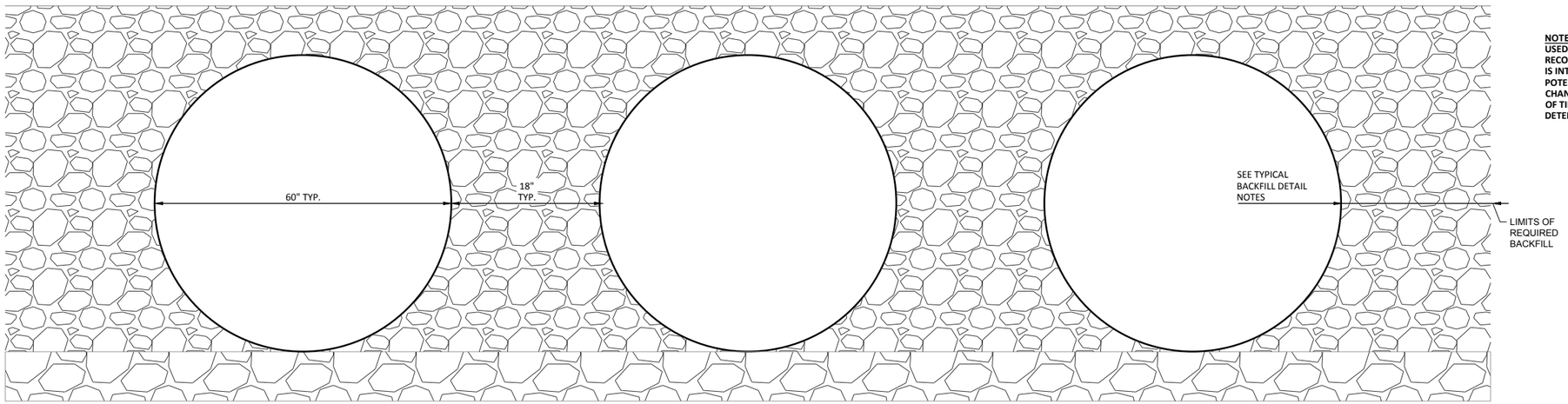
THE BACKFILL MATERIAL SHALL BE FREE-DRAINING ANGULAR WASHED STONE 3/4" - 2" PARTICLE SIZE. MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL- SLICING, RODDING, AIR-TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE PROJECT ENGINEER OR HIS REPRESENTATIVE IS SATISFIED WITH THE LEVEL OF COMPACTION. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT, AND MAINTAINING BALANCED LOADING ON ALL PIPES IN THE SYSTEM, DURING ALL SUCH OPERATIONS.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

BACKFILL DETAIL
NOT TO SCALE

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.



TYPICAL SECTION VIEW
NOT TO SCALE

UNDERGROUND STORMWATER STORAGE SYSTEM
NOT TO SCALE

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C6.5

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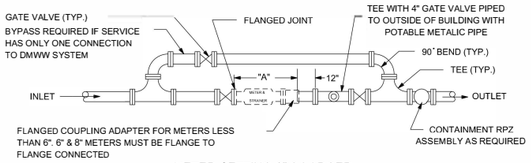


METER SETTING 3" & LARGER

DIMENSION "A"

SIZE OF METER	TURBINE METER		TRU FLOW COMPOUND METER		FIRE TURBINE		PROTECTUS III	
	FLANGE COUPLING ADAPTOR	FLANGE TO FLANGE	FLANGE COUPLING ADAPTOR	FLANGE TO FLANGE	FLANGE COUPLING ADAPTOR	FLANGE TO FLANGE	FLANGE COUPLING ADAPTOR	FLANGE TO FLANGE
3"	19"	18 3/8"	24"	23 3/8"	26-3/4"	26-3/8"	N/A	N/A
4"	22"	21-7/8"	28-1/2"	27-7/8"	35-3/8"	35 1/4"	33-1/2"	33-1/4"
6"	N/A	27-7/8"	N/A	33-7/8"	N/A	45-1/8"	N/A	45 1/4"
8"	N/A	33 3/8"	N/A	N/A	N/A	51-5/16"	N/A	53 1/4"

NOTES:

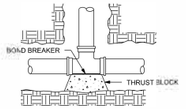
1. INSTALL 1/2" CONDUIT FROM METER TO AN ACCEPTABLE LOCATION FOR MOUNTING METER READING EQUIPMENT.
2. PIPE MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF DES MOINES PLUMBING CODE.
3. IF THE METER SETTING IS INSIDE A BLDG. 4" PIPE MUST BE INSTALLED FROM THE TEST TEE VALVE TO AN APPROVED LOCATION ON THE OUTSIDE WALL OF THE BUILDING.
4. THRUST RESTRAINTS MUST BE PROVIDED AT FLEXIBLE COUPLINGS AND FLANGED COUPLING ADAPTERS WHEN NECESSARY TO PREVENT LEAKAGE AND OVERSTRESSING OF THE PIPE.
5. METER SHALL BE NO MORE THAN 3' OFF THE FLOOR. PROVIDE PIPE SUPPORTS AT TEES OR AS REQUIRED IN METER PITS.
6. MINIMUM HORIZONTAL CLEARANCE FROM CENTER LINE OF METER TO WALL OR OTHER OBSTRUCTION SHALL BE 30" UNLESS OTHERWISE APPROVED BY DES MOINES WATER WORKS.

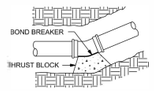
Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

STANDARD PLAN FOR METER & BYPASS INSTALLATION

SCALE: NONE | DATE: 05/10/1996
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 09/19/2016 JLH

512-21
FIGURE 21

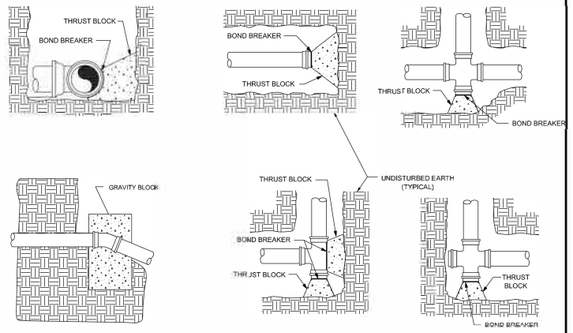




MINIMUM BEARING SURFACE (IN SQ. FT.)

SIZE OF PIPE	BENDS				TEE OR DEAD END
	11 1/4°	22 1/2°	45°	90°	
6"	1.00	1.25	2.25	4.50	3.00
8"	1.00	2.00	4.00	7.90	5.25
12"	2.00	4.25	8.25	16.00	11.00
16"	8.00	15.25	28.00	48.00	35.00
20"	8.50	16.50	32.00	57.00	40.00
24"	9.00	18.00	35.00	65.00	45.00

Note: Restrained joints may be used in lieu of blocking with prior approval from DMWW.

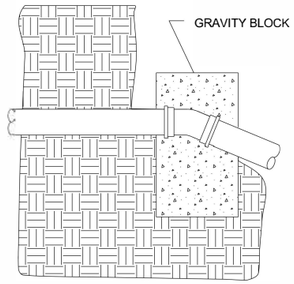


Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

CONCRETE THRUST BLOCK STANDARD

SCALE: NONE | DATE: 9-25-1992
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 04/29/2013 JLH

512-23
FIGURE 23



VOLUME OF GRAVITY BLOCK
CUBIC METERS (CUBIC YARDS)

PIPE SIZE (INCHES)	ANGLE OF DEFLECTION (DEGREES)			
	11.25	22.5	45	90
4	.16	.43	.90	1.35
6	.16	.43	.90	1.35
8	.30	.76	1.57	2.33
12	.65	1.63	3.33	4.92
16	1.16	2.85	5.80	8.56
20	1.78	4.37	8.91	13.14
24	2.47	6.17	12.63	18.64
30	3.82	9.51	19.43	28.66

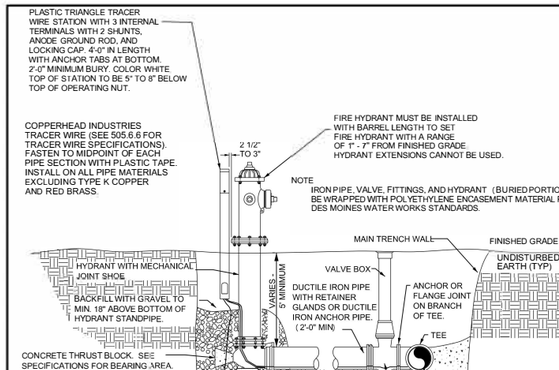
Note: Restrained joints may be used in lieu of blocking with prior approval from DMWW.

Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

CONCRETE GRAVITY BLOCK STANDARD

SCALE: NONE | DATE: 2-25-1997
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 04/29/2013 JLH

512-23A
FIGURE 23A



NOTE:
IRON PIPE, VALVE, FITTINGS AND HYDRANT (BURIED PORTION) TO BE WRAPPED WITH POLYETHYLENE ENCASEMENT MATERIAL PER DES MOINES WATER WORKS STANDARDS.

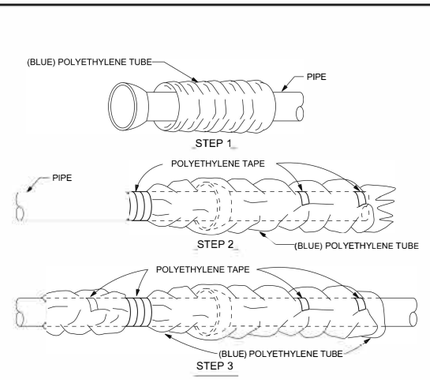
TRACER WIRE MAY BE INSTALLED IN PLASTIC CONDUIT FOR ADDITIONAL PROTECTION FROM POTENTIAL DAMAGE, BUT IT IS NOT REQUIRED.

Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

STANDARD HYDRANT DETAIL W/ TRACER WIRE

SCALE: NONE | DATE: 5-10-1996
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 07/06/2017 JLH

512-24
FIGURE 24



FIELD INSTALLATION - POLYETHYLENE WRAP

Step 1 - Place tube ofblue polyethylene material on pipe prior to lowering it into the trench.

Step 2 - Pull the tube over the length ofpipe. Tapetube to pipe at joint. Fold material aroundthe adjacent spigot end and wrap with tape to hold the plastic tube in place.

Step 3 - Overlap first tube with adjacent tube and and secure with plastic adhesive tape. The blue polyethylene tube covering the pipe shall be loose. Excess material shallbe neatly drawn up around the pipe barrel, folded on top of and taped in place.

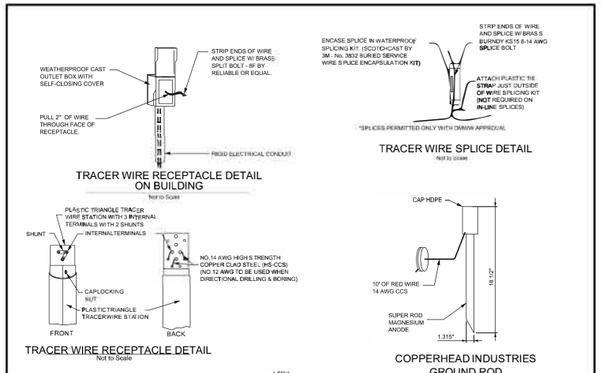
Note: Iron pipe fittings, including valves and hydrants shall be wrapped with two layers of blue polyethylene material. The wrapping shall extend atleast 1' beyond the fitting joints onto the adjoining pipe and shall be fastened to the pipe with plastic tape. Tape shall be used as needed to hold wrap in place. Either polyethylene sheets or slit tubingmay be used.

Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

POLYETHYLENE WRAP DETAIL

SCALE: NONE | DATE: 5-10-1995
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 04/29/2013 JLH

512-25
FIGURE 25



TRACER WIRE MAY BE INSTALLED IN PLASTIC CONDUIT FOR ADDITIONAL PROTECTION FROM POTENTIAL DAMAGE, BUT IT IS NOT REQUIRED.

Des Moines Water Works — Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

TRACER WIRE DETAIL

SCALE: NONE | DATE: 5-10-1996
DRAWN BY: DLH | APPROVED BY: TPC
REVISED: 08/05/2014 JLH

512-26
FIGURE 26

No.	Revision	Date	By

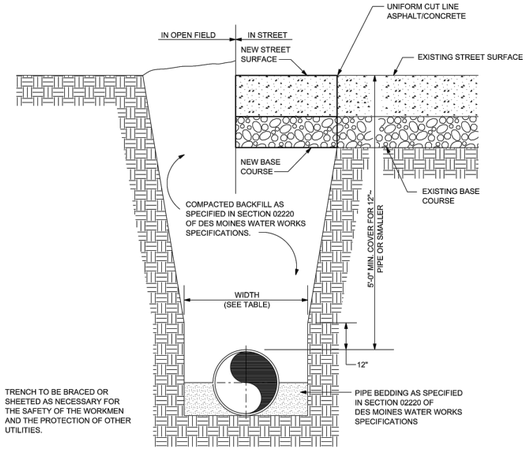
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.6

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Details.dwg-C6.6 DETAILS-1/27/2023 10:49 AM-(adargay)



PIPE DIAMETER	MINIMUM WIDTH	MAXIMUM WIDTH
4"	1'-4"	2'-4"
6"	1'-6"	2'-6"
8"	1'-8"	2'-8"
12"	2'-0"	3'-0"
16"	2'-4"	3'-4"
20"	2'-8"	3'-8"

TYPICAL TRENCH SECTION
Not to Scale

Des Moines Water Works
Water You Can Trust for Life
ENGINEERING DEPARTMENT
Des Moines, Iowa

TYPICAL TRENCH SECTION

SCALE: NONE	DATE: 9-22-1992
DRAWN BY: DLH	APPROVED BY: TPC
REVISED: 04/29/2013 JLH	

512-27
FIGURE 27

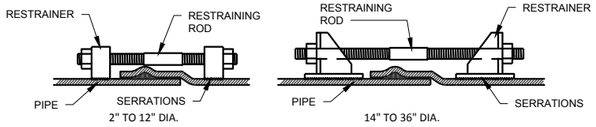
RESTRAINED LENGTHS OF PVC PIPE

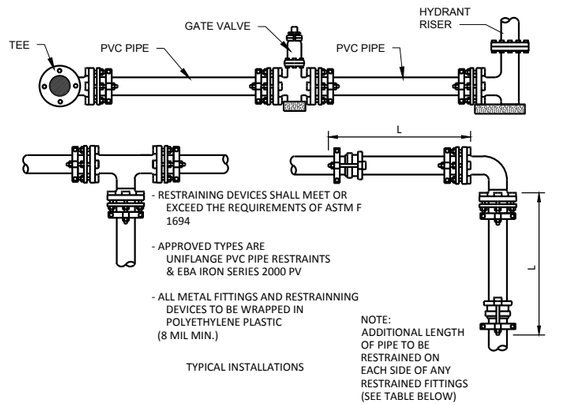
NOM. PIPE SIZE	90° BEND (L)	45° BEND (L)	22.5° BEND (L)	11.25° BEND (L)	SIZE ON SIZE TEE(L)*	VALVE/ DEAD-END(L)
6"	19'	8'	4'	2'	2'	35'
8"	25'	11'	5'	3'	13'	45'
10"	31'	13'	6'	3'	22'	55'
12"	36'	15'	8'	4'	33'	65'
16"	47'	20'	10'	5'	52'	84'

* RECOMMENDED RESTRAINED LENGTHS FOR TEES ARE FOR THE BRANCH OUTLET AND ASSUME A MINIMUM 10 FT. SECTION OF PIPE ATTACHED TO EACH SIDE OF THE RUN. RESTRAINT DEVICES ARE ALSO REQUIRED ON BOTH RUN JOINTS OF THE TEE ITSELF.

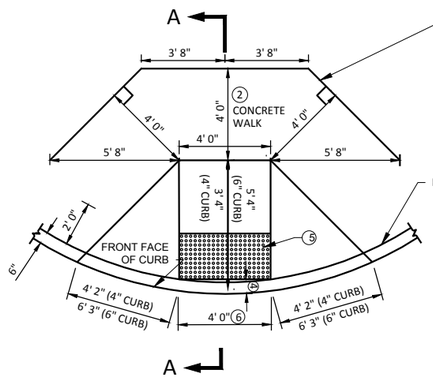
SIZE	45° VERT. OFFSET* (L)	22 1/2° VERT. OFFSET* (L)
6"	15'/8'	7'/4'
8"	19'/11'	9'/5'
10"	23'/13'	11'/6'
12"	27'/15'	13'/8'
16"	35'/20'	17'/10'

* FIRST NUMBER IS THE RECOMMENDED RESTRAINED LENGTH ON EACH SIDE OF THE DOWN BEND, THE SECOND NUMBER IS THE LENGTH FOR EACH SIDE OF THE UP BEND.

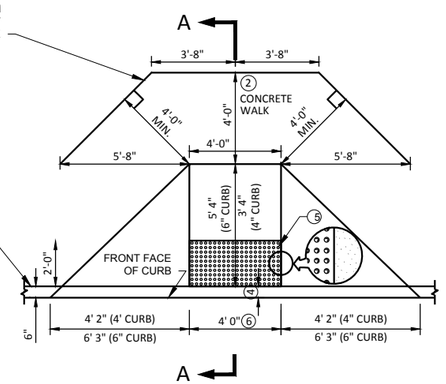




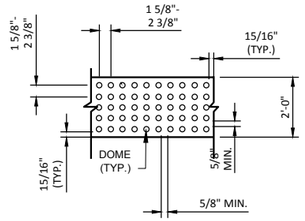
RESTRAINED JOINT PIPE
NOT TO SCALE



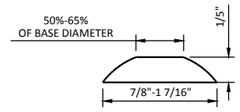
PLAN VIEW OF DIAGONAL RAMP



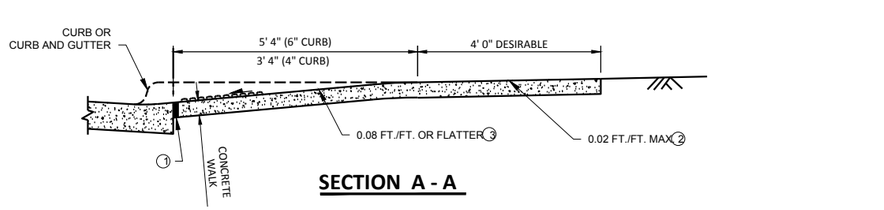
PLAN VIEW OF PERPENDICULAR RAMP



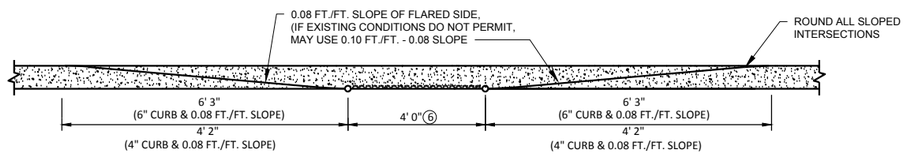
DOME SPACING



DOME SECTION



SECTION A - A



ELEVATION OF RAMP

PEDESTRIAN CURB RAMP DETAILS FOR THE HANDICAPPED
NOT TO SCALE

NOTES:
1. THE CURB AND CURB TRANSITION ON THE RAMP WILL BE PAID FOR AS LINEAR FEET OF CONCRETE CURB OR CONCRETE CURB AND GUTTER. THE RAMP AREA WILL BE PAID FOR AS CONCRETE WALK. THE TRUNCATED DOME AREA SHALL BE CONSIDERED INCIDENTAL.
2. 1/2" PRE-FORMED JOINT FILLER MATERIAL, AASHTO M 213
3. WHEN POSSIBLE, PROVIDE A PATH OF TRAVEL 48" WIDE BEHIND THE PEDESTRIAN RAMP. A RELATIVELY FLAT 48"x48" LANDING WILL ALLOW WHEELCHAIRS TO NAVIGATE AROUND THE PEDESTRIAN RAMP
4. WHEN A MEDIAN IS NOT WIDE ENOUGH FOR TWO PEDESTRIAN RAMPS AND A 48" LANDING BETWEEN THEM, THE PEDESTRIAN CROSSING SHALL BE CUT THROUGH THE MEDIAN AT STREET LEVEL
5. 6" TO 8" IS THE REQUIRED OFFSET OF THE DETECTABLE WARNINGS/TRUNCATED DOME AREA FROM THE POINT OF FACE OF CURB, OR PLACE THE DETECTABLE WARNINGS AT THE BACK OF CURB
6. ADA REQUIRED TRUNCATED DOME AREA SHALL BE 24" MIN. IN DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH (36" OR 48" TYP.) OF THE CURB RAMP. THIS 24" BY 36" OR 48" WIDTH (TYP.) TRUNCATED DOME AREA SHALL CONTRAST VISUALLY WITH THE ADJACENT WALKING SURFACE. THE ENTIRE TRUNCATED DOME AREA SHALL BE A LIGHT COLOR (LIGHT GRAY, WHITE OR YELLOW) WHEN THE ADJACENT SIDEWALK IS A DARK COLOR. THE ENTIRE TRUNCATED DOME AREA SHALL BE A DARK COLOR (RED, BLACK, DARK GRAY OR BRIGHT YELLOW) WHEN THE ADJACENT SIDEWALK IS A "WHITE" OR LIGHT GRAY CEMENT COLOR
7. 48" FOR NEW CONSTRUCTION. 36" ALLOWED FOR RETROFITS OR PRESERVATION PROJECTS

No.	Revision	Date	By

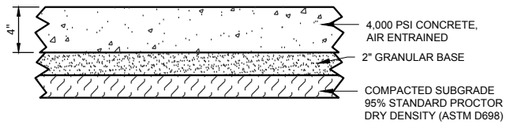
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

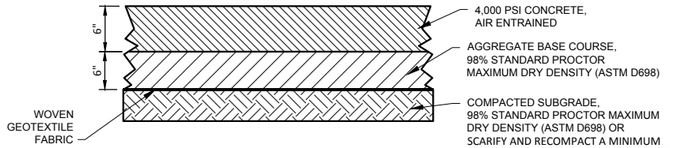
HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.7

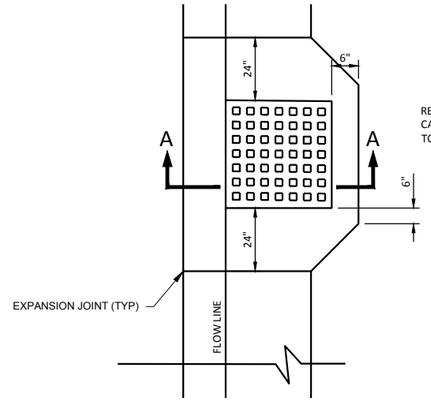
H:\JBN\109000\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Details.dwg-C6.7 DETAILS-1/27/2023 10:50 AM-(adargay)



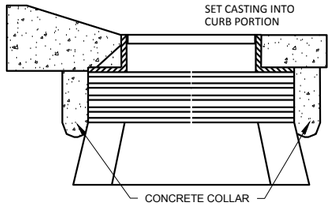
SIDEWALK
NOT TO SCALE



6" CONCRETE PAVEMENT
NOT TO SCALE

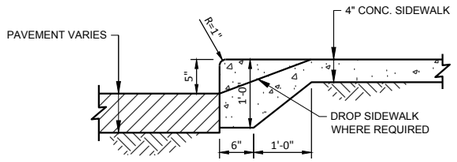


RECESS CASTING INTO CURB CASTING (PROVIDED BY OTHERS) TO BE FLUSH W/ FLOW LINE

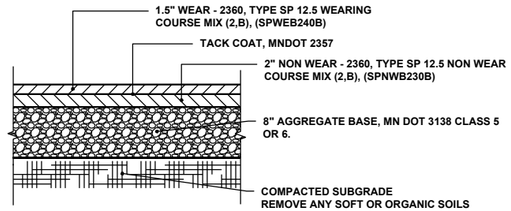


SECTION A - A

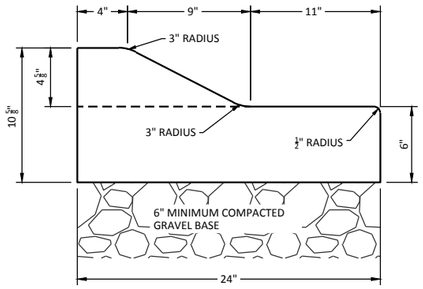
MOUNTABLE CURB & GUTTER AT CATCH BASIN
NOT TO SCALE



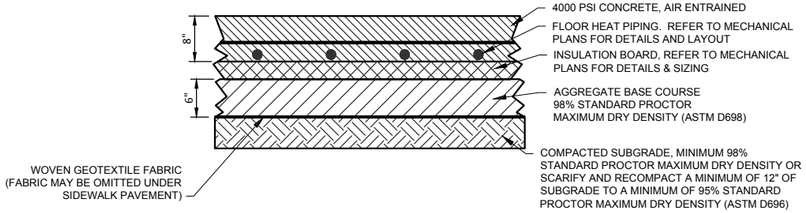
SIDEWALK WITH THICKENED EDGE
NOT TO SCALE



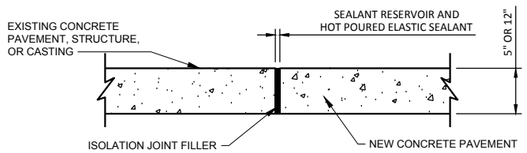
ASPHALT PAVEMENT
NOT TO SCALE



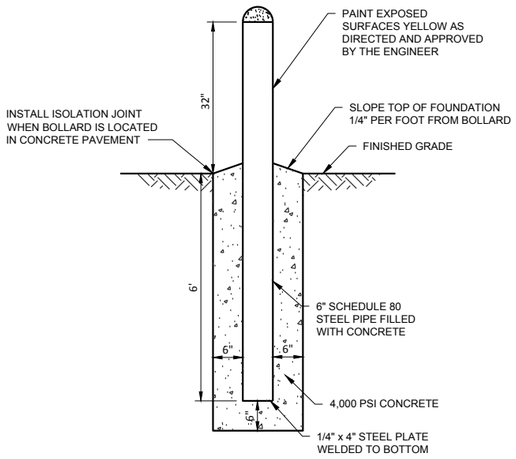
ROLL TIP-OUT CURB AND GUTTER
NOT TO SCALE



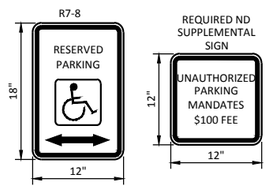
8" HEATED CONCRETE PAVEMENT
NOT TO SCALE



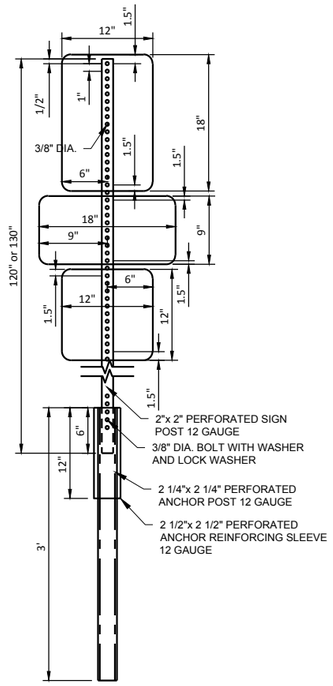
ISOLATION JOINT
NOT TO SCALE



BOLLARD DETAIL
NOT TO SCALE



NOTE:
1. ALL HOLES TO BE PUNCHED FOR 3/8" BOLTS.
2. BOTTOM OF LOWEST SIGN TO BE MIN 7' FROM GROUND.
3. ALL SIGNS SHALL CONFORM TO 2004 EDITION STANDARD HIGHWAY SIGNS AND CURRENT VERSION OF MUTCD.
4. R7-8A TO BE USED WHERE APPLICABLE.



HANDICAPPED PARKING SIGN DETAIL
NOT TO SCALE

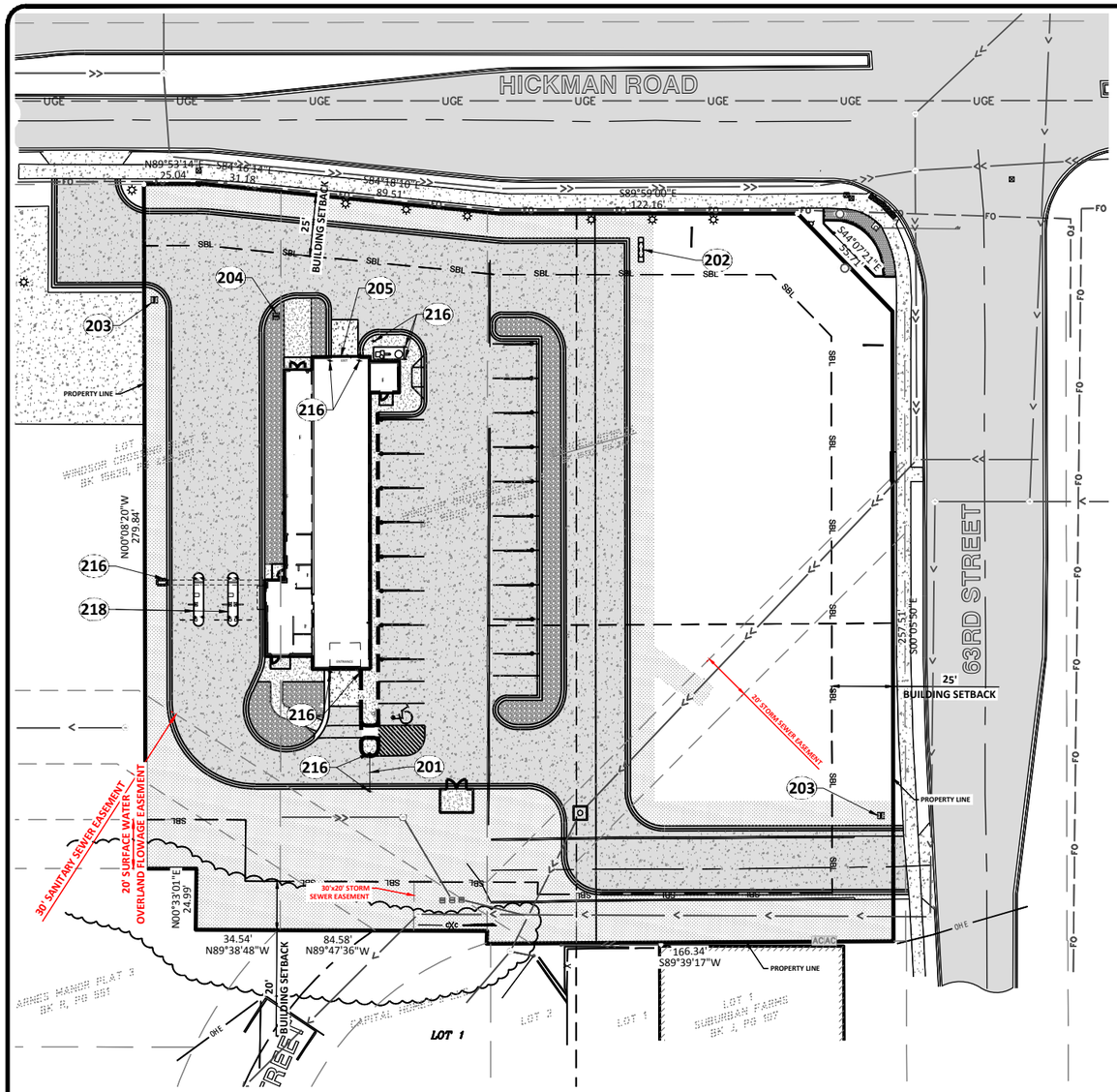
No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.8

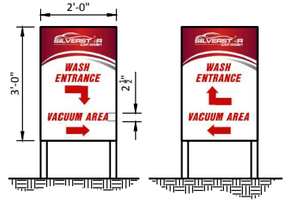


202 **MONUMENT SIGN**

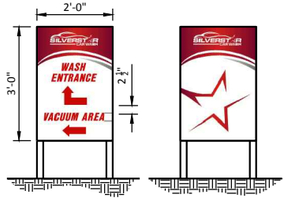
PLAN NOTES

201	COATED CHAIN, RED.
202	MONUMENT SIGN.
203	DIRECTIONAL SIGN.
204	WASH TUNNEL DIRECTIONAL SIGN.
205	BUILDING FACADE SIGN.
212	RFID TRUSS.
213	GATE. SEE EQUIPMENT PLANS.
214	AUTO PAY STATION. SEE EQUIPMENT PLAN.
215	MENU SIGN. SEE EQUIPMENT PLANS.
216	6" DIAMETER CONCRETE FILLED PIPE BOLLARD. INSTALL PREFAB BOLLARD COVER. VERIFY COLOR WITH ARCHITECT.
217	24" HIGH - 6" DIAMETER CONCRETE FILLED PIPE BOLLARD. INSTALL PREFAB BOLLARD COVER. VERIFY COLOR WITH ARCHITECT.
218	POURED CONCRETE ISLAND. SEE DETAIL 5/A1.0. SEE CIVIL PLANS.

205 **BUILDING FACADE SIGNS**



QTY: (1) ALUMINUM PANELS WITH VINYL PRINT MOUNTED ON 2"x2" ALUMINUM FRAME SYSTEM.



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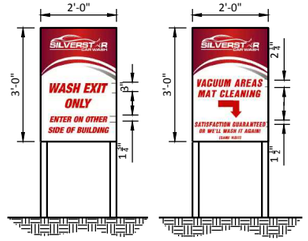
203 **SERVICE ROAD DIRECTIONAL SIGN**



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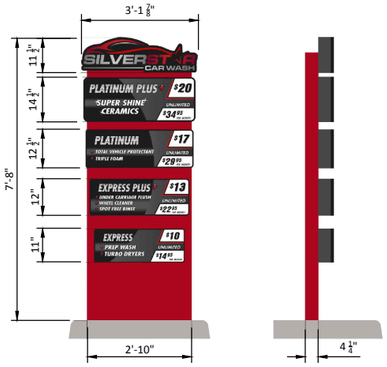
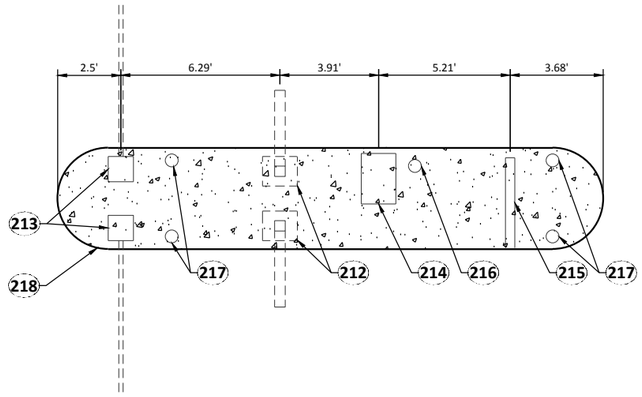
204 **WASH TUNNEL DIRECTIONAL SIGN**



215 **MENU SIGN**



ENLARGED ISLAND DETAIL

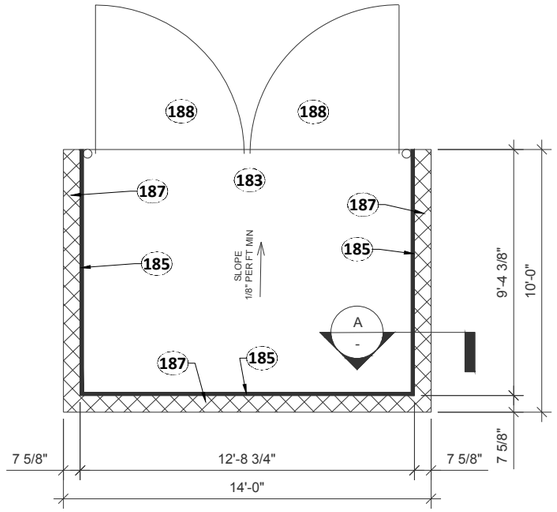
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

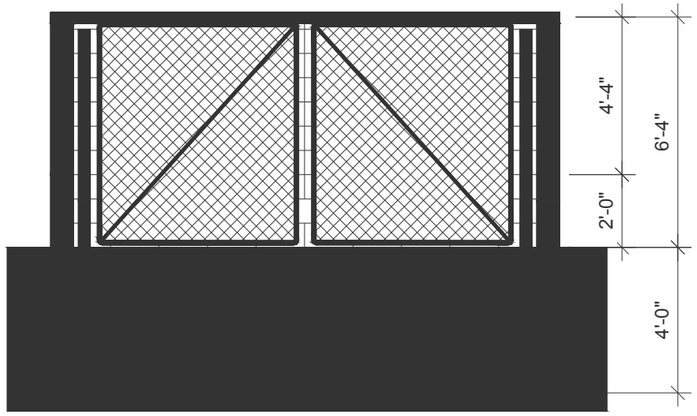
HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C6.9

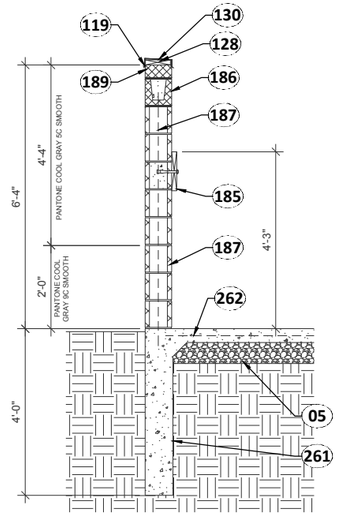
H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Details.dwg-C6.9 DETAILS - SIGNS - UPDATE-1/27/2023 10:50 AM-(adargay)



1 TE-PLAN VIEW
Scale:



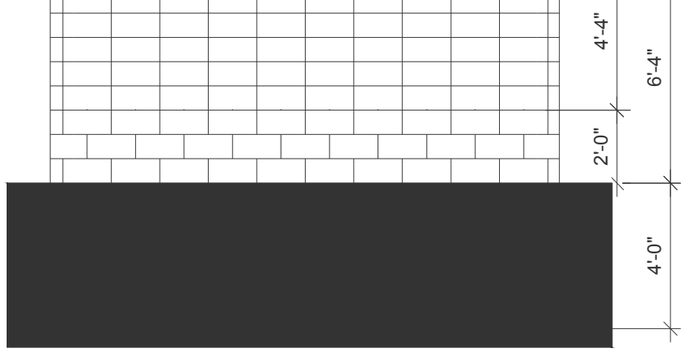
2 TE-FRONT ELEVATION
Scale: 1/4" = 1'-0"



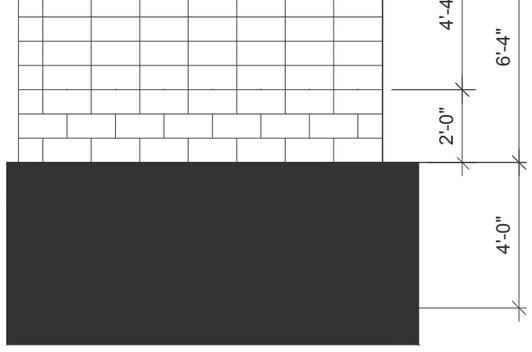
A SECTION A-A

PLAN NOTES

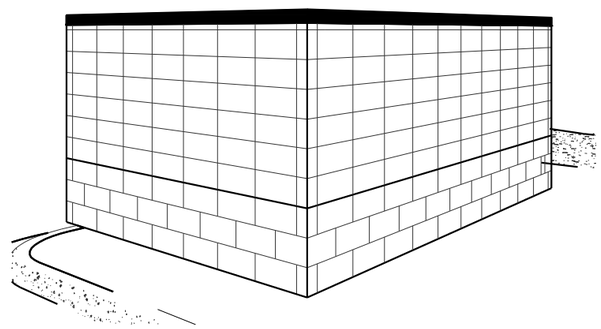
05	GRANULAR FILL PER SOILS REPORT.
119	PREFINISHED METAL KEEPER FOR PARAPET CAP.
128	2x BLOCKING FOR PARAPET CAP ATTACHMENT.
130	PREFINISHED METAL PARAPET CAP. MATCH RED PAINT.
183	7" THICK POURED CONCRETE SLAB WITH HEAT SYSTEM OVER MINIMUM 12" NEW STRUCTURAL FILL. VERIFY WITH MECHANICAL AND CIVIL PLANS.
185	2x12 CEDAR BUMPER WITH ANCHOR BOLTS @ 16" O.C. GROUT CMU CORES FULL AT BUMPER LOCATION. VERIFY MOUNTING HEIGHT PER TRASH CONTAINER.
186	8" CMU BOND BEAM.
187	8x8x16 CMU WITH HORIZONTAL REINFORCEMENT @ 16" O.C. PAINT EXTERIOR OF TRASH ENCLOSURE TO MATCH BUILDING.
188	VINYL CLAD CHAIN LINK GATES WITH SLATS. INSTALL ADA COMPLIANT ROLLER AND LATCH.
189	8x4x16 CMU CAP.
261	POURED CONCRETE FOUNDATION WALL. SEE STRUCTURAL.
262	4" POURED CONCRETE SLAB. SEE STRUCTURAL.



3 TE-REAR ELEVATION
Scale:



4 TE-SIDE ELEVATIONS
Scale:



5 TE-PERSPECTIVE VIEW
Scale:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of _____.

_____ MM-DD-YYY
NAME Date
License No. XXXXX

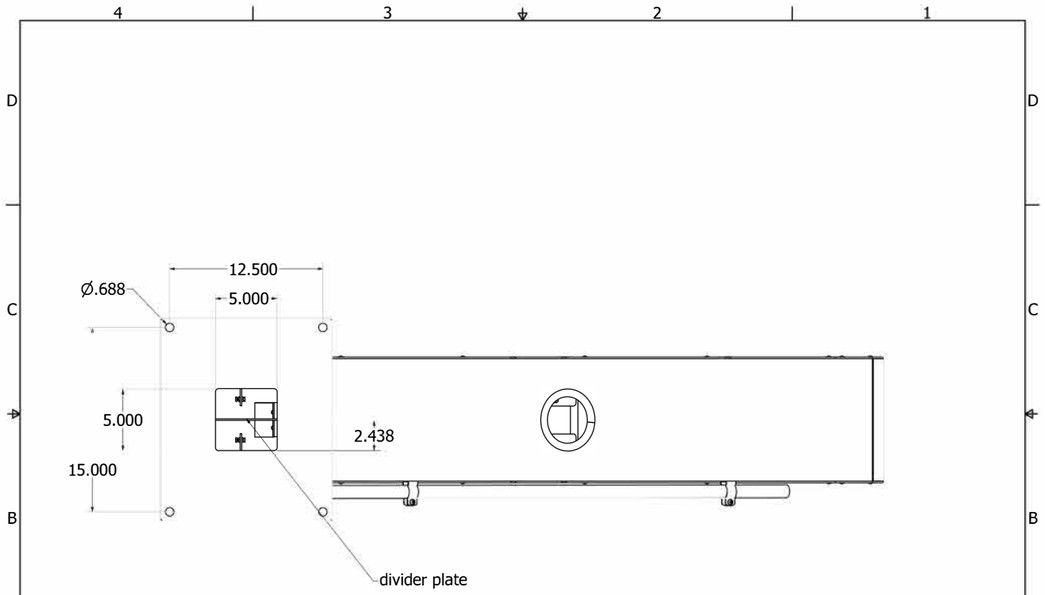
No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD.
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, Inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C6.10

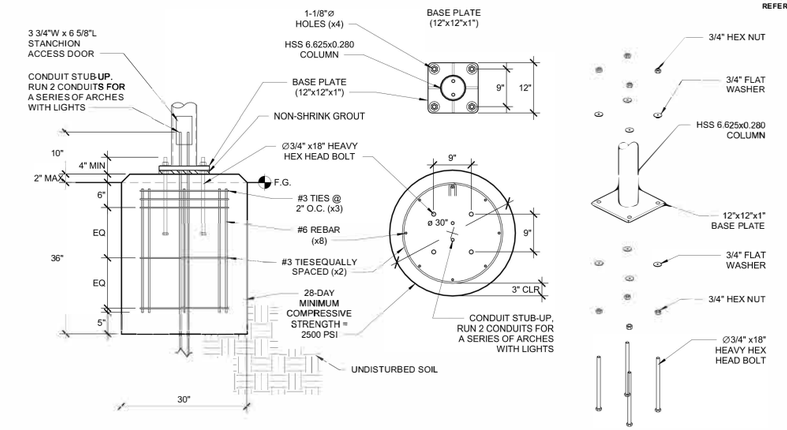


BREAK EDGES .01 ± .005 UNLESS OTHERWISE SPECIFIED MUST BE FREE OF BURRS WHICH MAY BE DETRIMENTAL TO SATISFACTORY ASSEMBLY, SAFE HANDLING, OR FUNCTION.	MATERIAL DESCRIPTION:
SURFACE SPECS. AS NOTED	*This drawing is the property of Steinhaus Brothers Incorporated / SBI mfg and is loaned to the recipient for his confidential use only. In consideration of the loan of this drawing, the recipient promises and agrees that it shall not be used in any way detrimental to the interest of Steinhaus Brothers Incorporated / SBI mfg. That it shall be returned upon request, and that it shall not be reproduced, copies, loaned, or otherwise disposed of, directly or indirectly without the express written consent of Steinhaus Brothers Incorporated / SBI mfg.*
HEAT TREAT SPECS. AS NOTED	
GRIND SPECS. AS NOTED	

FINISH UNLESS OTHERWISE NOTED:
STOCK
LIMITS UNLESS OTHERWISE NOTED:
FRACTIONS: +- 1/8
DECIMALS: 0.0 +-.1
0.00 +-.060
0.000 +-.030
0.0000 +-.005
ANGLES: +-1°

SBI MANUFACTURING
47061 Phillip street
Sioux Falls, SD 57108
(605)-368-2340

PART NO./DESCRIPTION: SS-ALUM
SUBASSYMBLY NO./DESCRIPTION: assembly notes
DATE: 5/8/2019 | DRAWN: Jared G. | CHECKED:
PRINT NO. | SS-ALUM assembly notes (2) | SCALE:



CONSTRUCTION NOTES:
REFER TO SHEET V721 FOR ASSEMBLY CUTSHEETS

NOTE:
PIER DESIGN AND REINFORCEMENT FOR CONCEPTUAL USE ONLY. CONSULT STRUCTURAL ENGINEER IN YOUR AREA FOR SPECIFIC DESIGN CRITERIA.

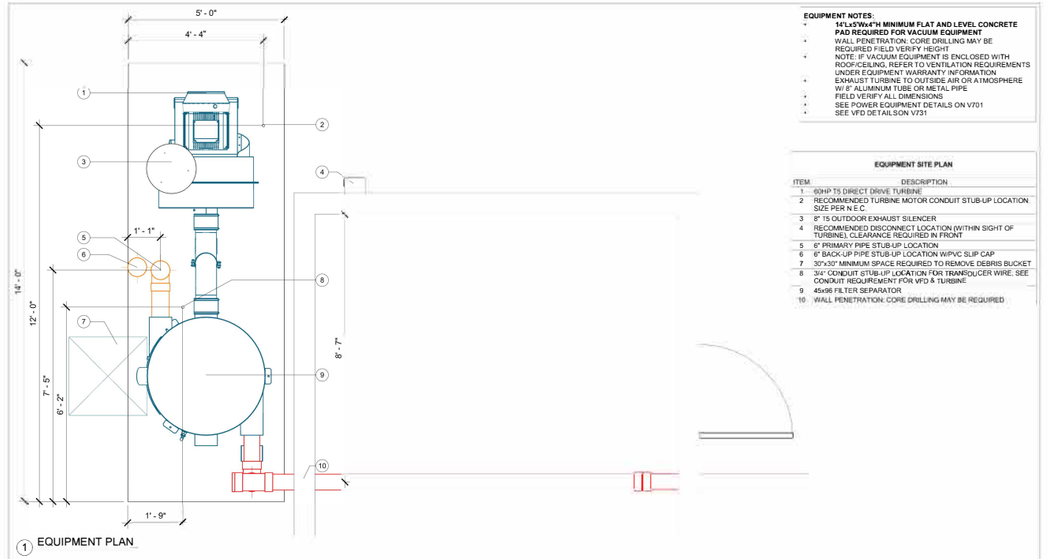
1 FOOTING - UMBRELLA ARCH

NCS VACUUMS BY VACUTECH
1350 HI-TECH DRIVE
SHERIDAN, WY 82801
PHONE: (307) 675-1982
EMAIL: vacinfo@ncswash.com
WEB: www.vacutechllc.com

#	Revision	By	Chk	Date

FOOTING DETAIL

Project Number
Date
Drawn By
Checked By



EQUIPMENT NOTES:
- **14'L x 5'Wx4'H MINIMUM FLAT AND LEVEL CONCRETE PAD REQUIRED FOR VACUUM EQUIPMENT**
- WALL PENETRATION: CORE DRILLING MAY BE REQUIRED FIELD VERIFY HEIGHT
- NOTE: IF VACUUM EQUIPMENT IS ENCLOSED WITH ROOF/CEILING, REFER TO VENTILATION REQUIREMENTS UNDER EQUIPMENT WARRANTY INFORMATION
- EXHAUST TURBINE TO OUTSIDE AIR OR ATMOSPHERE W/ 8" ALUMINUM TUBE OR METAL PIPE
- FIELD VERIFY ALL DIMENSIONS
- SEE POWER EQUIPMENT DETAILS ON V701
- SEE VFD DETAILSON V731

EQUIPMENT SITE PLAN

ITEM	DESCRIPTION
1	60HP T5 DIRECT DRIVE TURBINE
2	RECOMMENDED TURBINE MOTOR CONDUIT STUB-UP LOCATION. SIZE PER N.E.C.
3	8" T5 OUTDOOR EXHAUST SILENCER
4	RECOMMENDED DISCONNECT LOCATION (WITHIN SIGHT OF TURBINE), CLEARANCE REQUIRED IN FRONT.
5	6" PRIMARY PIPE STUB-UP LOCATION
6	6" BACK-UP PIPE STUB-UP LOCATION W/PVC SLIP CAP
7	30"x30" MINIMUM SPACE REQUIRED TO REMOVE DEBRIS BUCKET
8	3/4" CONDUIT STUB-UP LOCATION FOR TRANSDUCER WIRE. SEE CONDUIT REQUIREMENT FOR VFD & TURBINE.
9	40x96 FILTER SEPARATOR
10	WALL PENETRATION: CORE DRILLING MAY BE REQUIRED

1 EQUIPMENT PLAN

NCS VACUUMS BY VACUTECH
1350 HI-TECH DRIVE
SHERIDAN, WY 82801
PHONE: (307) 675-1982
EMAIL: vacinfo@ncswash.com
WEB: www.vacutechllc.com

#	Revision	By	Chk	Date

EQUIPMENT SITE PLAN

Project Number
Date
Drawn By
Checked By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

DETAILS

HOUSTON engineering, inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C6.11

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EROSION CONTROL LEGEND

SILT FENCE — XX — XX

INLET PROTECTION

BIOROLL

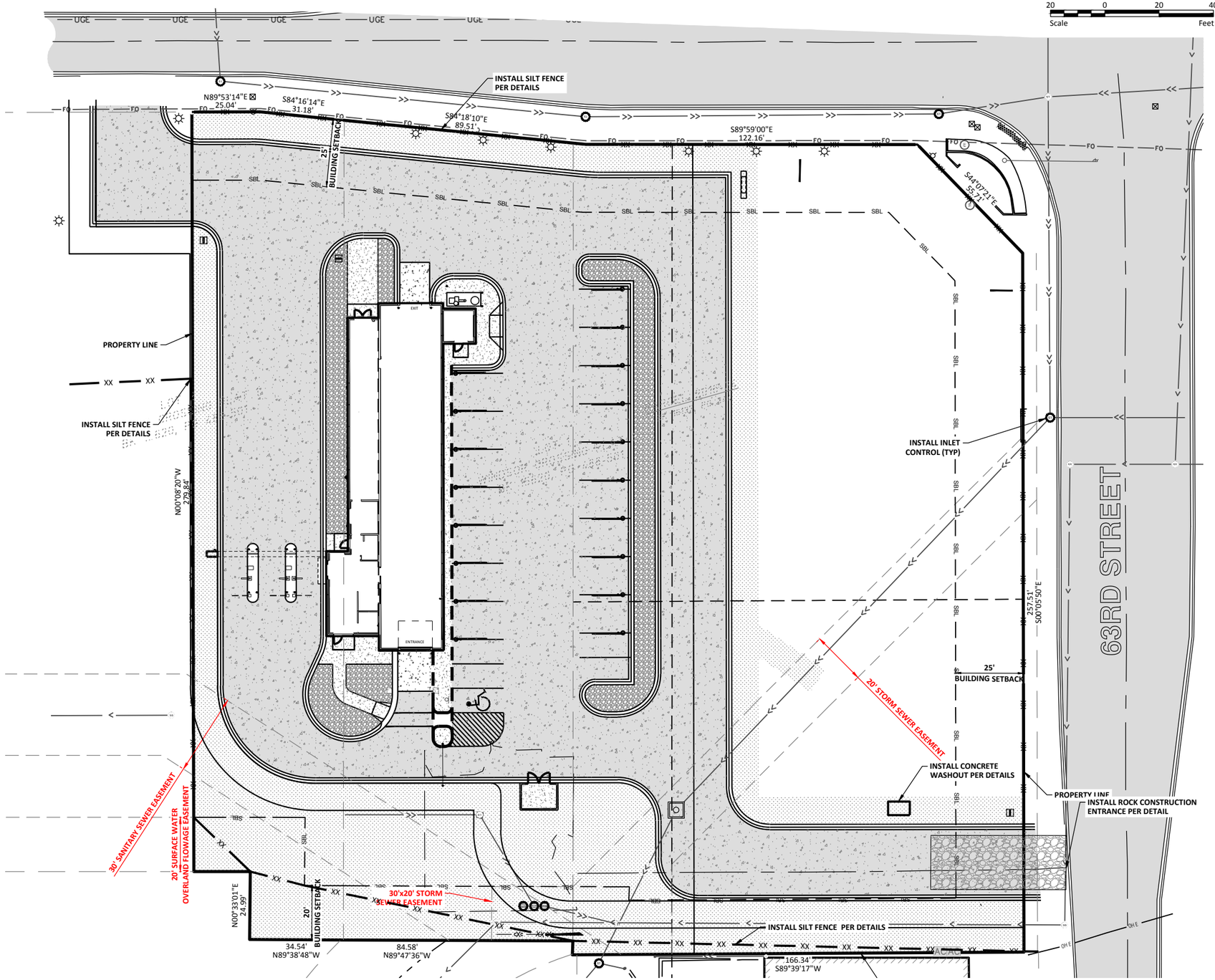
SEED AND MULCH

CONSTRUCTION ENTRANCE

EROSION AND SEDIMENT CONTROL QUANTITY SUMMARY AND BMP SCHEDULE

DESCRIPTION	UNITS	QUANTITY
SEEDING & MULCH	ACRE	0.46
EROSION CONTROL BLANKET, CAT. 3*	SY	500
SILT FENCE	LF	1062

*EROSION BLANKET TO BE INSTALLED AT LOCATIONS SPECIFIED BY ENGINEER



LEGEND

	EXISTING	NEW
WATER MAIN	W	W
SANITARY SEWER MAIN	SS	SS
STORM SEWER MAIN	STS	STS
STORM INLET		
SANITARY MANHOLE	SS	
STORM MANHOLE	ST	
FIRE HYDRANT		
GATE VALVE		
AC UNIT	AC	
GAS METER	GM	
TRANSFORMER	T	
UNDERGROUND FIBER OPTIC	FO	
DECIDUOUS TREE		
SIGN		
GUARD POST		
GUARD RAIL		
SPOT ELEVATION	x 897.16G	898.55TC 898.05G
STANDARD CURB & GUTTER		
MOUNTABLE CURB & GUTTER		
CURB & INVERTED GUTTER		
BUILDING		
NEW 4" CONCRETE		
NEW 5" CONCRETE		
NEW 8" HEATED CONCRETE		
THICKENED EDGE SIDEWALK		
DRAINAGE DIRECTION		
IRON MONUMENT FOUND	●	
IRON MONUMENT SET	○	

SWPPP NOTES:

1. THE CONTRACTOR SHALL INSTALL INLET PROTECTION AND ROCK CONSTRUCTION ENTRANCE PRIOR TO BEGINNING SITE WORK.
2. THE CONTRACTOR SHALL INSTALL PERIMETER CONTROL AROUND DISTURBED AREAS AND LIMIT ACCESS TO THE ROCK CONSTRUCTION ENTRANCE.
3. THE CONTRACTOR SHALL INSTALL TEMPORARY SOIL STABILIZATION MEASURES SUCH AS COVER CROPS, EROSION CONTROL BLANKETS, MULCH, ETC. AS NEEDED WHEN AREAS ARE NOT ACTIVELY BEING WORKED AND WILL NOT BE DISTURBED FOR A PERIOD OF GREATER THAN 14 DAYS. THIS INCLUDES STOCKPILED SOIL.
4. IF SITE WORK OR GRADING ACTIVITIES ARE STOPPED OVER THE WINTER DUE TO COLD WEATHER THE CONTRACTOR SHALL PROVIDE TEMPORARY SOIL STABILIZATION MEASURES PRIOR TO STOPPING WORK DUE TO COLD WEATHER.
5. THE CONTRACTOR SHALL PROVIDE TEMPORARY OR PERMANENT SOIL STABILIZATION TO AREAS THAT HAVE BEEN FINISH GRADED WITHIN 7 DAYS OF THE COMPLETION OF WORK.
6. STORM SEWER INLETS WILL BE PROTECTED AT ALL TIMES WITH APPROPRIATE INLET PROTECTION AND SHALL BE INSTALLED PRIOR TO DISTURBANCE IN THAT AREA.
7. MULTIPLE APPLICATIONS OF TEMPORARY SOIL STABILIZATION MEASURES SHOULD BE ANTICIPATED BY THE CONTRACTOR.
8. TEMPORARY MULCHING AND PERMANENT SEEDING SHALL CONFORM TO SUDAS STANDARD SPECIFICATIONS. AREAS TO BE SEEDED SHALL BE SEEDED WITH SUDAS SECTION 9010 TYPE B SEED MIXTURE AND BONDED FIBER MATRIX (BMF) MULCH PER .
9. THE CONTRACTOR SHALL MINIMIZE SITE DISTURBANCE AND PHASE THE CONSTRUCTION TO MINIMIZE THE AMOUNT OF OPEN DISTURBED SOIL AS PRACTICAL.
10. THIS PLAN SHOWS THE TYPE AND GENERAL PLACEMENT OF SEDIMENT AND EROSION CONTROL MEASURES. NOT EXACT PLACEMENT.
11. THE CONTRACTOR SHALL MODIFY THE SWPPP AS NEEDED TO PREVENT DISCHARGE OF SEDIMENT FROM THE SITE, THIS INCLUDES DUST, RUNOFF FROM THE CONCRETE WASH WATER, AND RUNOFF FROM SAW CUTTING OF CONCRETE.
12. THE CONTRACTOR SHALL MAINTAIN AND UPDATE THE SWPPP AS NEEDED TO ENSURE THAT THE SITE CONDITIONS MATCH WHAT IS SHOWN ON THE SWPPP DOCUMENTS.
13. TYPE C INLET PROTECTION INSTALLED IN THE RIGHT OF WAY SHALL BE WIMCO, LANGE IPD, FLEXSTORM, OR APPROVED EQUIVALENT PER SUDAS STANDARD SPECIFICATIONS.
14. EXCAVATION OR OTHER WORK IN THE RIGHT OF WAY SHALL REQUIRE A TRAFFIC CONTROL PLAN THAT MEETS ALL MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) REQUIREMENTS. THIS PLAN IS REQUIRED BEFORE ANY PERMITS TO WORK IN THE RIGHT OF WAY WILL BE ISSUED. A PERMIT IS REQUIRED FOR WORK IN DOT ROADWAYS.

No.	Revision	Date	By
1	REVISIONS PER COMMENTS FROM THE CCWD	11-16-2022	AMZ

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

EROSION CONTROL PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C7.0

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - SWPPP.dwg C7.0 EROSION CONTROL PLAN-1/27/2023 10:51 AM (adargay)

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) NARRATIVE

THE IOWA DEPARTMENT OF NATURAL RESOURCES GENERAL PERMIT AUTHORIZATION TO DISCHARGE STORMWATER ASSOCIATED WITH CONSTRUCTION ACTIVITY ISSUED ON JANUARY 1, 2018 SHALL APPLY FOR THIS PROJECT THROUGH FEBRUARY 28, 2023.

GENERAL CONSTRUCTION ACTIVITY INFORMATION

1. PROJECT NAME: SILVERSTAR CARWASH
2. PROJECT LOCATION: 6300 HICKMAN RD WINDSOR HEIGHTS, IA

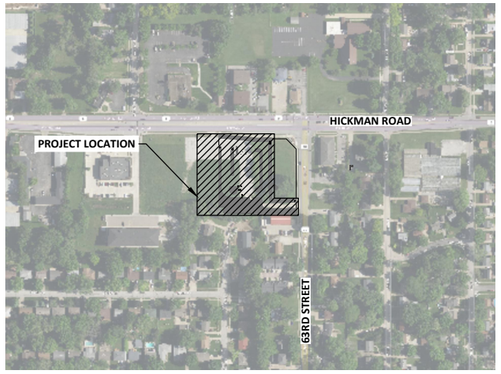
COORDINATES: 41.61451, 93.70417
CITY OR TOWNSHIP: WINDSOR HEIGHTS
STATE: IA ZIP CODE: 50324 COUNTY: POLK

3. DESCRIBE THE CONSTRUCTION ACTIVITY:

THE PROJECT CONSISTS OF DEMOLITION OF EXISTING STRUCTURES AND PAVEMENT AND VEGETATION, AND CONSTRUCTING NEW PAVEMENT, UTILITIES AND A CARWASH STRUCTURE.

PROJECT AREAS

TOTAL AREA TO BE DISTURBED (ACRES): 2.12
PRE-CONSTRUCTION IMPERVIOUS SURFACE (ACRES): 0.59
POST-CONSTRUCTION IMPERVIOUS SURFACE (ACRES): 1.07
TOTAL NEW IMPERVIOUS SURFACE (ACRES): 0.48



CONTACT INFORMATION

PROJECT OWNER: MIDWEST FIDELITY PARTNERS, LLC

ADDRESS: 1610 S. MINNESOTA AVE.
SIOUX FALLS, SD 57105
CONTACT: DAN NELSON
EMAIL: DAN@MFP.LLC.COM

CONTRACTOR: HEGG CONSTRUCTION

DESIGN OF CONSTRUCTION SWPPP

DESIGN OF CONSTRUCTION SWPPP COMPLETED BY:
STAN HANSON
HOUSTON ENGINEERING, INC.
100 COURT AVE, SUITE 202
DES MOINES IA 50309
PHONE: (515) 444-5393
FAX: (402) 932-6940
STHANSON@HOUSTONENG.COM

EROSION AND SEDIMENT CONTROL NOTES:

1. NO EARTHWORK OPERATIONS SHALL BEGIN PRIOR TO ALL TEMPORARY PERIMETER EROSION AND SEDIMENT CONTROL MEASURES BEING INSTALLED.

2. THIS SWPPP SCHEMATIC SITE MAP SHOWS INITIAL LOCATIONS OF PROPOSED CONTROLS BASED ON FINAL PROPOSED SITE CONDITIONS. THROUGHOUT CONSTRUCTION, ADDITIONAL CONTROLS MAY BE NECESSARY BASED ON CHANGING SITE CONDITIONS. THE CONTRACTOR SHALL KEEP AN AMENDED COPY OF THE POLLUTION PREVENTION SITE MAP UPDATED TO REFLECT CURRENT SITE CONDITIONS WITH CHANGES IN EROSION AND SEDIMENT CONTROLS NOTED.

3. TEMPORARY SANITARY FACILITIES SHALL BE STAKED DOWN OR OTHERWISE SECURED TO PREVENT OVERTURNING. WASTE COLLECTION AREAS SHALL BE COVERED OR SECURED IN A MANNER TO PREVENT BLOWING OF TRASH OR DEBRIS. LOCATE THESE FACILITIES AWAY FROM STORM INLETS, CONCENTRATED FLOW PATHS, STREAMS OR THE SITE PERIMETER. CONTRACTOR SHALL NOTE LOCATION OF SUCH FACILITIES ON THE AMENDED COPY OF THIS SITE POLLUTION PREVENTION PLAN MAP.

4. DAILY CLEANUP OPERATIONS, TRASH COLLECTION, GOOD HOUSEKEEPING AND OTHER ITEMS NECESSARY TO PREVENT OFF-SITE TRACKING, DEBRIS BEING CARRIED OFF-SITE AND POLLUTION OF RECEIVING WATERS OR OTHER STORM WATER CONTAMINATION SHALL BE COMPLETED BY THE CONTRACTOR AND SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT WORK.

5. STABILIZED CONSTRUCTION ENTRANCES (SCE) SHALL BE PROVIDED AT ALL ACCESS POINTS TO THE CONSTRUCTION SITE. ENGINEERING FABRIC MATERIAL SUDAS SECTION 9040 SHALL BE INSTALLED BELOW ALL CONSTRUCTION ENTRANCES. ENTRANCE SHALL BE AT LEAST 75 FEET IN LENGTH AND 16 FEET IN WIDTH. LOCATIONS OF CONSTRUCTION ENTRANCES ARE APPROXIMATE AND SHALL BE FIELD LOCATED. ANY SEDIMENT TRACKED OR DEPOSITED ONTO OFF-SITE PAVED SURFACES SHALL BE REMOVED WITHIN 24 HOURS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR STREET SWEEPING AND/OR SCRAPING TO REMOVE ANY ACCUMULATED SEDIMENT FROM OFF-SITE PAVED SURFACES.

6. IF EQUIPMENT MUST CROSS AN EXISTING CURBLINE, PROTECT CURBLINE WITH ASPHALT FILLET WITH ENGINEERING FABRIC UNDERLAYMENT DURING CONSTRUCTION. REMOVE FILLET AFTER CONSTRUCTION IS COMPLETE.

7. ALL STORM DRAIN INLETS WITHIN THE PROJECT LIMITS AND IN THE IMMEDIATE VICINITY OF THE SITE SHALL HAVE SEDIMENT PROTECTION MEASURES. THIS INCLUDES INLETS AFFECTED BY SEDIMENT TRACKED FROM THE SITE.

8. VEGETATIVE BUFFERS SHALL HAVE A MINIMUM WIDTH OF 25 FEET FOR EVERY 125 FEET OF DISTURBED AREA THAT DRAINS TO THE BUFFER. FOR EACH ADDITIONAL 5 FEET OF DISTURBANCE, AN ADDITIONAL 1 FOOT OF BUFFER MUST BE ADDED. THE BUFFER SHALL HAVE A MAXIMUM 5 PERCENT SLOPE AND CONCENTRATED FLOWS TO THE BUFFER SHALL BE MINIMIZED.

9. VEGETATIVE BUFFER SHALL CONSIST OF DENSE GRASS VEGETATION 3 TO 12 INCHES TALL WITH UNIFORM COVERAGE OVER 90 PERCENT OF THE BUFFER. NO MORE THAN 10 PERCENT OF THE BUFFER MAY CONSIST OF WOODY VEGETATION.

10. PROVIDE TEMPORARY STABILIZATION FOR DISTURBED AREAS WITHIN SITE WHERE NO ADDITIONAL GRADING OR CONSTRUCTION ACTIVITIES ARE EXPECTED FOR AT LEAST 14 DAYS. REFER TO SUDAS SECTION 9040 AND PROJECT SPECIFICATIONS FOR STABILIZATION METHODS.

11. FIBER ROLLS OR SILT FENCE SHALL BE INSTALLED ON ALL DISTURBED AREAS WITH SLOPES STEEPER THAN 3:1 AND LENGTHS GREATER THAN 75 FEET. ANY SLOPE EXHIBITING RILLS, SIGNIFICANT EROSION, OR EVIDENCE OF CONCENTRATED FLOW SHALL BE REGRADED TO PLAN GRADES AND FIBER ROLLS OR OTHER TEMPORARY EROSION CONTROL MEASURE INSTALLED TO PREVENT FUTURE EROSION.

12. SEDIMENT ACCUMULATED BEHIND FIBER ROLLS AND SILT FENCE SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE FIBER ROLL OR SILT FENCE. ANY INEFFECTIVE (DECOMPOSED, TORN, COLLAPSED) FIBER ROLLS OR SILT FENCE SHALL BE REPLACED IMMEDIATELY.

13. WATTLES SHALL BE 9" HEIGHT UNLESS NOTED OTHERWISE.

14. ALL TEMPORARY OR PERMANENT DRAINAGE DITCHES, SWALES, OR STORM SEWER DISCHARGE POINTS SHALL HAVE THEIR NORMAL WETTED PERIMETER STABILIZED WITHIN 200 LINEAL FEET OF THE PROPERTY EDGE OR POINT OF DISCHARGE TO A SURFACE WATER. STABILIZATION SHALL BE ACCOMPLISHED BY THE USE OF EROSION CONTROL BLANKETS, SODDING, APPLICATION OF RIPRAP, OR OTHER METHOD OF STABILIZATION.

15. ALL TEMPORARY OR PERMANENT DRAINAGE DITCHES, SWALES, OR STORM SEWER DISCHARGE POINTS SHALL BE STABILIZED WITHIN 24 HOURS OF CONNECTION TO A SURFACE WATER, INCLUDING STORM SEWER SYSTEMS.

16. TEMPORARY SOIL STOCKPILES SHALL BE SURROUNDED BY SILT FENCE OR OTHER EFFECTIVE SEDIMENT CONTROLS, AND SHALL NOT BE PLACED IN SURFACE WATERS, INCLUDING STORMWATER CONVEYANCES SUCH AS CURB AND GUTTER SYSTEMS, OR CONDUITS AND DITCHES UNLESS THERE IS A BYPASS IN PLACE FOR THE STORMWATER. PLACE PERIMETER SEDIMENT CONTROLS AROUND STOCKPILES (25-50 FEET FROM TOE OF STOCKPILE TO ALLOW FOR EQUIPMENT MOVEMENT AND SEDIMENT COLLECTION).

17. DEWATERING OR BASIN DRAINAGE RELATED TO CONSTRUCTION SHALL BE DISCHARGED TO A TEMPORARY OR PERMANENT SEDIMENTATION BASIN. IF THE WATER CANNOT BE DISCHARGED TO A TEMPORARY OR PERMANENT SEDIMENTATION BASIN, IT SHALL BE TREATED WITH ONE OF THE DEWATERING STRUCTURES SHOWN. ALL WATER FROM DEWATERING OR BASIN DRAINING ACTIVITIES MUST BE DISCHARGED IN A MANNER THAT DOES NOT CAUSE NUISANCE CONDITIONS, EROSION IN RECEIVING CHANNELS OR ON DOWNSLOPE PROPERTIES, OR INUNDATION IN WETLANDS CAUSING SIGNIFICANT ADVERSE IMPACT OT THE WETLAND.

18. CONTRACTOR SHALL INSTALL, MAINTAIN AND REMOVE A CONCRETE WASHOUT AREA THROUGHOUT THE DURATION OF PAVING ACTIVITIES AND OTHER CONCRETE WORK. USE A ROLLAWAY SYSTEM AS PER SUDAS SECTION 11040. INCLUDE ALL LABOR, EQUIPMENT AND MATERIALS TO COMPLETE, MAINTAIN AND REMOVE ALONG WITH COLLECTED WASTE UPON COMPLETION OF CONSTRUCTION. INCLUDE PROPER DISPOSAL OF COLLECTED MATERIALS. CONTRACTOR SHALL NOTE LOCATION OF SUCH FACILITIES ON THE AMENDED COPY OF THIS SITE POLLUTION PREVENTION PLAN MAP.

19. DEWATERING IS LIMITED TO STORMWATER AND GROUNDWATER THAT MAY COLLECT ON SITE, AND THE FOLLOWING ALLOWABLE NON-STORMWATER SOURCES: FIRE-FIGHTING, FIRE HYDRANT FLUSHING, POTABLE WATER LINE FLUSHING, INFREQUENT BUILDING AND EQUIPMENT WASH DOWN WITHOUT DETERGENTS, UNCONTAMINATED FOUNDATION DRAINS, SPRINGS, LAWN WATERING, AND AIR CONDITIONING CONDENSATE. THE OPERATION MUST NOT LEAD TO SEDIMENT DEPOSITS WITHIN STORM SEWERS, DITCHES, AND SURFACE WATERS. THE OPERATION MUST NOT CAUSE OR POTENTIALLY CAUSE A VISIBLE PLUME IN A SURFACE WATER.

20. TEMPORARY SEDIMENTATION BASINS SHALL BE PROVIDED WHEN 10 OR MORE ACRES OF DISTURBED AREA DRAIN TO A COMMON LOCATION. THE BASIN MUST BE PROVIDE PRIOR TO RUNOFF LEAVING THE SITE OR ENTERING SURFACE WATERS.

21. ANY SEDIMENT ACCUMULATION IN SURFACE WATERS, INCLUDING DRAINAGEWAYS, CATCH BASINS, AND OTHER DRAINAGE SYSTEMS, SHALL BE REMOVED AND THE AREA STABILIZED WHERE SEDIMENT REMOVAL RESULTS IN EXPOSED SOILS. THE REMOVAL AND STABILIZATION MUST TAKE PLACE IMMEDIATELY, BUT NO MORE THAN 7 DAYS AFTER THE DISCOVERY UNLESS PRECLUDED BY LEGAL, REGULATORY, OR PHYSICAL ACCESS CONSTRAINTS. ALL REASONABLE EFFORTS MUST BE USED TO OBTAIN ACCESS. ONCE ACCESS IS OBTAINED, REMOVAL AND STABILIZATION MUST TAKE PLACE IMMEDIATELY, BUT NO MORE THAN 7 DAYS LATER. THE CONTRACTOR IS RESPONSIBLE FOR CONTRACTING ALL OF THE APPROPRIATED AUTHORITIES AND RECEIVING THE APPLICABLE PERMITS PRIOR TO CONDUCTING ANY WORK.

22. TEMPORARY EROSION AND SEDIMENT CONTROLS IN ADDITION TO THOSE SHOWN ON THE PLANS SHALL BE INSTALLED IF DEEMED NECESSARY OR AT THE DIRECTION OF THE ENGINEER/OWNER'S REPRESENTATIVE.

23. REMOVE ALL TEMPORARY SYNTHETIC, STRUCTURAL, NON-BIODEGRADABLE EROSION AND SEDIMENT CONTROL DEVICES AFTER THE SITE HAS UNDERGONE FINAL STABILIZATION AND PERMANENT VEGETATION HAS BEEN ESTABLISHED. MINIMUM VEGETATION ESTABLISHMENT IS 70% COVER. MAINTAIN ALL TEMPORARY EROSION CONTROL DEVICES UNTIL 70% ESTABLISHED COVER IS ACHIEVED.

24. STORMWATER CONTROLS ARE EXPECTED TO WITHSTAND AND FUNCTION PROPERLY UP TO A TWO-YEAR, 24-HOUR PRECIPITATION EVENT. VISIBLE EROSION AND/OR OFF-SITE SEDIMENT DEPOSITS SHOULD BE MINIMAL.

25. SLOPES EXCEEDING 6% SHALL BE ROUGHENED AS PER LOCAL OR PROJECT SPECIFICATIONS.

FINAL STABILIZATION

1. ALL SOIL-DISTURBING ACTIVITIES AT THE SITE HAVE BEEN COMPLETED AND A UNIFORM PERENNIAL VEGETATIVE COVER WITH A MINIMUM DENSITY OF 70 PERCENT OF THE NATIVE COVER FOR UNPAVED AREAS AND AREAS NOT COVERED BY PERMANENT STRUCTURES OR EQUIVALENT PERMANENT STABILIZATION MEASURES (SUCH AS THE USE OF RIPRAP, GABIONS, OR GEOTEXTILES) HAVE BEEN ACHIEVED.

2. FOR SOIL-DISTURBING ACTIVITIES ON LAND USED FOR AGRICULTURAL PURPOSES, FINAL STABILIZATION MAY BE ACCOMPLISHED BY RETURNING THE DISTURBED LAND TO ITS PRE-DISTURBANCE AGRICULTURAL USE. AREAS DISTURBED THAT WERE NOT PREVIOUSLY USED FOR AGRICULTURAL ACTIVITIES, SUCH AS BUFFER STRIPS IMMEDIATELY ADJACENT TO WATERS OF THE STATES, AND AREAS NOT BEING RETURNED TO THEIR PRE-DISTURBANCE AGRICULTURAL USE MUST MEET THE FINAL STABILIZATION CRITERIA ABOVE.

3. FINAL STABILIZATION HAS BEEN ACHIEVED WHEN THE ABOVE CRITERIA HAS BEEN MET AND:
   - 3.1 ALL DRAINAGE DITCHES CONSTRUCTED TO DRAIN WATER FROM THE SITE FOLLOWING CONSTRUCTION HAVE BEEN STABILIZED TO PREVENT EROSION.
   - 3.2 ALL TEMPORARY, SYNTHETIC, AND STRUCTURAL EROSION AND SEDIMENT CONTROLS HAVE BEEN REMOVED.
   - 3.3 ANY ACCUMULATED SEDIMENT HAS BEEN REMOVED FROM ALL STORMWATER CONVEYANCES AND BASINS USED FOR PERMANENT WATER QUALITY MANAGEMENT. ANY REMOVED SEDIMENT THAT EXPOSES SOIL MUST BE STABILIZED TO PREVENT EROSION.

INSPECTION AND MONITORING

1. A COPY OF THE COMPLETED AND SIGNED NOTICE OF INTENT, COVERAGE LETTER FROM THE IOWA DNR, STORMWATER POLLUTION PREVENTION PLAN (SWPPP), SITE INSPECTION RECORDS, AND THE GENERAL PERMIT SHALL BE KEPT ON SITE DURING CONSTRUCTION. IF NO REASONABLE ON-SITE LOCATION IS AVAILABLE, THE DOCUMENTS MAY BE RETAINED AT A READILY AVAILABLE ALTERNATIVE LOCATION. ALL RECORDS SHALL BE RETAINED FOR A PERIOD OF THREE YEARS AFTER THE SUBMISSION OF THE NOTICE OF TERMINATION.

2. THE CONTRACTOR SHALL PROVIDE AT LEAST ONE INDIVIDUAL PRESENT ON THE PERMITTED PROJECT SITE (OR AVAILABLE TO THE PROJECT SITE IN 72 HOURS) THAT IS TRAINED BY LOCAL, STATE, OR FEDERAL AGENCIES; PROFESSIONAL ORGANIZATIONS, OR OTHER ENTITIES WITH EXPERTISE IN EROSION PREVENTION, SEDIMENT CONTROL, OR PERMANENT STORMWATER MANAGEMENT. THE INDIVIDUAL SHALL BE KNOWLEDGEABLE AND EXPERIENCED IN THE APPLICATION OF EROSION PREVENTION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPS) AND SHALL BE FAMILIAR WITH THE INSTALLATION, INSPECTION, AND MAINTENANCE OF THE EROSION PREVENTION AND SEDIMENT CONTROL BMPS.

3. INSPECTION SHALL BE PERFORMED BY, OR UNDER THE DIRECTION OF, THE PERMITTEE AT LEAST ONCE EVERY 7 CALENDAR DAYS.

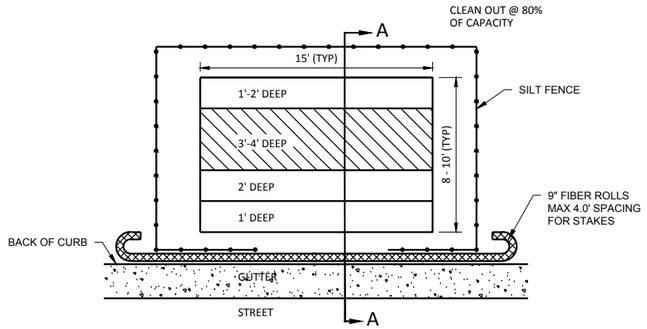
4. ALL INSPECTION AND MAINTENANCE CONDUCTED DURING CONSTRUCTION SHALL BE RECORDED IN WRITING AND THESE RECORDS SHALL BE RETAINED. RECORDS OF EACH INSPECTION AND MAINTENANCE ACTIVITY SHALL INCLUDE:
   - 4.1 DATE AND TIME OF INSPECTION.
   - 4.2 NAME OF PERSON(S) CONDUCTING INSPECTIONS.
   - 4.3 FINDINGS OF INSPECTIONS, INCLUDING RECOMMENDATIONS FOR CORRECTIVE ACTIONS.
   - 4.4 CORRECTIVE ACTIONS TAKEN (INCLUDING DATES, TIMES, AND PARTY COMPLETING MAINTENANCE ACTIVITIES).
   - 4.5 DOCUMENTATION THAT THE SWPPP PLAN HAS BEEN AMENDED WHEN SUBSTANTIAL CHANGES ARE MADE TO THE EROSION AND SEDIMENT CONTROLS OR OTHER BMPS IN RESPONSE TO INSPECTIONS.

5. INSPECTIONS SHALL INCLUDE THE FOLLOWING:
   - 5.1 ALL EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED IN THE SWPPP MUST BE INSPECTED TO ENSURE THEY ARE OPERATING CORRECTLY AND IN SERVICEABLE CONDITIONS.
   - 5.2 SURFACE WATERS, DRAINAGE DITCHES, AND CONVEYANCE SYSTEMS, INCLUDING STORM SEWER, MUST BE INSPECTED FOR SEDIMENT DEPOSITS AND/OR VISIBLE PLUMES.
   - 5.3 EXIT POINTS FROM THE CONSTRUCTION SITE ONTO PAVED SURFACES MUST BE INSPECTED FOR SEDIMENT BEING TRACKED BY VEHICLES OR EQUIPMENT.
   - 5.4 VEGETATIVE BUFFERS MUST BE INSPECTED FOR PROPER DISTRIBUTION OF FLOWS, SEDIMENT ACCUMULATION, AND SIGNS OF RILL FORMATION.

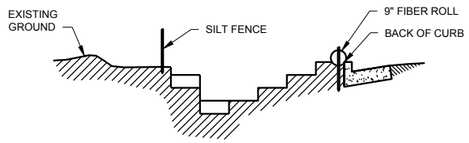
6. EROSION AND SEDIMENT CONTROLS FOUND IN NEED OF MAINTENANCE BETWEEN INSPECTIONS NEED TO BE REPAIRED OR SUPPLEMENTED WITH APPROPRIATE MEASURES WITHIN 72 HOURS OF DISCOVERY.

SCHEDULE OF EROSION CONTROL ACTIVITIES

1. INSTALL PERIMETER CONTROL INCLUDING SILT FENCE AND CONSTRUCTION ENTRANCE
2. COMPLETE SITE GRADING
3. SURROUND INFILTRATION BASINS WITH SILT FENCE OR BIO-LOGS TO PREVENT CLOGGING
4. INSTALL INLET PROTECTION WITH STORMSEWER
5. STABILIZE SOIL WITHIN 14 DAY OF INACTIVITY.



PLAN VIEW



SECTION A - A

CONCRETE WASHOUT

NOT TO SCALE

No.	Revision	Date	By
1	REVISIONS PER COMMENTS FROM THE CCWD	11-16-2022	AMZ

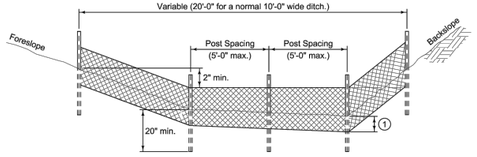
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

EROSION CONTROL DETAILS

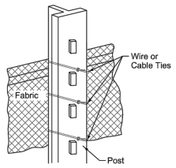
HOUSTON engineering, Inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C7.1

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - SWPPP.dwg:C7.1 EROSION CONTROL DETAILS-1/27/2023 10:51 AM:(adargay)



TYPICAL SILT FENCE DITCH CHECK



ATTACHMENT TO POST

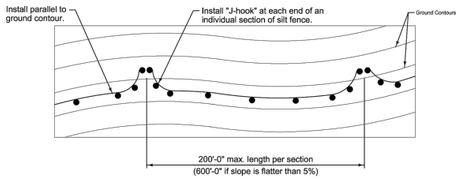
1. Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).

FIGURE 9040.119 SHEET 1 OF 2

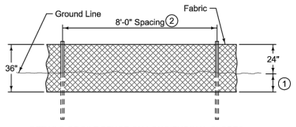
SUDAS | REVISION 2 10-21-14 | 9040.119 | SHEET 1 of 2

SUDAS Standard Specifications

SILT FENCE

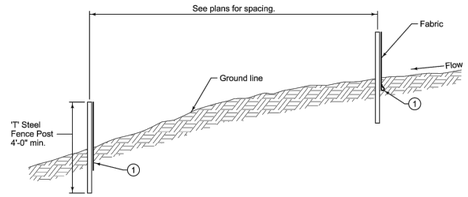


TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES
(Plan View)



DETAILS OF SILT FENCE ON LONGITUDINAL SLOPES

1. Insert 12 inches of fabric a minimum of 6 inches deep (fabric may be folded below the ground line).
2. Reduce post spacing to 5'-0" at water concentration areas, or as required to adequately support fence.



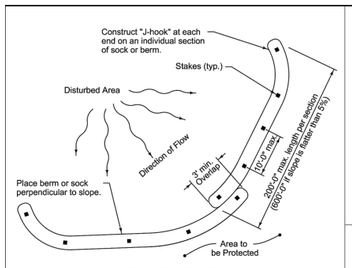
TYPICAL SILT FENCE INSTALLATION ON LONGITUDINAL SLOPES
(Profile View)

FIGURE 9040.119 SHEET 2 OF 2

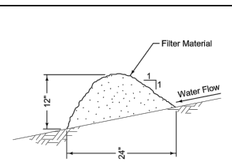
SUDAS | REVISION 2 10-21-14 | 9040.119 | SHEET 2 of 2

SUDAS Standard Specifications

SILT FENCE



PLAN VIEW OF SLOPE
(for sediment and slope control)

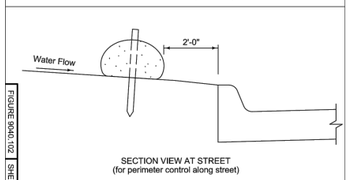


FILTER BERM

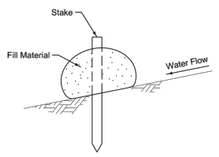
Berm shown is typical for slopes flatter than 3:1. For steeper slopes, increase berm size as directed by the Engineer.

Place berm in uncompacted windrow perpendicular to the slope at locations specified in the contract documents.

Filter sock diameter as specified in the contract documents.



SECTION VIEW AT STREET
(for perimeter control along street)



FILTER SOCK

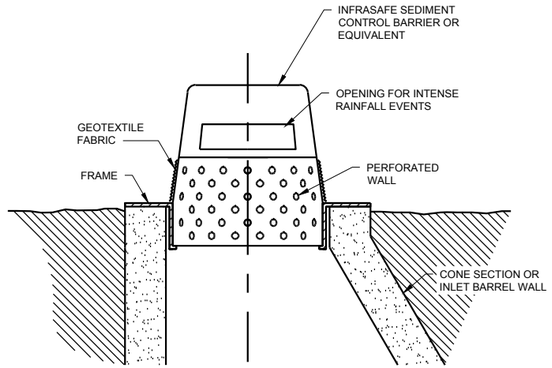
TYPICAL PLACEMENT OF BERM OR SOCK

FIGURE 9040.102 SHEET 1 OF 1

SUDAS | REVISION 4 10-17-17 | 9040.102 | SHEET 1 of 1

SUDAS Standard Specifications

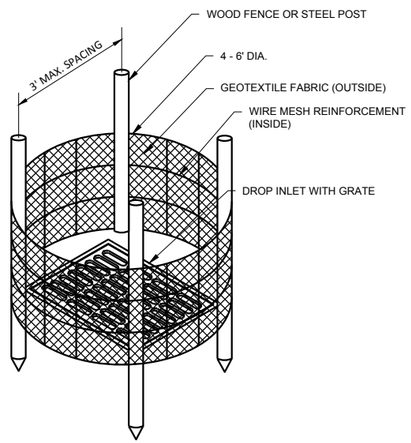
FILTER BERM AND FILTER SOCK



NOTES
1. ALTERNATIVE INLET PROTECTION DEVICES MAY BE ALLOWED SUBJECT TO ENGINEER'S APPROVAL.
2. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN TO INSURE THAT SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO INLET. ANY MATERIAL FALLING INTO INLET SHALL BE IMMEDIATELY REMOVED.
3. ANY INLET PROTECTION USED SHALL BE EQUIPPED WITH AN EMERGENCY OVERFLOW TO MINIMIZE THE THREAT OF STREET FLOODING DURING AN INTENSE RAINFALL EVENT.

INLET PROTECTION - TYPE B

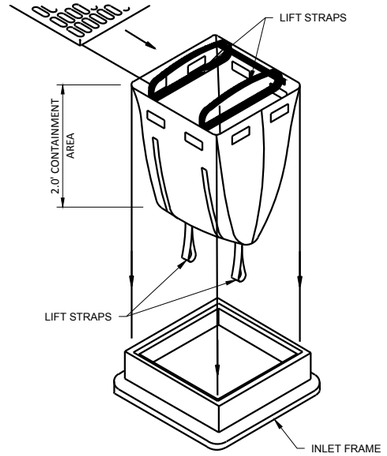
NOT TO SCALE



NOTES
1. INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER.
2. MANUFACTURED ALTERNATIVES MAY BE SUBSTITUTED, SUBJECT TO THE ENGINEER'S APPROVAL.
3. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.
4. ANCHOR FABRIC PER SILT FENCE DETAIL.

INLET PROTECTION - TYPE A

NOT TO SCALE



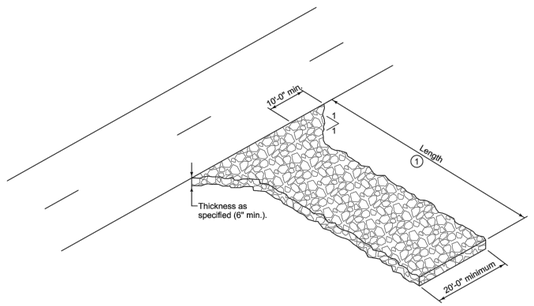
INSTALLATION
1. REMOVE THE INLET GRATE.
2. STAND THE GRATE UPRIGHT. INSTALL THE GRATE BETWEEN THE LIFTING HANDLES.
3. PLACE THE BAG IN THE INLET & LOWER THE BAG AND GRATE USING THE LIFTING STRAPS.

MAINTENANCE
1. CHECK BAG REGULARLY & AFTER RAIN EVENTS. IF THE BAG IS FILLED WITH ⅓ OF ITS CAPACITY WITH SEDIMENT, EMPTY THE BAG.
2. REMOVE DEBRIS AROUND THE INLET GRATE PRIOR TO REMOVING BAG.
3. USE THE LIFT HANDLES TO REMOVE THE BAG AND USE THE HANDLES ON THE BOTTOM TO EMPTY BAG.

NOTES
1. ALTERNATIVE INLET PROTECTION DEVICES MAY BE ALLOWED SUBJECT TO ENGINEER'S APPROVAL.
2. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN TO INSURE THAT SEDIMENT DOES NOT FALL INTO INLET. ANY MATERIAL FALLING INTO INLET SHALL BE IMMEDIATELY REMOVED.
3. ANY INLET PROTECTION USED SHALL BE EQUIPPED WITH AN EMERGENCY OVERFLOW TO MINIMIZE THE THREAT OF STREET FLOODING DURING AN INTENSE RAINFALL EVENT.
4. THIS STYLE MAY BE USED ONLY IN THE PROPERTY LINES. TYPE C INSTALLED IN RIGHT OF WAY SHALL CONFORM WITH SUDAS STANDARD SPECIFICATIONS AND BE FROM WIMCO, LANGE IPD, FLEXSTORM, OR APPROVED EQUIVALENT.

INLET PROTECTION - TYPE C

NOT TO SCALE



1. Entrance length: 50 foot minimum (30 foot for single family residential), or as specified in the contract documents. Length of entrance may be increased if sediment track-out occurs.

FIGURE 9040.120 SHEET 1 OF 1

SUDAS | REVISION 2 10-21-14 | 9040.120 | SHEET 1 of 1

SUDAS Standard Specifications

STABILIZED CONSTRUCTION ENTRANCE

No.	Revision	Date	By
1	REVISIONS PER COMMENTS FROM THE CCWD	11-16-2022	AMZ

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

EROSION CONTROL DETAILS

HOUSTON engineering, Inc.

Drawn By: JLV
Checked By: SMH
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017

SHEET C7.2

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LANDSCAPE REQUIREMENTS

- REQUIRED PLANTINGS:

STREET TREES :

REQUIRED: 1 **TREE**/185 OF FRONTAGE

2,124.60 FRONTAGE/50 = **4 STREET TREES REQUIRED**

GENERAL LANDSCAPING:

LANDSCAPING REQUIRED ADJACENT TO EACH STREET PROPERTY LINE

N

20 0 20 40

Scale Feet

PLANT SCHEDULE

TREES	BOTANICAL NAME	COMMON NAME	SIZE	QTY	REMARKS
	Gleditsia triacanthos inermis 'Harve'	Northern Acclaim® Honey Locust	2" Cal.	2	
	Tilia americana	American Linden	2" Cal.	4	

SHRUBS	BOTANICAL NAME	COMMON NAME	SIZE	QTY	REMARKS
CK	Calamagrostis x acutiflora `Karl Foerster`	Karl Foerster Feather Reed Grass	2 gal.	58	
SH	Sporobolus heterolepis	Prairie Dropseed	2 gal.	60	
SM	Syringa meyeri `Palibin`	Dwarf Korean Lilac	2 gal.	22	

GROUND COVERS	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	QTY	REMARKS
	ROCK MULCH	1 1/2" RIVER ROCK	MULCH		4,448 sf	
	SOD	SOD	SOD		14,077 sf	

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

LANDSCAPE PLAN

HOUSTON engineering, Inc.

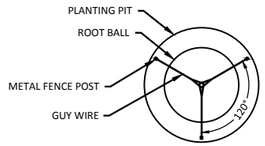
Drawn By	JJJ
Checked By	JJJ
Date	01-13-2023
Scale	As Shown
Project No.	10904-0017
SHEET	C8.0

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of _____.

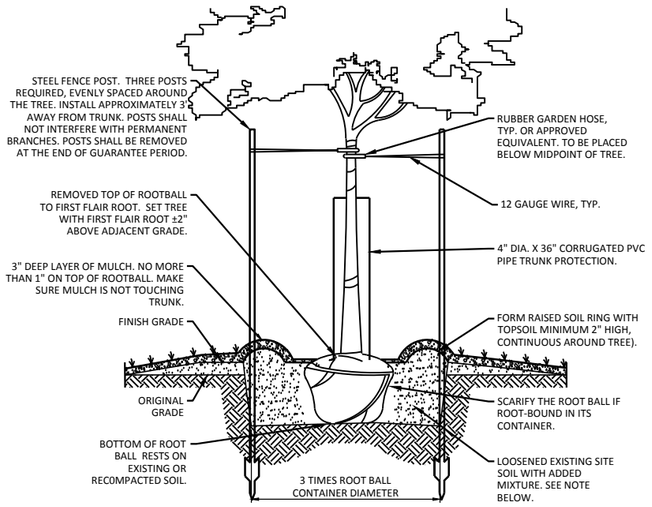
NAME
License No. XXXXX

MM-DD-YYY
Date

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Landscape.dwg-C8.0 LANDSCAPE PLAN-1/19/2023 10:02 PM-(jjohnson)



STAKING DIAGRAM



NOTES;

1. REMOVE TOP OR ROOTBALL, ADVANTAGEOUS ROOTS AND FIBROUS LOCATED ABOVE FLARE ROOTS TO DETERMINE PROPER PLANTING DEPTH.
2. TREE STAKING IS NOT PREFERRED BUT TO BE USED AS A LAST RESORT ON WINDY SITES. INSTALL TWO OF THE THREE STAKES AND GUY WIRES ON THE UPHILL SIDE OF THE TREE.
3. DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKES.
4. WATER THOROUGHLY AFTER INSTALLATION.
5. REMOVE GUY WIRES AND TIES AFTER 6 MONTHS OR AT THE DIRECTION OF THE LANDSCAPE ARCHITECT.
6. TREE SHALL STAND PLUMB.
7. SOIL MIX: 1 PART ORGANIC MATERIAL, 1 PART SAND AND 2 PARTS TOPSOIL.
8. REMOVE ALL TAGS, ROPE, WIRE BASKETS AND CONTAINERS.
9. CLEAN TRUNK TO HEIGHT SPECIFIED AND PAINT WOUNDS WITH APROVED DRESSING COMPOUND.

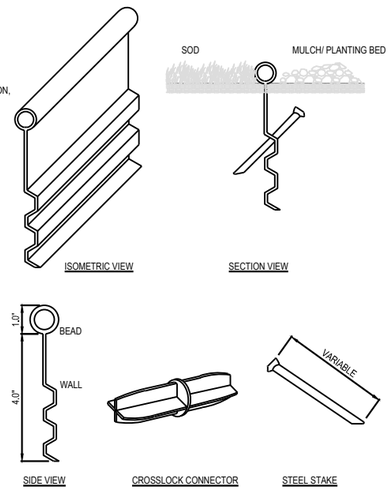
TREE PLANTING

NO SCALE

MATERIAL:

PURE POLYETHYLENE WITH 3.5% - 4% CARBON BLACK CONCENTRATE ADDED FOR UV STABILIZATION, MDPE WITH A MELT FACTOR UNDER 2

APPROXIMATE DIMENSIONS:
HEIGHT: 5 INCH
LENGTH: 20 FT
THICKNESS: .09 TO .105 INCHES



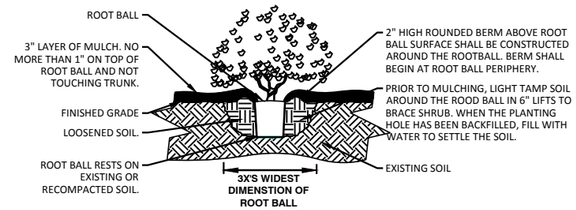
NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWING.
3. HIS DRAWING IS A TYPICAL DETAIL FOR THE INSTALLATION OF POLY EDGING.

TYPICAL POLY EDGING DETAIL

NOT TO SCALE

IRRIGATION NOTES

1. IRRIGATION CONTRACTOR TO PROVIDE IRRIGATION SYSTEM ON A DESIGN/BUILD ARRANGEMENT FOR AREA NOTED ON THE PLAN. CONTRACTOR TO PREPARE DESIGN DRAWINGS AND SUBMIT FOR APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION.
2. IRRIGATION CONTRACTOR TO CONFIRM ADEQUATE PRESSURE EXISTS TO OPERATE SYSTEM PRIOR TO INSTALLATION.
3. IRRIGATION CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY LOCATION OF POC. CONTRACTOR TO NOTIFY OWNER'S REPRESENTATIVE OF ANY ISSUES.
4. IRRIGATION CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES AND TAKE ALL PRECAUTIONS NOT TO DAMAGE OR DISTURB SUCH IMPROVEMENTS. COORDINATE WITH GENERAL CONTRACTOR AS NECESSARY.
5. IRRIGATION CONTRACTOR SHALL ARRANGE FOR AND PAY FOR ANY NECESSARY PERMITS AND/OR INSPECTIONS AS REQUIRED BY LOCAL AGENCIES OR ORDINANCES RELATED TO THE IRRIGATION INSTALLATION FOR THIS PROJECT.
6. INSTALL ALL COMPONENTS OF IRRIGATION SYSTEM TO MANUFACTURER'S SPECIFICATIONS. FLUSH ALL LINES BEFORE INSTALLING NOZZLES.
7. ALL BACKFLOW DEVICES TO BE INSTALLED PER LOCAL CODE REQUIREMENTS.
8. ALL PVC PIPING UNDER CONTINUOUS PRESSURE SHALL BE CLASS 200 PVC PIPE. ALL OTHER PVC SHALL BE CLASS 160 PVC.
9. CONTROL WIRE SHALL BE SOLID COPPER WIRE U.L. APPROVED FOR DIRECT BURIAL IN GROUND. MINIMUM GAUGE - #14 (#12 FOR RUNS OVER 2000') OR AS OTHERWISE SPECIFIED. DECODER WIRE SHALL BE JACKETED. GROUND WIRE (WHERE APPLICABLE) SHALL BE WHITE.
10. 24VAC WIRE SPLICING WILL BE DIRECT BURIAL SPLICE KIT AS MANUFACTURED BY 3M, SPECIFICALLY DBY-6 & DBR-6. UTILIZE GB LIQUID ELECTRICAL TAPE ON CONNECTIONS PRIOR TO PLACING WIRE NUT.
11. LEAVE 18 INCHES OF ADDITIONAL WIRE AT EACH VALVE LOCATION. ROLL WIRE INTO COIL AT EACH LOCATION.
12. INSTALL RAIN SENSORS ON VERTICAL SURFACES. COORDINATE WITH OWNER'S REPRESENTATIVE AS TO FINAL LOCATION OF RAIN SENSOR, MOISTURE SENSORS, WEATHER STATIONS AND OTHER ADDITIONAL SENSORS.
13. IRRIGATION CONTRACTOR TO COORDINATE WITH OWNER'S REPRESENTATIVE AS TO FINAL LOCATION OF THE CONTROLLER. ELECTRICAL POWER TO BE INSTALLED TO WITHIN FIVE (5) FEET OF THE CONTROLLER LOCATION. COORDINATE WITH ELECTRICAL CONTRACTOR AS NECESSARY.
14. IRRIGATION SYSTEM TO BE OPERATIONAL BEFORE PLANTING MATERIALS MAY BE INSTALLED IN PLANTING BEDS.
15. ALL VALVES, QUICK COUPLERS AND WIRE SPLICES SHALL BE LOCATED IN VALVE WITH LABELED COVERS AND BURIED FLUSH WITH GRADE.
16. SLEEVING IS REQUIRED UNDER ALL WALKS AND ROADWAYS. SLEEVES SHALL EXTEND A MINIMUM OF 18" BEYOND END OF WALK/ROADWAY AND BE MARKED. WIRES SHALL BE CONTAINED IN A SEPARATE, 1 1/2" (MIN.) SLEEVE.
17. WINTERIZATION OF THE IRRIGATION SYSTEM SHALL BE AS PER MANUFACTURER'S SPECIFICATIONS.

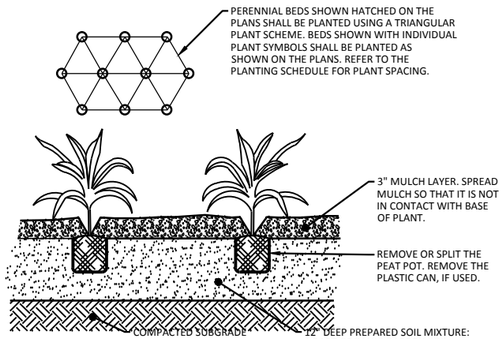


NOTES:

1. SCARIFY THE ROOT BALL IF ROOT-BOUND IN ITS CONTAINER.
2. WHERE SHRUBS APPEAR IN BED AREAS, 3" OF MULCH SHALL BE SPREAD OVER THE ENTIRE AREA WITHIN THE BED EDGE AS INDICATED ON THE PLANS.
3. DO NOT PRUNE BEFORE ACCEPTANCE.
4. REMOVE BURLAP FROM TOP THIRD OF ROOT BALL OR CAREFULLY REMOVE THE PLASTIC CONTAINER, IF ONE IS USED.
5. IF EXISTING SOIL IS NOT ACCEPTABLE, BACKFILL WITH SOIL MIXTURE AS FOLLOWS: 1 PART COMPOSTED GARDEN SOIL - 1 PART SAND - 2 PARTS NATIVE TOPSOIL.

SHRUB PLANTING

NO SCALE



PERENNIAL PLANTING

NO SCALE

PLANTING NOTES

PERMITS:
1. THE LANDSCAPE CONTRACTOR SHALL OBTAIN ANY NECESSARY PERMITS, LICENSES, ETC. AND SHALL GIVE ALL NOTICES AND COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, CODES, RULES AND REGULATIONS DURING THE COURSE OF THE INSTALLATION OF THIS PROJECT.

PREPARATION AND PLANTING:
2. ALL PLANTING BEDS TO RECEIVE 1 ½" RIVER ROCK MULCH. MULCH TO BE INSTALLED TO 3" DEPTH OVER 5 OZ. WOVEN WEED BARRIER FABRIC UNLESS OTHERWISE INDICATED ON THE PLANTING DETAILS.
3. ALL TREES IN LAWN AREAS TO HAVE 5' DIAMETER RING WITH 3" DEEP 1 ½" RIVER ROCK MULCH OVER 5 OZ. WOVEN WEED BARRIER FABRIC UNLESS OTHERWISE INDICATED ON THE PLANTING DETAILS. KEEP MULCH 6" AWAY FROM TRUNK.
4. ALL PLANTING BEDS AND TREE RINGS TO BE EDGED WITH 5" POLY EDGING OR APPROVED EQUAL. EDGING TYPE SUBSTITUTIONS TO BE APPROVED BY OWNER'S REPRESENTATIVE.
5. NEW TREE PLANTINGS TO BE STAKED PER PLANTING DETAILS.
6. DIMENSIONS LISTED FOR HEIGHTS, SPREAD AND TRUNK SPECIFICATIONS ON THE PLANT MATERIAL SCHEDULE ARE THE MINIMUM REQUIRED SIZE OF EACH PLANT.
7. NO SUBSTITUTIONS AS TO TYPE, SIZE, OR SPACING OF PLANT MATERIALS SPECIFIED ON THIS PLAN MAY BE MADE WITHOUT THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
8. PRE-EMERGENT HERBICIDE SHALL BE APPLIED TO ALL PLANTING BEDS IMMEDIATELY PRIOR TO PLACEMENT OF MULCH FOR WEED CONTROL.
9. ALL DISTURBED AREAS OF THE SITE ARE TO BE SEEDED AND/OR SODDED IN ACCORDANCE WITH THE PLANS. ANY AREAS DISTURBED BY CONTRACTOR OUTSIDE OF PROJECT LIMITS TO BE RESTORED TO ORIGINAL CONDITIONS.
10. NO EXCAVATION OR PLANTING PIT SHALL BE LEFT OPEN OVERNIGHT.
11. ALL PLANT MATERIALS TO BE NURSERY GROWN AND TO COMPLY WITH THE AMERICAN STANDARD FOR NURSERY STOCK FOR SIZE AND QUALITY.
12. ALL PLANTS SHALL HAVE A WELL-FORMED HEAD WITH MINIMUM CALIPER, HEIGHT AND SPREAD OF THE SIDE BRANCHES AS SHOWN ON THE PLANT LIST. TRUNKS SHALL BE UNDAMAGED AND SHAPE SHALL BE TYPICAL OF THE SPECIES.
13. MEASUREMENT OF CONIFER HEIGHT SHALL INCLUDE NOT MORE THAN FIFTY PERCENT (50%) OF THIS YEARS VERTICAL GROWTH (TOP CANDLE).
14. THE OWNER'S REPRESENTATIVE RESERVES THE RIGHT TO REFUSE ANY PLANT MATERIAL OR ANY DEFECTIVE WORKMANSHIP.
15. NO MATERIAL SHALL BE PLANTED BEFORE FINISH GRADING HAS BEEN COMPLETED.
16. DO NOT PLANT WHEN TEMPERATURE IS BELOW 35 DEGREES FAHRENHEIT, EXCEED 90 DEGREES FAHRENHEIT, SUSTAINED WIND EXCEEDING 25 MPH, GROUND IS SATURATED, GROUND IS FROZEN AND/OR OTHER ENVIRONMENTAL CONDITIONS THAT ARE NOT CONDUCIVE TO TREE PLANTING.
17. DO NOT ALLOW TREES TO DRY-OUT BEFORE THEY CAN BE PLANTED. KEEP TREES, INCLUDING ROOTBALLS, COOL AND MOIST UNTIL PLANTED.
18. PLANT TREES SUCH THAT FIRST FLARE ROOT IS 1" TO 2" ABOVE SURROUNDING GRADE.
19. REMOVE FROM SITE ALL DEBRIS ASSOCIATED WITH INSTALLATION ACTIVITIES. CLEAN SIDEWALKS, ROADS, ADJACENT LAWN AREAS AS NECESSARY TO KEEP THE SITE CLEAN AT ALL TIMES.

CONTRACTOR REQUIREMENTS:
20. IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO CONFIRM ALL MATERIAL QUANTITIES. IN THE EVENT OF A DISCREPANCY, THE QUANTITIES SHOWN ON THE PLAN SHALL TAKE PRECEDENCE OVER THE MATERIAL SCHEDULE.
21. THE LANDSCAPE CONTRACTOR IS TO VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES. TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN, REPAIR ANY DAMAGE ACCORDING TO LOCAL STANDARDS AND AT CONTRACTOR'S EXPENSE. COORDINATE ALL CONSTRUCTION WITH THE APPROPRIATE UTILITY COMPANY.
22. THE LANDSCAPE CONTRACTOR WILL BE RESPONSIBLE FOR STAKING AND LAYOUT OF PLANTINGS ON THIS PROJECT. THE OWNER'S REPRESENTATIVE SHALL BE ADVISED WHEN STAKES ARE READY FOR INSPECTION ON VARIOUS PLANTING AREAS. ALL LAYOUT WORK SHALL BE INSPECTED AND APPROVED BY THE OWNER'S REPRESENTATIVE PRIOR TO OPENING ANY PLANT PITS.
23. IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO VERIFY THAT EACH EXCAVATED TREE OR SHRUB PIT WILL PERCOLATE (DRAIN) PRIOR TO ADDING TOPSOIL AND INSTALLING TREES OR SHRUBS. THE CONTRACTOR SHALL FILL THE BOTTOM OF SELECTED HOLES WITH SIX INCHES OF WATER. THIS WATER SHOULD PERCOLATE OUT WITHIN A 24-HOUR PERIOD. THE OWNER'S REPRESENTATIVE SHALL VERIFY ACCURACY AND EFFECT OF PERCOLATION TESTING. IF THE SOIL AT A GIVEN AREA DOES NOT DRAIN PROPERLY, A PVC DRAIN OR GRAVEL SUMP SHALL BE INSTALLED OR THE PLANTING RELOCATED.
24. SHOULD THE LANDSCAPE CONTRACTOR ENCOUNTER UNSATISFACTORY SURFACE OR OTHER SUBSURFACE DRAINAGE CONDITIONS, SOIL DEPTH, LATENT SOILS, HARD PAN, STEAM OF OTHER UTILITY LINES OR OTHER CONDITIONS THAT WILL JEOPARDIZE THE HEALTH AND VIGOR OF THE PLANTS, HE MUST ADVISE THE LANDSCAPE ARCHITECT IN WRITING OF THE CONDITIONS PRIOR TO INSTALLING THE PLANTS, OTHERWISE THE LANDSCAPE CONTRACTOR WARRANTS THAT THE PLANTING AREAS ARE SUITABLE PROPER GROWTH AND DEVELOPMENT OF THE PLANTS TO BE INSTALLED.
25. LANDSCAPE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT WHEN THE PLANT MATERIALS ARE AVAILABLE AT THE JOB SITE FOR REVIEW BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION
26. SEED DISTURBED LAWN AREAS AND AREA AROUND TREE PLANTING NOT COVERED WITH WOOD MULCH. SEED BY IMPORTING TOPSOIL TO FILL DEPRESSIONS, RAKE LEVEL, OVERSEED AND RAKE-IN MULCH.

MAINTENANCE AND WARRANTY:
27. TREES STAKES TO REMAIN IN-PLACE FOR 2 FULL GROWING SEASONS. CONTRACTOR TO REMOVE STAKES AT END OF SECOND SEASON AND BEFORE WINTER.
28. MAINTAIN AND WARRANTY TREES FOR 1-YEAR. MAINTAIN BY REGULAR WATERING, WEED CONTROL, STRAIGHTENING OF TREES AND STAKES, TIGHTENING OF TREE TIES, PRUNING, PEST/RODENT/DEER CONTROL, AND AS ADDITIONALLY REQUIRED.
29. TREES THAT DIE (HAVE LESS THAN 50% CANOPY) DURING THE WARRANTY PERIOD TO BE REMOVED IMMEDIATELY. REPLACEMENT TREES TO BE PLANTED DURING SPRING OR FALL PLANTING PERIODS AND MAINTAINED AND WARRANTIED FOR 1 ADDITIONAL YEAR FROM DATE OF REPLACEMENT PLANTING.
30. IF WATERING OPTIONS ARE NOT AVAILABLE ON SITE, LANDSCAPE CONTRACTOR TO INSTALL 20-GALLON WATERING BAG FOR 2-YEAR WARRANTY PERIOD AND WATER TREES USING WATERING BAG. REMOVE WATERING BAGS BEFORE WINTER AND REPLACE WITH PVC TREE TRUNK PROTECTION. RE-INSTALL WATERING BAG THE FOLLOWING SPRING IF APPLICABLE TO COMPLETE THE WARRANTY REQUIREMENT. REMOVE WATERING BAGS UPON COMPLETION OF TREE WARRANTY.

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

LANDSCAPE NOTES & DETAILS

HOUSTON engineering, Inc.

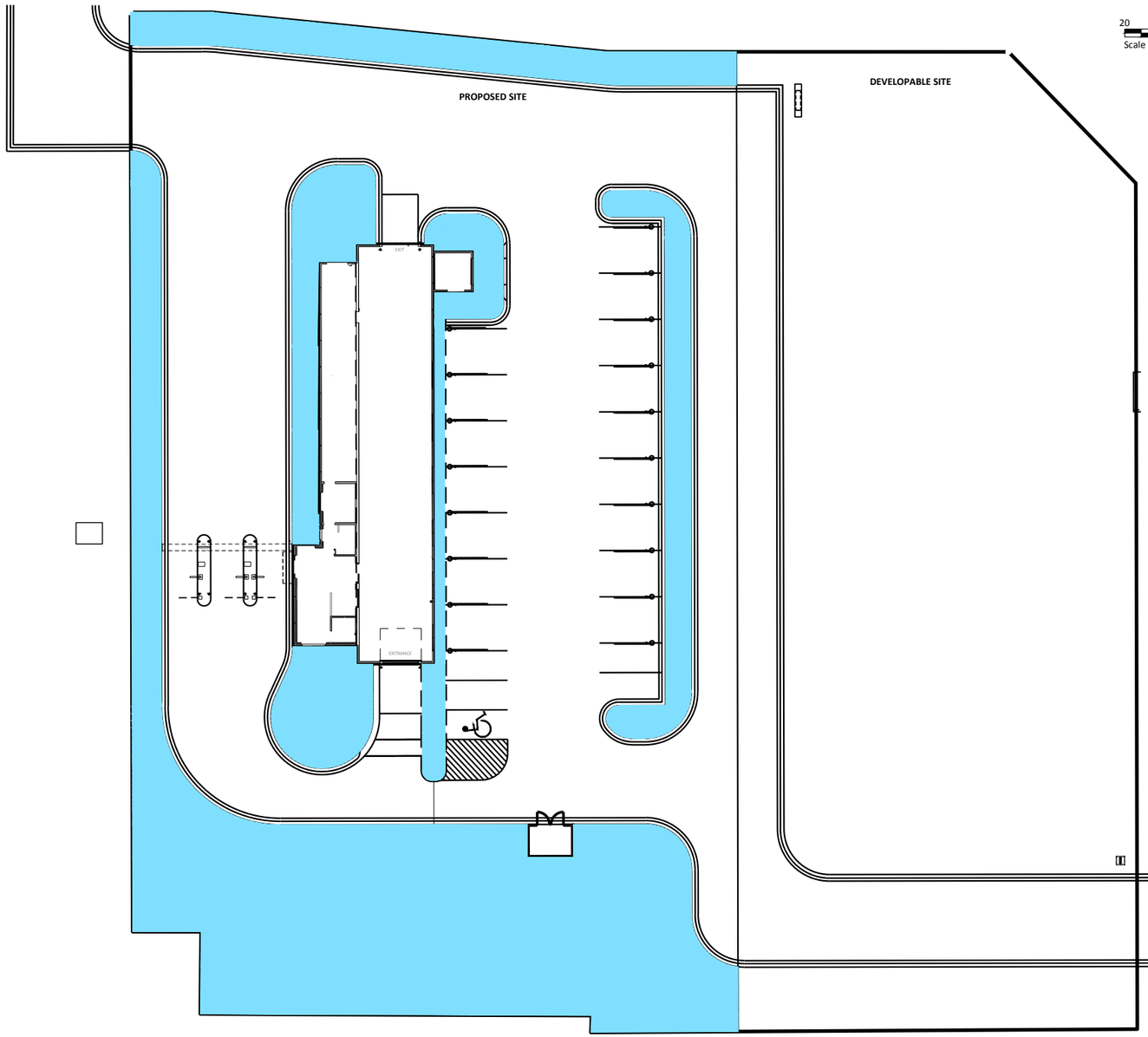
Drawn By: JJJ
Checked By: JJJ
Date: 01-26-2023
Scale: As Shown
Project No.: 10904-0017
SHEET: C8.1

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Landscape Architect under the laws of the State of Iowa.

NAME
License No. XXXXX

MM-DD-YYY
Date

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Landscape.dwg-C8.1 LANDSCAPE DETAILS-1/27/2023 10:53 AM-(adargay)



N

20 0 20 40
Scale Feet

LEGEND

GREEN SPACE AREA: 21851.93 SQ FT.
PARKING AREA: 3057.37
OPEN SPACE AREA: 18794.56

No.	Revision	Date	By

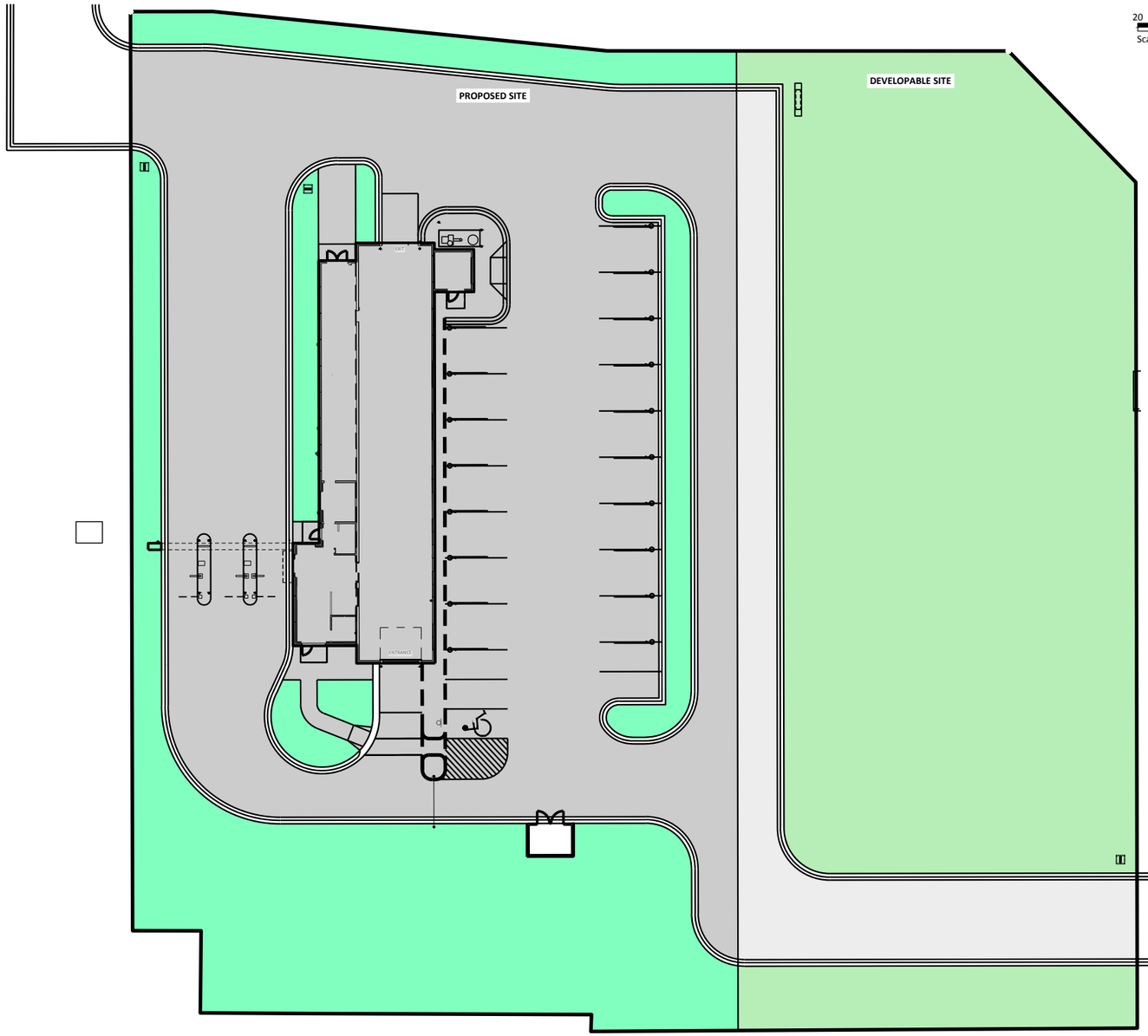
SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

SITE PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	

H:\JBN\10900\10904\10904_0017 IA 6300 Hickman Rd\CAD\Plans\10904-0017 - Area Calc Plan.dwg-AREA CALC PLAN (2)-1/27/2023 1:37 PM-(adargay)



N

20 0 20 40
Scale Feet

LEGEND

- (DEVELOPABLE SITE) PERVIOUS AREA: 28577.91 SQ FT
- (PROPOSED SITE) PERVIOUS AREA: 16663.36 SQ FT
- (DEVELOPABLE SITE) IMPERVIOUS AREA: 6847.80 SQ FT
- (PROPOSED SITE) IMPERVIOUS AREA: 38110.35 SQ FT

PARKING SPACE

16 - VACUUM BAYS
5 - PARKING SPACES INCLUDING HANDICAP

No.	Revision	Date	By

SILVERSTAR CARWASH
6300 HICKMAN RD
WINDSOR HEIGHTS, IOWA

SITE PLAN

HOUSTON engineering, Inc.

Drawn By	JLV
Checked By	SMH
Date	01-26-2023
Scale	As Shown
Project No.	10904-0017
SHEET	

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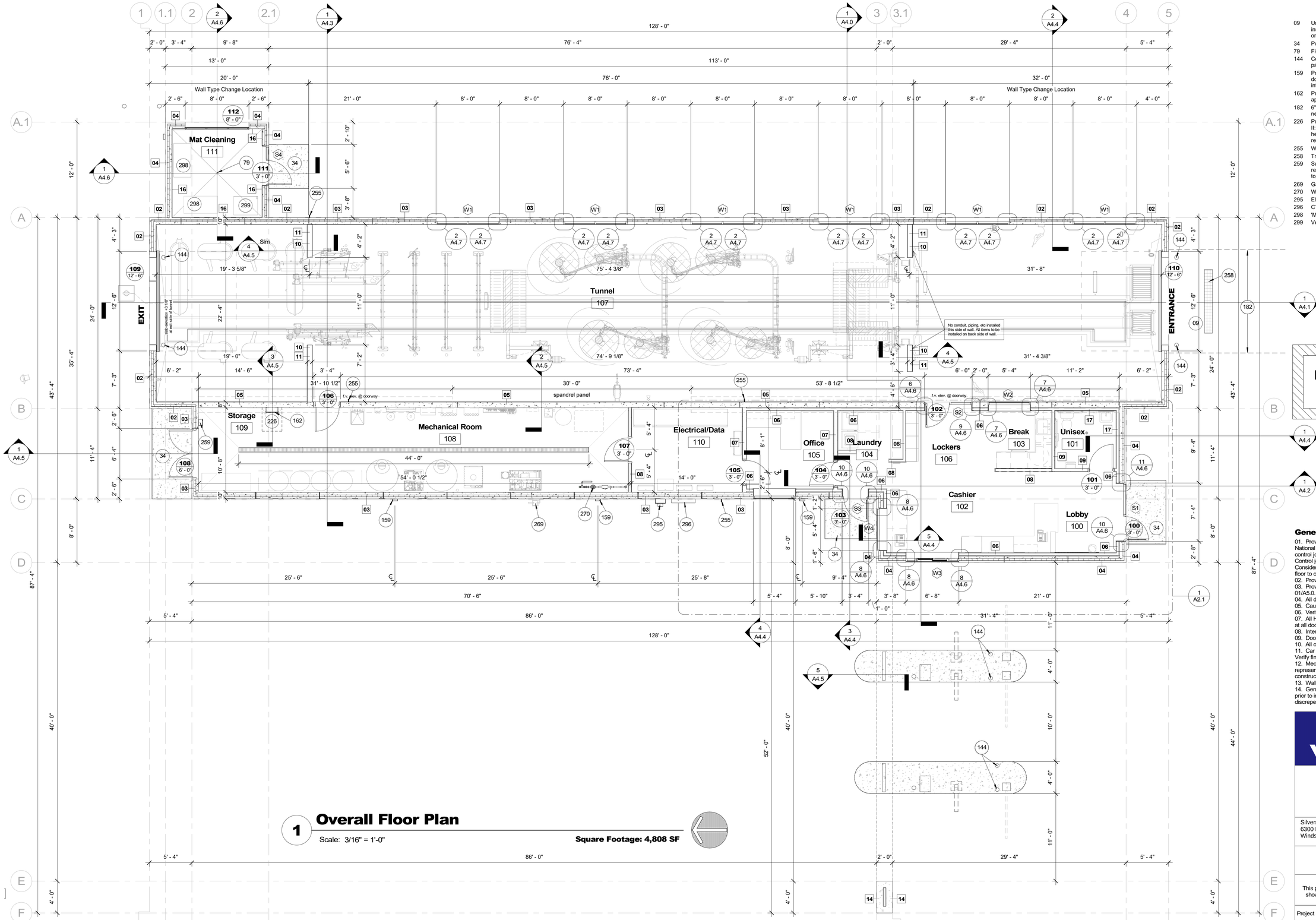


1 Overall Floor Plan

Scale: 3/16" = 1'-0"

Square Footage: 4,808 SF

Plan Notes

09 Underslab heating system. Heat piping laid into 2" rigid insulation w/ integral clips. (R-10 min.) Rigid insulation to sit on a bed of compacted granular fill. Verify extent w/ civil.
34 Poured concrete stoop. See struct.
79 Floor drain. See mech.
144 Concrete filled steel pipe bollard. Paint red to match precast panels.
159 Prefinished aluminum scupper & rectangular open faced downspout w/ silver metallic finish. Downspout 6" min. Tie into underground collection system. See civil plans.
162 Prefabricated 18"w roof access ladder. Rung spaced 12" apart evenly. Install per mfr. standard recommendations.
182 6" thick poured concrete slab w/ heat system over min. 12" new structural fill. Verify w/ mechanical & civil plans.
226 Prefabricated roof access hatch ('Babcock Davis' Personnel II: Model: BRHUG36x30S1T or approved equal). Guard height to be 42" above roof surface. Install per mfr. recommendations. Coordinate location w/ precast mfr.
255 Wall mounted water spigot. See mechanical plans.
258 Trench drain. See mechanical plans.
259 Surface mounted fire extinguisher cabinet. Verify requirements w/ fire marshall. Install cabinet @ 48" AFF to top of cabinet per ADA requirements.
269 Gas meter. See mechanical.
270 Water meter. See mechanical.
295 Electrical meter. See electrical plans.
296 CT cabinet. See electrical plans.
298 'Mat beater' equipment. See mechanical & electrical plans.
299 Vending machine, NIC

General Notes:

01. Provide 'W' style GWB control joints as recommended by the National Gypsum Association. This includes, but is not limited to, control joints @ 30'-0" o.c. max. in long corridors/wall expanses. Control joints @ door jambs, extending from door head to ceiling. Consideration should also be given to locating control joints from floor to ceiling at either edge of large window openings.
02. Provide W.R. GWB in all bathroom areas.
03. Provide 2x blocking at all grab bar locations. See detail 01/A5.0.
04. All dimensions are from face of stud, U.N.O.
05. Caulk perimeter of all sinks, toilets, & backsplashes.
06. Verify all appliance dimensions prior to ordering cabinets.
07. All H/C accessible areas shall have ADA compliant thresholds at all doors requiring thresholds.
08. Interior elevations are on sheet A5.0.
09. Door & window schedules/elevations are on sheet A5.1.
10. All outlets, switches, and plate covers to be white.
11. Car wash equipment shown for representation purposes only. Verify final design w/ supplier prior to construction.
12. Mechanical, Electrical, & Structural items shown for representaiton purposes only. Verify final design per trade prior to construction.
13. Wall types are shown on sheet A2.4.
14. General contractor to coordinate & verify all vendor equipment prior to installation, typical. Contact Architect with any layout discrepencies.

PRELIMINARY

NOT FOR CONSTRUCTION

VanDeWalle Architects LLC
ARCHITECTURE • PLANNING • INTERIORS
Sioux Falls, S.D. 605-339-4411

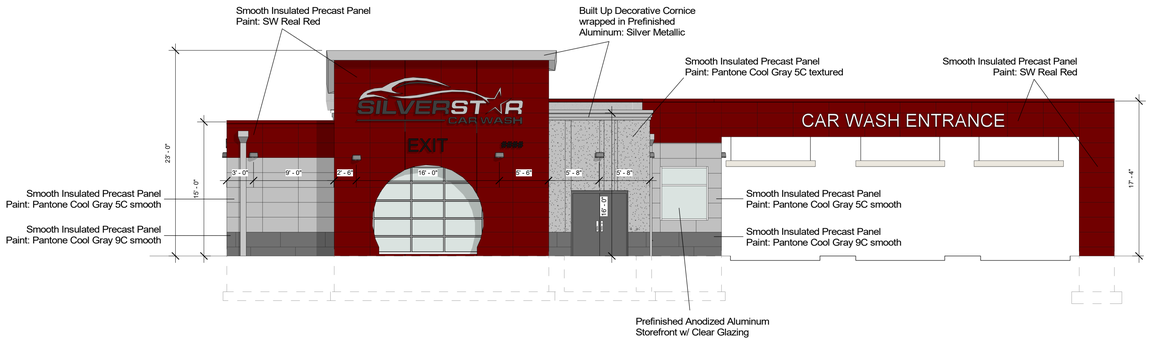
MFP Midwest Fidelity Partners

Silverstar Car Wash
6300 Hickman Road
Windsor Heights, IA

Floor Plan

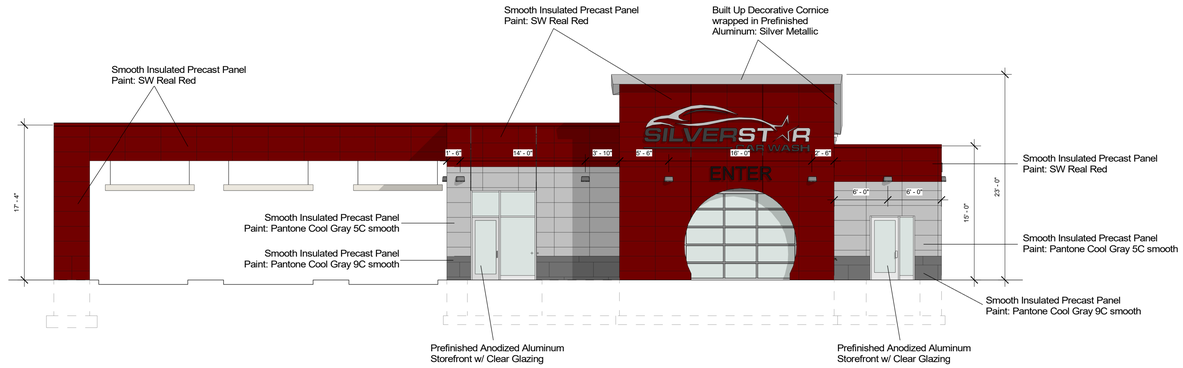
		Revisions	
Project No.	22077		**A2.0**
Date:	01.27.23		
Drawn By:	TJS		

1/16/2023 4:02:56 PM 22078 Silverstar Johnston IA-128 3 LANE-10-PRECAST_detached.rvt



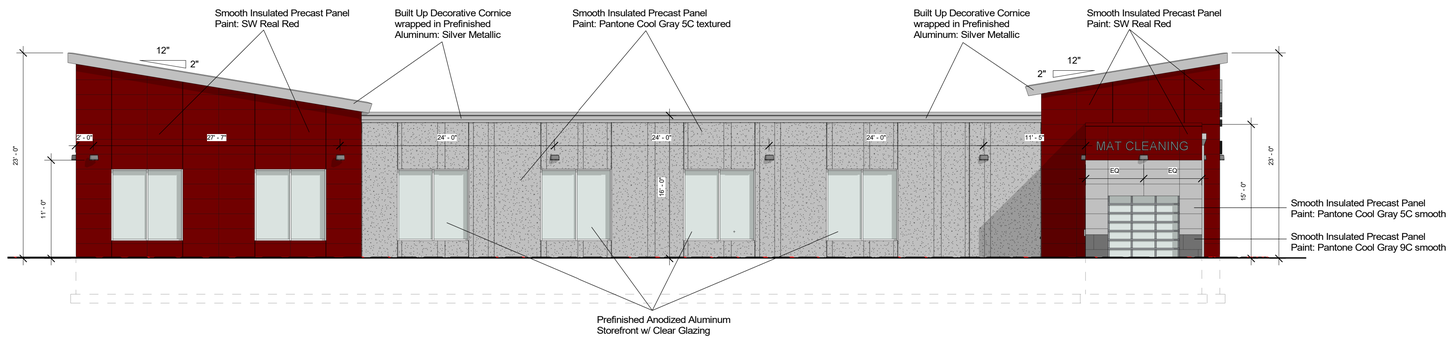
1 North Elevation DRC

Scale: 1/8" = 1'-0"



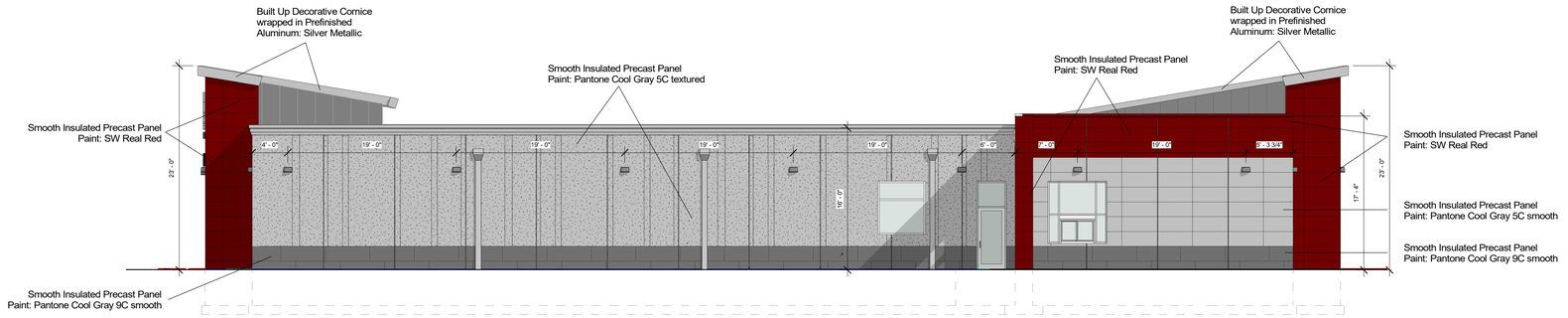
4 South Elevation DRC

Scale: 1/8" = 1'-0"



2 East Elevation DRC

Scale: 1/8" = 1'-0"



3 West Elevation DRC

Scale: 1/8" = 1'-0"

PRELIMINARY

NOT FOR CONSTRUCTION

VanDeWalle Architects LLC
ARCHITECTURE • PLANNING • INTERIORS
Sioux Falls, S.D. 605·339·4411

Midwest Fidelity Partners

Silverstar Car Wash
6300 Hickman Road
Windsor Heights, IA

Exterior Elevations - Materials

Project No.	22077	Revisions	**SD-1**
Date:	01.27.23		
Drawn By:	TJS		

Smooth Insulated Precast Panel
Paint: Pantone Cool Gray 5C textured

Smooth Insulated Precast Panel
Paint: Pantone Cool Gray 9C smooth

Smooth Insulated Precast Panel
Paint: Pantone Cool Gray 5C smooth

Prefinished Anodized Aluminum
Storefront w/ Clear Glazing

Firestone Prefinished Aluminum
Parapet Cap: Silver Metallic

Smooth Insulated Precast Panel
Paint: SW Real Red

Photo of recently constructed building

PRELIMINARY

NOT FOR CONSTRUCTION

VanDeWalle Architects LLC
ARCHITECTURE • PLANNING • INTERIORS
Sioux Falls, S.D. 605·339·4411

MFP Midwest Fidelity Partners

Silverstar Car Wash
6300 Hickman Road
Windsor Heights, IA

Exterior Elevations - Materials

Project No. 22077	Revisions	**SD-2**
Date: 01.27.23		
Drawn By: TJS		

IA 6300 HICKMAN RD SILVERSTAR CAR WASH STORMWATER REPORT

Prepared for: City of Windsor Heights, IA

STORMWATER REPORT

IA 6300 Hickman RD Silverstar Car Wash

January 27, 2023
Windsor Heights, IA

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a <insert Registered Professional Engineer OR duly Licensed Engineer> under the laws of the State of <insert state>.

Houston Engineering, Inc.
100 Court Ave, Suite #202
Des Moines, IA 50309
Phone (515) 444-5393

_____
Name of Signee
<Insert State Reg. No. ## OR License No. ##>

_____
Date

TABLE OF CONTENTS

TABLES

FIGURES

LIST OF ACRONYMS

AC	Acres
CFS	Cubic Feet per Second
CPv	Channel Protection Volume
CN	Curve Number
CSO	Combined Sewer Overflow
FT^3	Cubic Feet
HSG	Hydrologic Soil Group
MI^3	Square Miles
MIN	Minute
PCSMP	Post Construction Stormwater Management Plan
SCS	Soil Conservation Service
T_c	Time of Concentration
USACE	United States Army Corps of Engineers
WQCv	Water Quality Control Volume

1 INTRODUCTION

This document describes and presents the components of a drainage plan required for Windsor Heights, IA. It involves the redevelopment of a site located the intersection of Hickman Rd and 63rd St. The project location can be seen in Figure 1.

Figure 1: Location Map

The parcel ID for this site is 29202001001004 and the property is currently in the process of being bought by Silverstar. This sale is contingent on the approval of a site plan from the city of Windsor Heights. The site is 2.07 ac and zoned CC and it will have a conditional use permit submitted for approval to allow the site to be used as a car wash.

1.1 PROJECT DESCRIPTION

Renovation of the site includes the removal of the existing driveway. New additions include a parking lot, building, and new drives. The site will be developed into a SilverStar Carwash. The project also consists of an underground storage system along with new storm sewers that connect to the existing storm sewer.

1.2 SITE LOCATION RESTRICTIONS AND UTILITIES

The site is not located within a floodway or floodplain. There were no wetlands identified on site. There is an existing sanitary sewer easement on the southwest corner of the property. This area is being planned as open space so that there is no interference with the easement and access to the utilities. No conflicts

are expected to occur. There is an existing storm sewer easement on the southeast of the property. Most of this area is being planned as open space and the proposed driveway will go over a small portion. There will still be access to the utilities.

2 DEISIGN REQUIREMENTS

Information regarding the ordinance requirements is addressed in this section. All necessary items including WQv treatment, CPv, required local and state document submission have been addressed.

2.1 WINDSOR HEIGHTS CODE OF ORDINANCES– CHAPTER 161

According to Chapter 161 Post-Construction Storm Water Control of the Windsor Heights Code of Ordinances, the City requires that the detention system does the following:

1. The site design shall provide on-site treatment during construction and postconstruction to ensure no increases over pre-settlement conditions (meadow not in good condition, CD=58) for the one-year, 24-hour storm event, the five-year, 24-hour storm event, and the 100-year, 24-hour storm event;
2. The site design shall provide for on-site water quality treatment to reduce potential increases in downstream water pollution. Practices or techniques shall be employed that capture and treat runoff from a 1.25” rainfall;
3. Practices or techniques shall be employed that provide extended detention of the 1-year, 24-hour storm event – with release rates established as per methods defined within the ISWMM manual to provide a minimum drawdown period of 24 hours;
4. Practices and techniques shall be employed that limit allowable peak release rates that are anticipated to occur post-development during the 2-, 5- and 10-year, 24-hour storm events to levels no greater than those expected to occur from natural conditions a given site from a similar storm event (e.g. the post-development release rate from 5-year storm event will be no greater than the natural release rate from a 5-year storm event);
5. Practices and techniques shall be employed that limit allowable peak release rates that are anticipated to occur post-development during the 25-, 50- and 100-year, 24-hour storm events to levels no greater than those expected to occur from natural conditions on a given site from a similar storm event (e.g. the post-development release rate from a 100-year storm event will be no greater than the natural release rate from a 100-year storm event);
6. The site design shall retain on-site for recharge a portion of the water quality treatment volume calculated as a soil specific recharge factor multiplied by the volumetric runoff coefficient multiplied by the area and all divided by 12. The soil specific recharge factor is given as 0.51 for Hydrologic Soil Group (HSG) A soils, 0.34 for HSG B soils, 0.17 for HSG C soils, and 0.08 for HSG D soils. The volumetric runoff coefficient is calculated as 0.05 + 0.009 multiplied by the site impervious percentage;

All these items are addressed within this report and its appendices. Items 1-7 are detailed in sections 3-4 and Appendix A.

3 HYDROLOGIC ANALISYS

The parameters and methodologies for the hydrologic analysis of the pre-settlement, existing, and post-development site conditions are described in this section. Hydrologic conditions for the pre-settlement, existing, and post-development site were analyzed for the Water Quality Volume (WQv), Channel Protection Volume (CPv)-1-year, 2-year, 5-year, 10-year, 25-year, 50-year and 100-year rainfall distribution events to determine the respective Curve Numbers (CN), time of concentrations (T_c), and peak runoff rates.

3.1 METHODOLOGIES

Due to the use of a detention structure, the rational method was not used since that method can only calculate peak flow values and does not consider storage volumes, which will be discussed in Section 3 – Hydraulic Analyses. The methods used for determining the site hydrology consisted of the SCS Curve Number (CN) method for losses and the NRCS Velocity method for time of concentration (T_c) and lag time paired with the SCS Unit hydrograph method for sub-basin hydrograph development. These parameters were entered into the United States Army Corps of Engineers' (USACE) computer software, Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS). These methods are consistent with the TR-55 method Calculations for each parameter across all site conditions are shown in Appendix B.

3.2 RUNOFF ANALYSIS

Existing drainage patterns begin west of the site and drain east and south to existing grate intakes, streets, and yards. Appendix B provides drainage maps for the area. Land cover and hydrologic soil group (HSG) types were assessed for the pre-settlement, existing, and post-developed conditions. Existing topography, from LiDAR datasets, and proposed topography, from site grading plans, were used to delineate sub-basins, identify flow paths, and the hydraulically most distant points in each sub-basin. These assessments allowed for the determination of drainage areas, CN values, T_c, and lag times. To determine CN values, sub-basins were analyzed individually and assigned a weighted CN based on varying land cover types. Within TR-55, the NRCS states that when runoff values are less than a 0.5 inch, the CN approach is less accurate. As part of the CN calculations, an initial abstract term is assumed to have an abstraction ratio of 0.2, making the initial abstraction equal to 0.2 times the potential maximum retention. This 0.2 value assumption is typical based on NRCS TR-55 methods. For T_c calculations, a minimum value of 0.1 hour, or 6 minutes, was used. Once T_c values were calculated, a lag time coefficient of 0.6 was used to determine the sub-basin lag times. A graph type of PRF 484 was used in determining the sub-basin hydrographs.

For pre-settlement and existing conditions analyses, the sub-basins were delineated based on existing grate intakes and areas draining towards the street and lawns. Pre-settlement CN values were based on the values presented in SUDAS Chapter 2 Section 2B for stormwater calculations and stormwater management. The values used were 58, which assume a cover type of meadow and HSG B. Travel times for the pre-settlement condition were assumed to follow longer sheet flow paths before becoming concentrated. Existing and post-development conditions assume HSG B due to compacted soils from development. Sub-basins were delineated based on proposed grading and outlet for the sub-basins were chosen to be storm sewer intake structures and open spaces draining towards the street and lawns. Figures showing the drainage areas for all conditions can be seen in Appendix B.

3.3 HYDROLOGIC ANALYSIS RESULTS

The hydrologic analysis of the site showed that there is an increase in the peak runoff when comparing the post-development conditions to the pre-settlement conditions. The increased runoff values must be detained to reduce the post-development peak flow values. Tables 1, 2, and 3 show the hydrologic parameters for all sub-basins for each condition. The increase in the number of sub-basins for the post-development condition is due to the planned site grading and storm sewer intake locations. A detailed description of hydrologic parameters can be found in Appendix B. This includes, impervious areas, CNs, T_c values, runoff hydrographs, WQv calculations, CPv calculations, storm sewer and intake calculations, peak discharge calculations, and detention basin design calculations.

The Rev, WQv, and CPv values that were determined for post-development conditions are include in Table 1. Additional information relating to the calculation of these volumes and Unified Sizing Criteria (USC) is included in Appendix B.

Table 1: Unified Sizing Criteria Summary

Event	Volume (CF)	Volume (Ac-ft)
Rev	3,812	0.088
WQv	4,874	0.112
CPv	9,279	0.213

Table 2: Pre-Settlement Sub-basin Hydrologic Parameters Summary

Subbasin	Time of Concentration, T_c (min)	Lag Time (min)	Drainage Area (ac)	CN
SB 01	8.40	5.04	1.23	58
SB 02	6.00	3.60	0.45	58
SB 03	7.84	4.70	0.24	58
SB 04	6.00	3.60	0.16	58
SB 05	7.12	4.27	0.90	58
SB 06	6.00	3.60	0.04	58

Table 3: Existing Sub-basin Hydrologic Parameters Summary

Subbasin	Time of Concentration, T_c (min)	Lag Time (min)	Drainage Area (ac)	CN
SB 01	9.22	5.53	1.23	81
SB 02	6.12	3.67	0.45	83
SB 03	8.79	5.28	0.24	74
SB 04	6.00	3.60	0.16	74
SB 05	7.98	4.79	0.90	81
SB 06	6.29	3.77	0.04	74

Table 4: Post-Development Sub-basin Hydrologic Parameters Summary

Subbasin	Time of Concentration, T_c (min)	Lag Time (min)	Drainage Area (ac)	CN
SB 01 Dev	6.00	3.60	0.29	96
SB 02 Dev	6.00	3.60	0.54	96
SB 03 Dev	6.00	3.60	0.33	93
SB 04 Dev	6.00	3.60	0.04	98
SB 05 Dev	23.18	13.91	0.62	74
SB 06 Dev	7.59	4.55	0.15	74
SB 07 Dev	6.00	3.60	0.13	74
SB 08 Dev	7.98	4.79	0.90	81
SB 09 Dev	6.29	3.77	0.04	74

4 HYDRAULIC ANALYSIS

The parameters and methodologies for the hydraulic analysis of the pre-settlement, existing, and post-development site conditions are described in this section. Hydraulic conditions for the pre-settlement, existing, and post-development site were analyzed for the Water Quality Volume (WQv), Channel Protection Volume (CPv)-1-year, 2-year, 5-year, 10-year, 25-year, 50-year and 100-year rainfall distribution events to determine the respective peak runoff rates, extended detention times, and detention storage amounts.

4.1 METHODOLOGIES

The hydraulic analysis involved storage and routing methods, which incorporated elevation, storage, and discharge components. These parameters were entered into the United States Army Corps of Engineers' (USACE) computer software, Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS). The hydrologic and hydraulic parameters were both input into the HEC-HMS model, where the sub-basin hydrology was used to provide inputs to the detention routing system. The model was used to guide the engineer in determining allowable release rates and drawdown times.

4.2 STORMWATER CONVEYANCE DESIGN

The post-development plan includes stormwater conveyance structures including intakes, pipes, and a detention system. The detention system is described in Section 4.3. The intake structures consist of grates. The pipes have a minimum diameter of 12".

4.3 STORMWATER MANAGEMENT DESIGN

Stormwater management will be provided by implementation of an underground detention system. The system consists of perforated CMPs and crushed stone aggregate to assist with infiltration. In addition to the CMPs and crushed stone, the on-site storm sewer system consisting of the pipes and local ponding areas above the intakes are included as part of the overall storage of the system. Once enough stormwater has filled the CMPs and crushed stone, the water will backup into the on-site storm sewer system and then the ponding areas, which all represent a single storage system. Storm sewer pipe storage and local ponding storage were not included in the storage curve during modeling because it was

a small volume and the designed storage provided sufficient volume. Once stormwater runoffs from the sub-basins, it enters the system via intakes, then continues through pipes, and then into the perforated CMPs. Once it enters the perforated CMPs, it may seep into the crushed stone (40% void space) or remain in the CMPs, whichever has available storage. From there, it is detained and slowly released through a multi-staged outlet including a 3" diameter orifice and a 1 foot weir where the stormwater enters the city storm sewer system. This system will consist of three 100 foot long 60" CMPs and 13,100 cubic feet of aggregate.

There are two areas on the site that will drain to the intake to the south and one area that will drain to the street to the east. These areas currently drain in these directions. Any runoff from these areas is accounted for in the HEC-HMS model and is considered in the total site runoff calculations. The three areas in the proposed design are primarily open space areas with minimal paved areas.

4.4 OUTLET STRUCTURES

The storage system outlet structure consists of a multi-stage design including one 3" diameter orifice and one 1 foot weir. The outlet is designed to detain storm events and slowly release the runoff over a longer duration than what exists currently. The outflow is designed to be at or below the same recurrence interval, 24-hour storm event based on pre-settlement conditions using a CN of 58. The allowable peak discharge for the outlet during the 100-yr is 7.5 cfs and actual peak discharge is 7.1 cfs. The existing storm sewer system that the detention system will be draining to has an invert elevation of 933.26 ft NAVD88. The outlet structure orifice will have its orifice bottom elevation set to 934.34 ft NAVD88 and the weir plate set to 939.5 ft NAVD88. The pipe leading from the outlet manhole to the existing storm sewer system will have its upstream invert elevation set to 934.3 ft NAVD88 allowing positive drainage throughout the system.

4.5 HYDRAULIC ANALYSIS

A detailed description of hydraulic parameters can be found in Appendix B. This includes, impervious areas, CNs, T_c values, runoff hydrographs, WQv calculations, CPv calculations, storm sewer and intake calculations, peak discharge calculations, and detention basin design calculations.

The Recharge Volume (Rev) for the site in a developed state was calculated to be 3,812 ft^3. The Water Quality Volume (WQv) for the site in a developed state was calculated to be 4,874 ft^3. The Channel Protection Volume (CPv) for the site in a developed state was calculated to be 9,279 ft^3. The analysis for the frequent events, WQv and CPv, did not include using an infiltration rate due to high levels of clay in the soils. Any on-site infiltration will act as additional storage.

Table 5: WQv and CPv Volumes and Peak Flow Summary

Storm Event	USC Calculated Volume (CF)	Peak Flow through Outlet (cfs)	Drawdown Time for Non-Infiltrated portion (hr)
Rev	2,921	N/A	N/A
WQv	3,755	0.22	21.3
CPv	8,015	0.35	22.8

The orifice is a 3” diameter, which is the smallest size allowed for use within the ISWMM document. Orifice sizes smaller than this tend to be prone to clogging more frequently and require additional maintenance. With a smaller orifice, the drawdown times could be increased, but then it would be below the minimum threshold value of 3” in diameter.

The peak flows for the pre-settlement, existing, and post-development conditions are shown in Tables 6-8. The outlet locations are where flow is leaving the site. For the pre-settlement and existing conditions, sub-basins SB 01 and SB 05 contribute to STS-Intake, SB 03 contributes to Street-East, SB 04 contributes to Yard-South, and sub-basins SB 02 and SB 06 contribute to STS-3 Intakes. For the proposed condition, sub-basins 01-04 Dev all contribute to STS via the detention storage. SB 05 Dev contributes to Street-East. SB 07 and SB 09 contribute to the Yard-South. SB 06 and SB 08 contribute to STS-3 Intakes. STS represents the storm sewer system, while the other two areas represent drainage to the east into the street and south into a residential lawn. Both areas are currently receiving flow in the existing conditions. All post-development peak flow totals must be at or below the pre-settlement condition flow as shown in Table 6 according to the Windsor Heights Code of Ordinances.

Table 6: Pre-Settlement Peak Flows Summary

Outlet Location	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
STS-Intake	0.60	1.54	2.59	4.41	6.14	8.07
STS-3 Intakes	0.15	0.40	0.66	1.13	1.56	2.05
Street-East	0.07	0.19	0.31	0.54	0.75	0.98
Yard-South	0.04	0.10	0.17	0.28	0.39	0.51
Total	0.86	2.23	3.73	6.36	8.84	**11.61**

The Q_{100} total site pre-settlement peak flow was calculated to be 11.61 cfs. There are two existing subbasins (SB 05 and SB 06) that are outside of the property boundary. The subbasins currently flow into the storm sewer on-site but will flow off-site into the existing storm sewer post-development. The flows were not included into the peak discharge calculations because the flow will be redirected to the same storm sewer and not be managed on-site of the property. Any storm event for the post-development conditions must be at or below this threshold. Existing conditions peak flows are shown for reference in Table 7.

Table 8: Existing Peak Flow Summary

Outlet Location	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
STS-Intake	4.42	6.31	8.05	10.71	12.98	15.38
STS-3 Intakes	1.19	1.69	2.14	2.83	3.41	4.02
Street-East	0.36	0.56	0.76	1.06	1.32	1.60
Yard-South	0.20	0.30	0.40	0.57	0.71	0.86
Total	6.17	8.86	11.35	15.17	18.42	21.86

Table 8: Post-Development Peak Flows Summary

Outlet Location	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
STS	0.40	0.46	0.51	2.97	6.35	**7.06**
STS-3 Intakes (PD 06)	0.19	0.29	0.39	0.55	0.68	0.83
Street-East	0.61	0.97	1.31	1.85	2.32	2.82
Yard-South (PD 07)	0.20	0.30	0.40	0.57	0.71	0.86
Total	**1.40**	**2.02**	**2.61**	**5.94**	**10.06**	**11.57**

From Table 8, all post-development total site peak flows are below the same recurrence interval storm as in the pre-settlement conditions except for the 2-yr. This storm is slightly above due to the 3'' orifice size limit. The detention storage system consists of four interconnected parts. The perforated CMPs, the crushed stone aggregate, the on-site storm sewer pipes, and the above grade ponding areas where the intake structures are.

Table 9: Post-Development Routed Elevations in Detention System

WQv (ft)	1-year (ft)	2-year Elev. (ft)	5-year Elev. (ft)	10-year Elev. (ft)	25-year Elev. (ft)	50-year Elev. (ft)	100-year Elev. (ft)
935.37	936.82	937.25	938.08	938.98	940.44	941.19	941.33

The CMPs and crushed stone parts of the system include enough storage to accommodate the 2-, 5-, 10-, 25-, 50- and 100-year events.

Table 10: Storage System Curve and Peak Storage

Storage		Peak Storage							
Elevation (ft)	Volume (ac-ft)	WQv (ac-ft)	1-year (ac-ft)	2-year (ac-ft)	5-year (ac-ft)	10-year (ac-ft)	25-year (ac-ft)	50-year (ac-ft)	100-year (ac-ft)
934.29	0	0.038	0.109	0.131	0.171	0.207	0.234	0.246	0.263
935.29	0.035216								
936.29	0.082691								
937.29	0.133035								
938.29	0.180487								
939.29	0.21568								
940.29	0.231703								
941.29	0.247727								
941.8	0.309803								

5 PERMITS AND AGREEMENTS

According to the City's Code of Ordinances Chapters 160 and 161, the following list shows permits and other agreements required by jurisdictions.

- City COSESCO Permit
- Iowa DNR NPDES General Permit # 2
- Stormwater Pollution Prevention Plan (SWPPP)
- Erosion and Sediment Control Plan (ESC)
- Stormwater Management Maintenance Agreement

All these items are being addressed as part of this project.

6 REFERENCES

Natural Resources Conservation Service. 1986. Urban Hydrology for Small Watersheds TR-55.

Windsor Heights. 2015. Windsor Heights Code of Ordinances Chapter 161 Post-Construction Storm Water Control.

Iowa Statewide Urban Design and Specifications (SUDAS). 2023. SUDAS Design Manual.

Iowa Department of Natural Resources. 2020. Iowa Stormwater Management Manual (ISWMM).

7 APPENDICES

A. Hydrologic and Hydraulic Calculations

B. Drainage Basin Figures

C. Geotechnical Investigation

D. Construction Drawings

7.1 APPENDIX A – HYDROLOGIC AND HYDRAULIC CALCULATIONS

Time of Concentration Calculations

Method: NRCS Velocity Method
Condition: Pre-Development
Sub-basin: SB 01

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.040	ft/ft	Slope
T_t	0.11	hr	Travel Time
T_t	6.75	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.11	hr	Sheet
T_t	0.03	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.14	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.14	hr	Use
T_c	8.40	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	248.0	ft	Flow Length
S	0.024	ft/ft	Slope
Area Type	Unpaved		
V	2.51	ft/s	Velocity
T_t	0.027	hr	Travel Time
T_t	1.65	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.08	hr	
T_L	5.04	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 01

Input

Calculation

Drainage Area:

Variable	Value	Unit	Note
DA	1.23	acres	Drainage Area
	0.0019	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	1.23	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		1.226511	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Pre-Development

Sub-basin: SB 02

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	55.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.027	ft/ft	Slope
T_t	0.08	hr	Travel Time
T_t	4.88	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.08	hr	Sheet
T_t	0.01	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.09	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	5.69	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	178.0	ft	Flow Length
S	0.051	ft/ft	Slope
Area Type	Unpaved		
V	3.63	ft/s	Velocity
T_t	0.01	hr	Travel Time
T_t	0.82	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 02

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.45	acres	Drainage Area
	0.0007	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	0.45	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.446993	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Pre-Development

Sub-basin: SB 03

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.028	ft/ft	Slope
T_t	0.13	hr	Travel Time
T_t	7.84	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.13	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.13	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.13	hr	Use
T_c	7.84	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	150	ft	Flow Length
S	0.010	ft/ft	Slope
Area Type	Unpaved		
V	1.61	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.08	hr	
T_L	4.70	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 03

Input

Calculation

Drainage Area:

Variable	Value	Unit	Note
DA	0.24	acres	Drainage Area
	0.0004	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	0.24	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.238223	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Pre-Development

Sub-basin: SB 04

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	50.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.050	ft/ft	Slope
T_t	0.06	hr	Travel Time
T_t	3.55	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.06	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.06	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	3.55	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	129	ft	Flow Length
S	0.078	ft/ft	Slope
Area Type	Unpaved		
V	4.49	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 04

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.16	acres	Drainage Area
	0.0002	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	0.16	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.156566	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Pre-Development

Sub-basin: SB 05

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.035	ft/ft	Slope
T_t	0.12	hr	Travel Time
T_t	7.12	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.12	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.12	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.12	hr	Use
T_c	7.12	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	380.0	ft	Flow Length
S	0.045	ft/ft	Slope
Area Type	Unpaved		
V	3.41	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.07	hr	
T_L	4.27	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 05

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.90	acres	Drainage Area
	0.0014	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	0.90	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.903834	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Pre-Development

Sub-basin: SB 06

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.130		Range (natural)
ℓ	54.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.019	ft/ft	Slope
T_t	0.09	hr	Travel Time
T_t	5.61	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.09	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.09	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	5.61	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	150.0	ft	Flow Length
S	0.040	ft/ft	Slope
Area Type	Unpaved		
V	3.23	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Pre-Development

Sub-basin: SB 06

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.04	acres	Drainage Area
	0.0001	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
PRE-DEVELOPMENT	B	0.04	58	100%	58
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.042493	AMC II	100%	58
				Weighted CN	58.00
				Weighted CN Use	58

Variable	Value	Unit	Note
S	7.24	in	Potential Maximum Retention
I_a	1.45	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.18	0.30	0.58	0.88	1.42	1.92	2.49

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method
Condition: Existing
Sub-basin: SB 01

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.040	ft/ft	Slope
T_t	0.13	hr	Travel Time
T_t	7.57	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.13	hr	Sheet
T_t	0.03	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.15	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.15	hr	Use
T_c	9.22	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	248.0	ft	Flow Length
S	0.024	ft/ft	Slope
Area Type	Unpaved		
V	2.51	ft/s	Velocity
T_t	0.03	hr	Travel Time
T_t	1.65	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.09	hr	
T_L	5.53	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method
Condition: Existing
Sub-basin: SB 01

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	1.23	acres	Drainage Area
	0.0019	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.84	74	68%	50.55765
PAVEMENT		0.39	98	32%	31.04528
				0%	0
				0%	0
				0%	0
				0%	0
		1.226511	AMC II	100%	81.60293
				Weighted CN	81.60
				Weighted CN Use	81

Variable	Value	Unit	Note
S	2.35	in	Potential Maximum Retention
I_a	0.47	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.07	1.38	1.96	2.51	3.38	4.12	4.92

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Existing

Sub-basin: SB 02

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	55.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.027	ft/ft	Slope
T_t	0.09	hr	Travel Time
T_t	5.47	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.09	hr	Sheet
T_t	0.01	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.10	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	6.12	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	178.0	ft	Flow Length
S	0.051	ft/ft	Slope
Area Type	Paved		
V	4.57	ft/s	Velocity
T_t	0.01	hr	Travel Time
T_t	0.65	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.67	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Existing

Sub-basin: SB 02

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.45	acres	Drainage Area
	0.0007	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.26	74	59%	43.68702
PAVEMENT		0.183104	98	41%	40.14421
				0%	0
				0%	0
				0%	0
				0%	0
		0.446993	AMC II	100%	83.83124
				Weighted CN	83.83
				Weighted CN Use	83

Variable	Value	Unit	Note
S	2.05	in	Potential Maximum Retention
I_a	0.41	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.19	1.51	2.12	2.69	3.57	4.33	5.14

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Existing

Sub-basin: SB 03

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.028	ft/ft	Slope
T_t	0.15	hr	Travel Time
T_t	8.79	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.15	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.15	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.15	hr	Use
T_c	8.79	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	150	ft	Flow Length
S	0.010	ft/ft	Slope
Area Type	Unpaved		
V	1.61	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.09	hr	
T_L	5.28	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Existing

Sub-basin: SB 03

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.24	acres	Drainage Area
	0.0004	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.24	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.238223	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.71	0.96	1.46	1.94	2.72	3.40	4.15

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Existing

Sub-basin: SB 04

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	50.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.050	ft/ft	Slope
T_t	0.07	hr	Travel Time
T_t	3.98	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.07	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.07	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	3.98	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	129	ft	Flow Length
S	0.078	ft/ft	Slope
Area Type	Unpaved		
V	4.49	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Existing

Sub-basin: SB 04

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.16	acres	Drainage Area
	0.0002	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.16	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.156566	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.71	0.96	1.46	1.94	2.72	3.40	4.15

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Existing

Sub-basin: SB 05

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.035	ft/ft	Slope
T_t	0.13	hr	Travel Time
T_t	7.98	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.13	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.13	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.13	hr	Use
T_c	7.98	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	380.0	ft	Flow Length
S	0.045	ft/ft	Slope
Area Type	Unpaved		
V	3.41	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.08	hr	
T_L	4.79	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Existing

Sub-basin: SB 05

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.90	acres	Drainage Area
	0.0014	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.62	74	69%	51.10325
PAVEMENT		0.27966	98	31%	30.32272
				0%	0
				0%	0
				0%	0
				0%	0
		0.903834	AMC II	100%	81.42597
				Weighted CN	81.43
				Weighted CN Use	81

Variable	Value	Unit	Note
S	2.35	in	Potential Maximum Retention
I_a	0.47	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.07	1.38	1.96	2.51	3.38	4.12	4.92

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Existing

Sub-basin: SB 06

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	54.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.019	ft/ft	Slope
T_t	0.10	hr	Travel Time
T_t	6.29	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.10	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.10	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	6.29	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	150.0	ft	Flow Length
S	0.040	ft/ft	Slope
Area Type	Unpaved		
V	3.23	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.77	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Existing

Sub-basin: SB 06

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.04	acres	Drainage Area
	0.0001	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.04	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.042493	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.71	0.96	1.46	1.94	2.72	3.40	4.15

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 01 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.011		Smooth Surface
ℓ	69.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.054	ft/ft	Slope
T_t	0.01	hr	Travel Time
T_t	0.62	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.01	hr	Sheet
T_t	0.03	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.04	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	2.22	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	140	ft	Flow Length
S	0.005	ft/ft	Slope
Area Type	Paved		
V	1.49	ft/s	Velocity
T_t	0.026	hr	Travel Time
T_t	1.57	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	1	ft	
S	0.001	ft/ft	
n	0.013		RCP
A	0.79	ft^2	
P_w	3.14	ft	
R_h	0.25	ft	
Q	2	cfs	
V	2.55	ft/s	

V use	2.55	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
T_t	0.001	hr	Travel Time
T_t	0.04	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 01 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.29	acres	Drainage Area
	0.0005	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.022371	74	8%	5.619779
Pavement		0.27	98	92%	90.55759
				0%	0
				0%	0
				0%	0
				0%	0
		0.294582	AMC II	100%	96.17737
				Weighted CN	96.18
				Weighted CN Use	96

Variable	Value	Unit	Note
S	0.42	in	Potential Maximum Retention
I_a	0.08	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.94	2.46	3.18	3.81	4.68	5.40	6.14

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 02 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.011		Smooth Surface
ℓ	56.5	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.013	ft/ft	Slope
T_t	0.02	hr	Travel Time
T_t	0.92	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.02	hr	Sheet
T_t	0.03	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.05	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	2.90	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	244	ft	Flow Length
S	0.010	ft/ft	Slope
Area Type	Paved		
V	2.06	ft/s	Velocity
T_t	0.033	hr	Travel Time
T_t	1.98	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 02 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.54	acres	Drainage Area
	0.0009	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.022808	74	4%	3.098603
Pavement		0.52	98	96%	93.89644
				0%	0
				0%	0
				0%	0
				0%	0
		0.544685	AMC II	100%	96.99505
				Weighted CN	97.00
				Weighted CN Use	96

Variable	Value	Unit	Note
S	0.42	in	Potential Maximum Retention
I_a	0.08	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.94	2.46	3.18	3.81	4.68	5.40	6.14

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method
Condition: Post-Development
Sub-basin: SB 03 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.011		Smooth Surface
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.025	ft/ft	Slope
T_t	0.02	hr	Travel Time
T_t	1.13	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.02	hr	Sheet
T_t	0.04	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.06	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	3.74	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	312	ft	Flow Length
S	0.010	ft/ft	Slope
Area Type	Paved		
V	1.99	ft/s	Velocity
T_t	0.043	hr	Travel Time
T_t	2.61	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 03 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.33	acres	Drainage Area
	0.0005	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.060399	74	18%	13.40222
Pavement		0.27	98	82%	80.25112
				0%	0
				0%	0
				0%	0
				0%	0
		0.333494	AMC II	100%	93.65334
				Weighted CN	93.65
				Weighted CN Use	93

Variable	Value	Unit	Note
S	0.75	in	Potential Maximum Retention
I_a	0.15	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.67	2.17	2.87	3.48	4.35	5.05	5.79

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 04 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.011		Smooth Surface
ℓ	45.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.039	ft/ft	Slope
T_t	0.01	hr	Travel Time
T_t	0.50	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.01	hr	Sheet
T_t	0.03	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.04	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	2.51	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	269	ft	Flow Length
S	0.012	ft/ft	Slope
Area Type	Paved		
V	2.23	ft/s	Velocity
T_t	0.033	hr	Travel Time
T_t	2.01	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 04 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.04	acres	Drainage Area
	0.0001	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Pavement		0.04	98	100%	98
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.037959	AMC II	100%	98
				Weighted CN	98.00
				Weighted CN Use	98

Variable	Value	Unit	Note
S	0.20	in	Potential Maximum Retention
I_a	0.04	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
2.15	2.68	3.41	4.03	4.91	5.63	6.37

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 05 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.003	ft/ft	Slope
T_t	0.38	hr	Travel Time
T_t	22.94	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.38	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.39	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.39	hr	Use
T_c	23.18	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	47	ft	Flow Length
S	0.043	ft/ft	Slope
Area Type	Unpaved		
V	3.33	ft/s	Velocity
T_t	0.004	hr	Travel Time
T_t	0.24	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.23	hr	
T_L	13.91	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
t_t	0.000	hr	Travel Time
t_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 05 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.62	acres	Drainage Area
	0.0010	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.62	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.62376	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.54	0.85	1.34	1.80	2.48	3.08	3.70

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 06 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	49.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.010	ft/ft	Slope
T_t	0.12	hr	Travel Time
T_t	7.39	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.12	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.13	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.13	hr	Use
T_c	7.59	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	61	ft	Flow Length
S	0.098	ft/ft	Slope
Area Type	Unpaved		
V	5.06	ft/s	Velocity
T_t	0.003	hr	Travel Time
T_t	0.20	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.08	hr	
T_L	4.55	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 06 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.15	acres	Drainage Area
	0.0002	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.15	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.150413	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.54	0.85	1.34	1.80	2.48	3.08	3.70

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method
Condition: Post-Development
Sub-basin: SB 07 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	72.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.052	ft/ft	Slope
T_t	0.09	hr	Travel Time
T_t	5.24	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.09	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.09	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	5.38	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	47	ft	Flow Length
S	0.112	ft/ft	Slope
Area Type	Unpaved		
V	5.39	ft/s	Velocity
T_t	0.002	hr	Travel Time
T_t	0.15	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.60	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	5.5	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D		ft	
S		ft/ft	
n			
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 07 PD

Input

Calculation

Drainage Area:

Variable	Value	Unit	Note
DA	0.13	acres	Drainage Area
	0.0002	sq. mi	

Rainfall, Runoff, and Curve Number for 2-year and larger events:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.38	2.91	3.64	4.27	5.15	5.87	6.61

Cover	HSG	Area (ac)	CN	% Area	% A * CN
Grass	B	0.13	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.125344	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.54	0.85	1.34	1.80	2.48	3.08	3.70

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 08 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	100.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.035	ft/ft	Slope
T_t	0.13	hr	Travel Time
T_t	7.98	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.13	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.13	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.13	hr	Use
T_c	7.98	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	380.0	ft	Flow Length
S	0.045	ft/ft	Slope
Area Type	Unpaved		
V	3.41	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.08	hr	
T_L	4.79	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 08 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.90	acres	Drainage Area
	0.0014	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.62	74	69%	51.10325
PAVEMENT		0.27966	98	31%	30.32272
				0%	0
				0%	0
				0%	0
				0%	0
		0.903834	AMC II	100%	81.42597
				Weighted CN	81.43
				Weighted CN Use	81

Variable	Value	Unit	Note
S	2.35	in	Potential Maximum Retention
I_a	0.47	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
1.07	1.38	1.96	2.51	3.38	4.12	4.92

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Time of Concentration Calculations

Method: NRCS Velocity Method

Condition: Post-Development

Sub-basin: SB 09 PD

Input	
Calculation	

Sheet Flow:

Variable	Value	Unit	Note
n	0.150		Short Grass
ℓ	54.0	ft	Flow Length
P_2	3.08	in	2-year 24 hr Rainfall
S	0.019	ft/ft	Slope
T_t	0.10	hr	Travel Time
T_t	6.29	min	

Time of Concentration:

Variable	Value	Unit	Note
T_t	0.10	hr	Sheet
T_t	0.00	hr	Shallow
T_t	0.00	hr	Channel
T_c	0.10	hr	Total
T_c	0.10	hr	Threshold
T_c use	0.10	hr	Use
T_c	6.29	min	

Shallow Concentrated Flow:

Variable	Value	Unit	Note
ℓ	150.0	ft	Flow Length
S	0.040	ft/ft	Slope
Area Type	Unpaved		
V	3.23	ft/s	Velocity
T_t	0.00	hr	Travel Time
T_t	0.00	min	

Lag Time:

Variable	Value	Unit	Note
Coefficient	0.6		Standard
T_L	0.06	hr	
T_L	3.77	min	

Channel Flow/Pipe Flow:

Channel

Variable	Value	Unit	Note
n	0		Manning's n
S	0	ft/ft	Slope
z_L	0	#:V	Left Bank Alope
z_R	0	#:V	Right Bank Slope
b	0	ft	Bottom Width
y_n	0	ft	Normal Depth
Q	0	cfs	Calculated Flow
A	0	ft^2	Cross Sectional Area
P_w	0.00	ft	Cross Section Wetted Perimeter
R_h	0.00	ft	Hydraulic Radius
K	0		Conveyance
B	0.00	ft	Top Width
D_h	0.00	ft	Hydraulic Depth
V	0.00	ft/s	Velocity

V use	0.00	ft/s	Velocity to use
ℓ	0	ft	Flow Length
I_t	0.000	hr	Travel Time
I_t	0.00	min	

Pipe (Assumes circular and full flow)

Variable	Value	Unit	Note
D	0	ft	
S	0	ft/ft	
n	0		
A	0.00	ft^2	
P_w	0.00	ft	
R_h	0	ft	
Q	0	cfs	
V	0.00	ft/s	

Rainfall Loss Calculations

Method: NRCS TR-55 SCS Curve Number Method

Condition: Post-Development

Sub-basin: SB 09 PD

Input	
Calculation	

Drainage Area:

Variable	Value	Unit	Note
DA	0.04	acres	Drainage Area
	0.0001	sq. mi	

Rainfall, Runoff, and Curve Number:

Variable	Value	Unit	Note
Distribution	Type II		Based on location
Duration	24	hr	Storm Duration

P, Rainfall Depths for Duration (in)						
1-year	2-year	5-year	10-year	25-year	50-year	100-year
2.67	3.08	3.81	4.46	5.44	6.26	7.12

Cover	HSG	Area (ac)	CN	% Area	% A * CN
GRASS	B	0.04	74	100%	74
				0%	0
				0%	0
				0%	0
				0%	0
				0%	0
		0.042493	AMC II	100%	74
				Weighted CN	74.00
				Weighted CN Use	74

Variable	Value	Unit	Note
S	3.51	in	Potential Maximum Retention
I_a	0.70	in	Initial Abstraction (Abstraction Ratio = 0.2)

Q, Runoff Depths for Duration (in)						
1-year*	2-year	5-year	10-year	25-year	50-year	100-year
0.71	0.96	1.46	1.94	2.72	3.40	4.15

*Actual 1-year runoff varies based on calculated CN for WQv and CPv events, see Unified Sizing Criteria section.

Unified Sizing Criteria

Method: Iowa Storm Water Management Manual

Condition: Developed

Sub-basin: All Sub-basins

Input

Calculation

Drainage Areas

	Entire Basin						On-Site						On-Site		Entire Basin		On-Site	Entire Basin		
Sub-basin	Area (SF)	Imp A (SF)	Per A (SF)	% Imp A	% Per A	Rv entire	Area (SF)	Imp A (SF)	Per A (SF)	% Imp A	% Per A	Rv site	A on-site (SF)	WQCv (CF)	Q_{aWQCv} (in)	CN_{WQCv}	CPv (CF)	Q_{aCPv} (in)	CN_{CPv}	Soil Recharge
SB 01 PD	12,832	11,858	975	92.4%	7.6%	0.89	11,406	10,431	975	91.5%	8.5%	0.88	11,406	1,046	1.10	98	1,991	2.12	97	323.6
SB 02 PD	23,737	22,744	993	95.8%	4.2%	0.92	23,737	22,744	993	95.8%	4.2%	0.92	23,737	2,275	1.15	98	4,332	2.19	98	618.7
SB 03 PD	14,527	11,896	2,631	81.9%	18.1%	0.79	14,406	11,775	2,631	81.7%	18.3%	0.79	14,406	1,186	0.99	97	2,258	1.89	95	325.2
SB 04 PD	1,654	1,654	0	100.0%	0.0%	0.95	1,533	1,533	0	100.0%	0.0%	0.95	1,533	152	1.19	98	289	2.27	98	44.5
SB 05 PD	27,171	0	27,171	0.0%	100.0%	0.05	27,171	0	27,171	0.0%	100.0%	0.05	27,171	142	0.07	73	270	0.12	58	38.5
SB 06 PD	12,018	0	12,018	0.0%	100.0%	0.05	12,018	0	12,018	0.0%	100.0%	0.05	12,018	63	0.07	73	120	0.12	58	17.0
SB 07 PD	1,851	0	1,851	0.0%	100.0%	0.05	1,851	0	1,851	0.0%	100.0%	0.05	1,851	10	0.07	73	19	0.12	58	1.3
Total (SF)	93,789	48,151	45,639	51.3%	48.7%	Total (SF)	92,121	46,483	45,639	50.5%	49.5%		92,121	4,874			9,279	9		
Total (Ac)	2.16	1.11	1.05			Total (Ac)	2.12	1.07	1.05					0.111892			0.213017			

Recharge Volume (Rev)

Variable	Value	Unit	Note
A_I	48,151	SF	Impervious Area
RD	1.00	in	Recharge Depth
Rev	3,812	CF	Recharge Volume

Water Quality Capture Volume Rainfall (WQCv)

Variable	Value	Unit	Note
P	1.25	in	Rainfall Depth

Channel Protection Storage Volume Rainfall (CPv)

P	2.38	in	Rainfall Depth

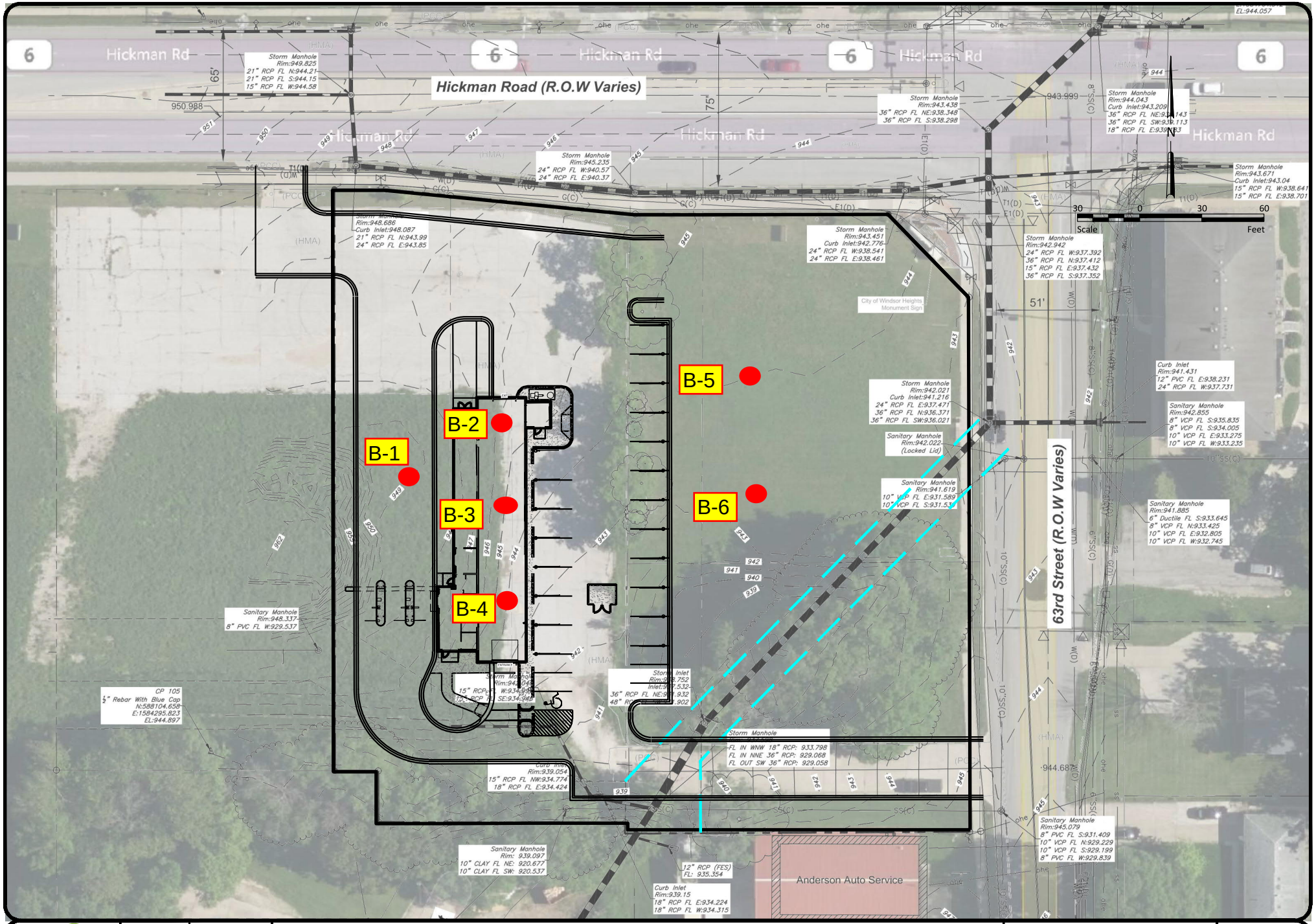
Soil Type	Soil Specific Recharge Factor	*Specific to Windsor Heights
A	0.51	
B	0.34	
C	0.17	
D	0.08	

7.2 APPENDIX B – DRAINAGE BASIN FIGURES


N
SB05 Off-site
SB01
SB03
SB02
SB04
SB06 Off-site
Legend
Pre-Settlement and Existing Drainage Area
0
90
180
Feet
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


N
SB08 Off-site
SB01
SB03
SB05
SB02
SB04
SB06
SB07
SB09 Off-site
Legend
Developed Drainage Area
0
90
180
Feet
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

7.3 APPENDIX C – GEOTECHNICAL INVESTIGATION



	Drawn by JJJ	Date 11-9-2022	SILVERSTAR CAR WASH	SILVERSTAR CARWASH - THE FALCON III MFP, INC 6300 HICKMAN ROAD, WINDSOR HEIGHTS, IA	CONCEPT PLAN PROJECT NO. 10300-0018	SHEET 1
	Checked by JJJ	Scale AS SHOWN				

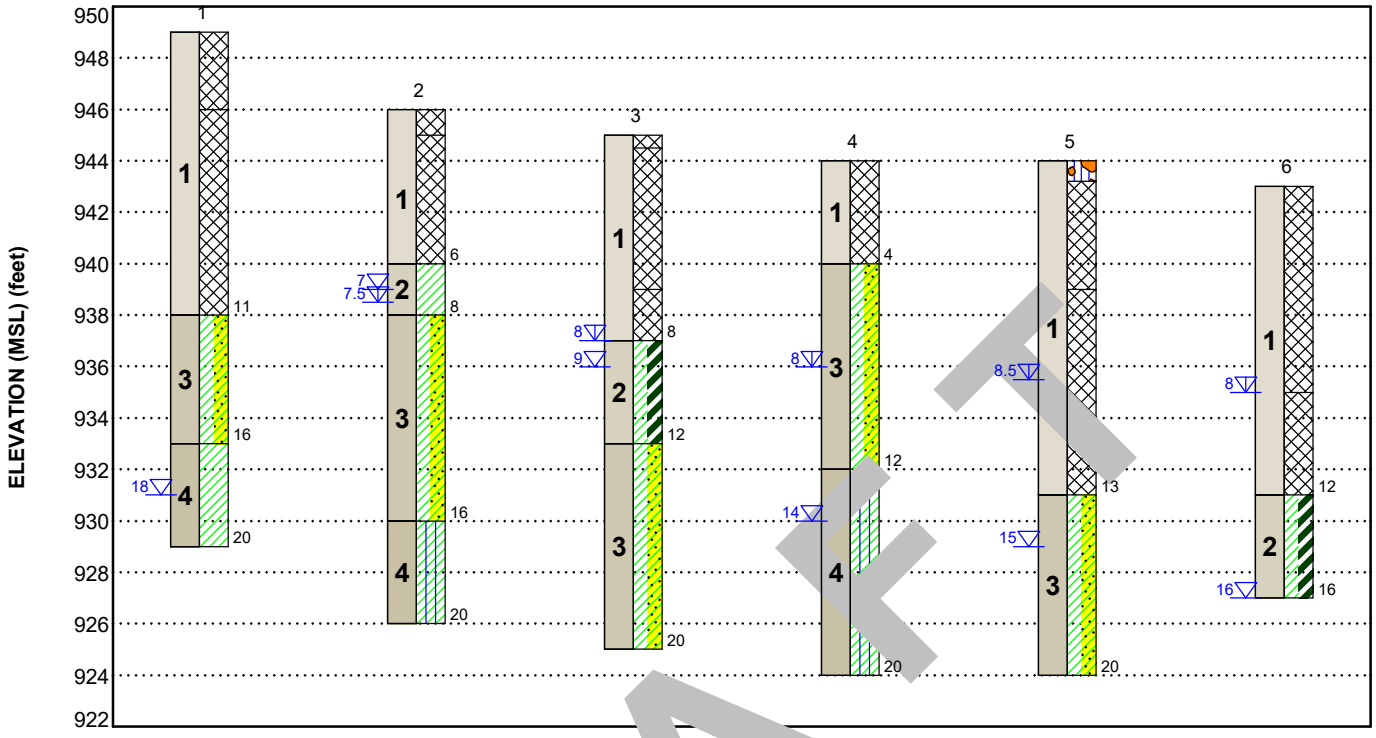
H:\JBN\10300\10300\10300_0018 Iowa Test Fits\6300 Hickman Road, Windsor Heights, IA\10300-0018 6300 Hickman Road Concept 4.dwg-FALCON-11/9/2022 1:34 PM-(jjohnson)

HEI NO. PPPP-PPP

GEOMODEL

Silverstar Carwash IA9 Hickman Road ■ Windsor Heights, Iowa
Terracon Project No. 08225344

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Fill	Lean Clay and Sandy Lean Clay with varying Sand, Gravel, Crushed Concrete and Brick Fragments. Poorly Graded Fine to Medium Sand, trace Coarse Sand and Gravel
2	Local Alluvium	Lean Clay (CL) and Lean to Fat Clay (CL-CH)
3	Wisconsinan Glacial Till	Lean Clay, with Sand, trace Gravel (CL)
4	Loess	Silty Clay (CL-ML) and Lean Clay (CL)

LEGEND

- Fill - Varies
- Lean Clay with Sand
- Lean Clay
- Silty Clay
- Lean Clay/Fat Clay
- Crushed Concrete

▽ First Water Observation
▽ Second Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

BORING LOG NO. 1

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6144° Longitude: -93.7047°

Approximate Surface Elev.: 949 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
1		0.0	949+/-										
							10	2-3-5 N=8	1		15.9		
		3.0	946+/-										
							20		2		20.0	103	
				5									
							6	3-4-5 N=9	3		22.1		
							24		4		20.0	106	
		11.0	938+/-	10									
3													
							18	2-3-4 N=7	5		24.3		
		16.0	933+/-	15									
4													
							14	1-1-3 N=4	6		32.7		
		20.0	929+/-	20									

FILL - SANDY LEAN CLAY, brown and light gray mixed

FILL - LEAN CLAY WITH SAND, trace gravel, very dark brown and brown mixed

Light gray and gray mixed below about 8'

LEAN CLAY WITH SAND (CL), trace gravel, light gray with rusty brown, medium stiff

LEAN CLAY (CL), gray with rusty brown, soft to medium stiff

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

18' (elev. 931') While Drilling

None Observed After Drilling

6' (elev. 943') After Drilling

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

Project No.: 08225344

BORING LOG NO. 2

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6144° Longitude: -93.7044°

Approximate Surface Elev.: 946 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
			FILL - SANDY LEAN CLAY, trace gravel and organics, dark brown										
		1.0	945+/-										
1			**FILL - POORLY GRADED SAND WITH FINES**, fine to medium grained, trace coarse sand and gravel, reddish brown Possible clayey zones/seams throughout				14	3-4-3 N=7	1		9.7		
1							7	1-1-4 N=5	2		21.8		
		6.0	940+/-	5									
2			**LEAN CLAY (CL)**, trace sand, very dark brown to dark brown, medium stiff		▽		20		3	1210	28.2	88	38-22-16
		8.0	938+/-		▽								
3			**LEAN CLAY WITH SAND (CL)**, trace gravel, brown with light gray, medium stiff				18	2-2-3 N=5	4		26.2		
				10									
3			Very stiff, rusty brown with light gray below about 12'				20		5	4200	21.5	98	
		16.0	930+/-	15									
4			**SILTY CLAY (CL-ML)**, gray, very stiff				18	5-7-9 N=16	6		22.2		
		20.0	926+/-	20									
			Boring Terminated at 20 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *7' (elev. 939') While Drilling*

▽ *7.5' (elev. 938.5') After Drilling*

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

Project No.: 08225344

BORING LOG NO. 3

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6145° Longitude: -93.7042°

Approximate Surface Elev.: 945 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.5	944.5+/-										
			FILL - SANDY LEAN CLAY, trace organics, dark brown										
1			**FILL - POORLY GRADED SAND WITH FINES**, fine to medium grained, trace coarse sand and gravel, reddish brown				9	2-2-3 N=5	1		7.5		
							8	1-2-2 N=4	2		8.0		
		6.0	939+/-	5									
			LEAN CLAY, trace sand and gravel, very dark gray and dark brown mixed				7		3		18.9	102	40-22-18
		8.0	937+/-										
2			**LEAN TO FAT CLAY (CL/CH)**, trace sand, very dark gray, medium stiff	10			18		4	1140	27.0	93	
		12.0	933+/-										
3			**LEAN CLAY WITH SAND (CL)**, trace gravel, brown with light gray, medium stiff to stiff	15			14	2-3-3 N=6	5		25.6		
		20.0	925+/-				0	2-4-4 N=8	6				
			Boring Terminated at 20 Feet	20									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

- 9' (elev. 936') While Drilling
- 8' (elev. 937') After Drilling

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

Project No.: 08225344

BORING LOG NO. 4

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6143° Longitude: -93.7043°

Approximate Surface Elev.: 944 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
1							6	3-4-5 N=9	1		19.9		
							10		2		18.9	89	42-22-20
3				5			18	2-3-3 N=6	3		26.5		
					▽		24		4	3020	23.5	99	
				10									
4					▽		15	2-3-4 N=7	5		23.2		
				15									
							18	3-4-5 N=9	6		27.2		
				20									

FILL - SANDY LEAN CLAY, brown and dark brown mixed

Organics to about 1'

4.0 940+/-

LEAN CLAY (CL), with sand, trace gravel, yellow brown with light gray, medium stiff to stiff

12.0 932+/-

SILTY CLAY (CL-ML), light gray with brown, medium stiff

Dark gray and stiff below about 16'

20.0 924+/-

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *14' (elev. 930') While Drilling*

▽ *8' (elev. 936') After Drilling*

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

Project No.: 08225344

BORING LOG NO. 5

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6146° Longitude: -93.7051°

Approximate Surface Elev.: 944 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
		0.8	943.2+/-										
							5	9-7-10 N=17	1		14.5		
							10		2		24.8	84	
		5.0	939+/-	5									
1							18	1-3-3 N=6	3		28.3		
							12		4	850	30.8	82	
		13.0	931+/-	10									
3							18	1-2-2 N=4	5		24.5		
				15									
							18	2-2-3 N=5	6		28.8		
		20.0	924+/-	20									

FILL - CRUSHED CONCRETE WITH FINES, gray and dark brown

FILL - SANDY LEAN CLAY, trace gravel and crushed concrete, brown, dark brown and gray mixed

FILL - LEAN CLAY, trace sand, very dark gray and very dark brown mixed

Driller's Note:
Hydrocarbon ordor noted in Samples #3 through #6

LEAN CLAY WITH SAND (CL), trace gravel, brown with light gray, medium stiff

Gray with brown below about 18'

Boring Terminated at 20 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

WATER LEVEL OBSERVATIONS

15' (elev. 929') While Drilling

8.5' (elev. 935.5') After Drilling

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

Project No.: 08225344

BORING LOG NO. 6

PROJECT: Silverstar Carwash IA9 Hickman Road

CLIENT: Midwest Fidelity Partners LLC
Sioux Falls, South Dakota

SITE: 6300 Hickman Road
Windsor Heights, Iowa

LOCATION See Exploration Plan

Latitude: 41.6146° Longitude: -93.7044°

Approximate Surface Elev.: 943 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE ID	UNCONFINED COMPRESSIVE STRENGTH (psf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
1							12	4-5-6 N=11	1		19.1		
							6		2		17.4	97	
				5			2	4-5-5 N=10	3		23.3		
		8.0	935+/-		▽								
							10		4		37.2		
		12.0	931+/-	10									
2							18	2-3-4 N=7	5		27.5		
		16.0	927+/-	15	▽								

FILL - SANDY LEAN CLAY, trace crushed concrete, dark brown and gray mixed

Organics to about 1'

Dark gray and brown mixed with traces of gravel and brick fragments below about 4'

Driller's Note:
Apparent hydrocarbon ordor noted below about 4'

FILL - SANDY LEAN CLAY, trace gravel and crushed concrete, dark gray and brown mixed

Very sandy zones or sand seams throughout

Hydrocarbon ordor noted in Samples #4 and #5

LEAN TO FAT CLAY (CL/CH), trace sand, very dark gray

Driller's Note
Apparent heavy hydrocarbon ordor and "sludge" below about 15'

Boring Terminated at 16 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" Hollow Stem Auger

Abandonment Method:
Boring backfilled with Auger Cuttings and/or Bentonite

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

▽ *16' (elev. 927') While Drilling*

▽ *8' (elev. 935') After Drilling*

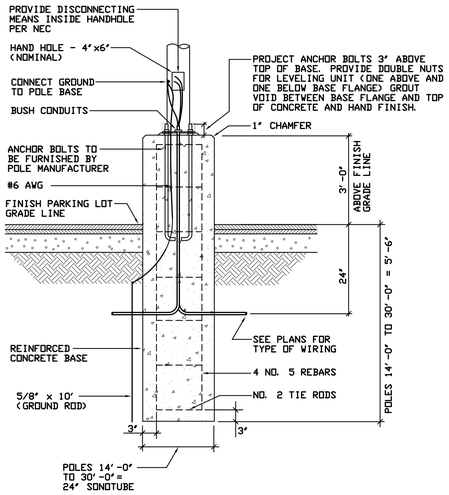
Terracon
600 SW 7th St, Ste M
Des Moines, IA

Boring Started: 11-28-2022 | Boring Completed: 11-28-2022

Drill Rig: CME 75 | Driller: David (Evora)

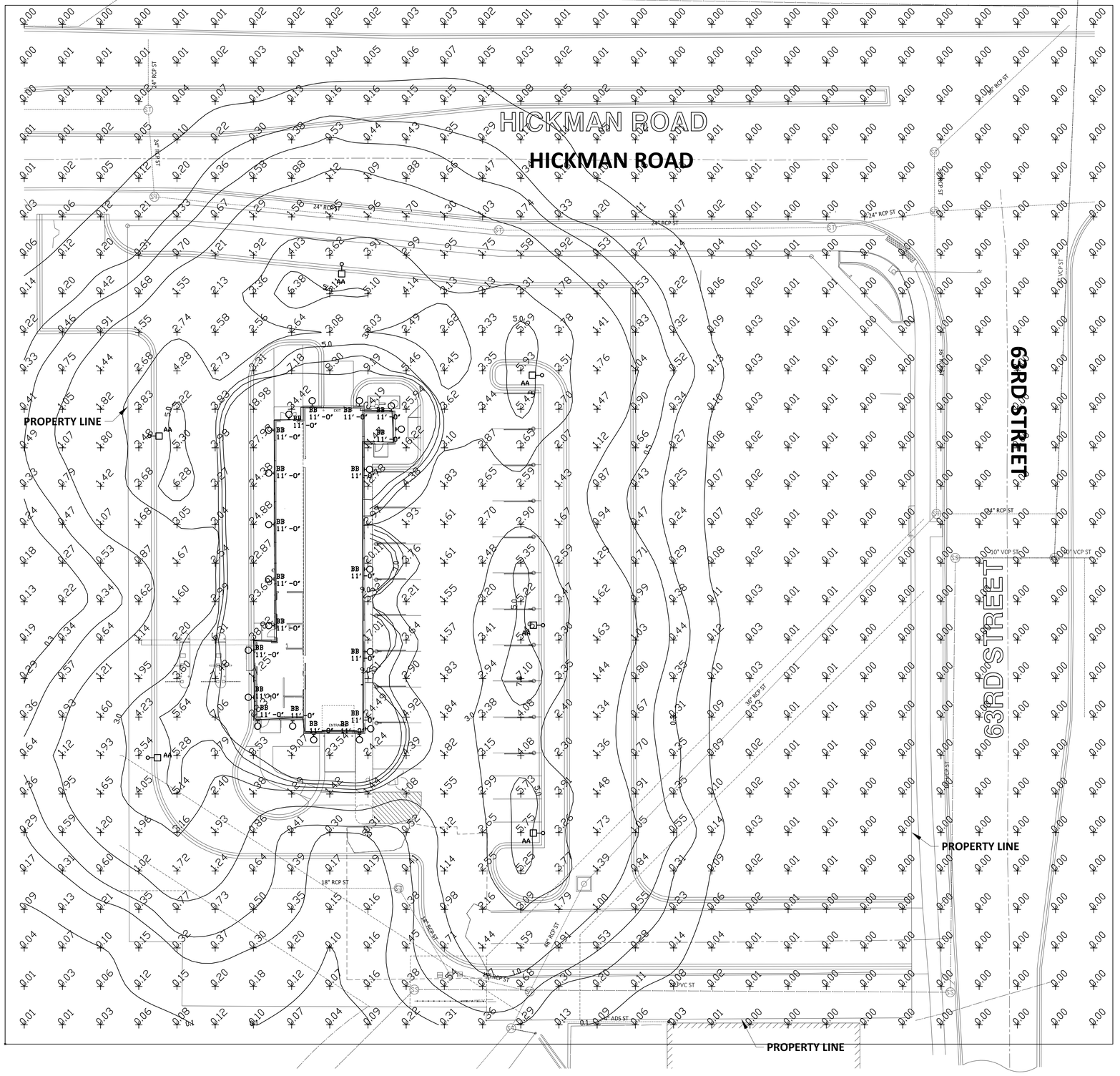
Project No.: 08225344

7.4 APPENDIX D – CONSTRUCTION DRAWINGS



TYPE "AA" FIXTURE POLE BASE DETAIL

NO SCALE



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SITE PLAN - PHOTOMETRIC

SCALE 0 10 20 30 40

ELECTRICAL NOTES

VanDeWalle Architects LLC
ARCHITECTURE • PLANNING • INTERIORS
Sioux Falls, S.D. 605-339-4411

Midwest Fidelity Partners

PDE Professional Design Engineers
48371 265th Street (605)941-3337
Brandon, SD 57005

Silverstar Car Wash
–
Windsor Heights, IA

Site Plan - Photometric

Project No. 2023002	Revisions	1.0
Date: 01-19-23		
Drawn By: DEM/RKK		

D-Series Size 2

Legacy LED Area Luminaire

Buy American

Catalog Number	DSX2 LED P4 40K T4M MVOLT DDBXD
Notes	25' pole mounted on a 3' high concrete base
Type	Type AA

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

EPA: 1.1 ft² *(0.10 m²)*

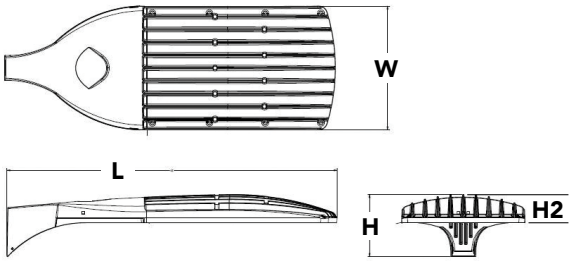
Length: 40″ *(101.6 cm)*

Width: 15″ *(38.1 cm)*

Height 1: 7-1/4″ *(18.4 cm)*

Height 2: (max): 3.5″

Weight: 36lbs



Introduction

The modern styling of the D-Series is striking yet unobtrusive - making a bold, progressive statement even as it blends seamlessly with its environment.

The D-Series distills the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire. The outstanding photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. The Size 2 is ideal for replacing 400-1000W metal halide in area lighting applications with energy savings of up to 80% and expected service life of over 100,000 hours.

Ordering Information

EXAMPLE: DSX2 LED P7 40K T3M MVOLT SPA NLTAIR2 PIRHN DDBXD G1

DSX2 LED

Series

DSX2 LED

LEDs

Forward optics

P1, P2, P3, P4, P5[1], P6, P7[1], P8[1]

Rotated optics

P10[2], P11[2], P12[2], P13[1,2], P14[1,2]

Color temperature

30K 3000 K
40K 4000 K
50K 5000 K

Distribution

T1S Type I Short (Automotive)
T2S Type II Short
T2M Type II Medium
T3S Type III Short
T3M Type III Medium
T4M Type IV Medium
TFTM Forward Throw Medium
T5VS Type V Very Short[3]
T5S Type V Short[3]
T5M Type V Medium[3]
T5W Type V Wide[3]
BLC Backlight control[4]
LCCO Left corner cutoff[4]
RCCO Right corner cutoff[4]

Voltage

MVOLT[5]
XVOLT (277V-480V)[6,7,8]
120[9]
208[9]
240[9]
277[9]
347[9]
480[9]

Mounting

Shipped included

SPA Square pole mounting
RPA Round pole mounting[10]
WBA Wall bracket[3]
SPUMBA Square pole universal mounting adaptor[11]
RPUMBA Round pole universal mounting adaptor[11]

Shipped separately

KMA8 DDBXD U Mast arm mounting bracket adaptor (specify finish)[10]

Control options

Shipped installed

NLTAIR2 nLight AIR generation 2 enabled[13]
PIRHN Network, Bi-Level motion/ambient sensor[14]
PER NEMA twist-lock receptacle only (no controls)[15]
PER5 Five-wire receptacle only (no controls)[15,16]
PER7 Seven-wire receptacle only (no controls)[15,16]
DMG 0-10V dimming extend out back of housing for external control (no controls)[17]
DS Dual switching[18,19,21]
PIRH Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enable at 5fc[20]
PIRH1FC3V High/low, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc[20]
FAO Field Adjustable Output[21,22]

Other options

Shipped installed

HS House-side shield[23]
SF Single fuse (120, 277, 347V)[9]
DF Double fuse (208, 240, 480V)[9]
L90 Left rotated optics[2]
R90 Right rotated optics[2]
HA 50°C ambient operations[1]
BAA Buy America(n) Act Compliant

Shipped separately

BS Bird spikes[24]
EGS External glare shield

Finish *(required)*

DDBXD Dark bronze
DBLXD Black
DNAXD Natural aluminum
DWHXD White
DDBTXD Textured dark bronze
DBLBXD Textured black
DNATXD Textured natural aluminum
DWHGXD Textured white

Generation *(required)*

G1 Generation 1

Ordering Information

Accessories

Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V) [25]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V) [25]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V) [25]
DSHORT SBK U	Shorting cap [25]
DSX2HS 80C U G1	House-side shield for 80 LED unit [23]
DSX2HS 90C U G1	House-side shield for 90 LED unit [23]
DSX2HS 100C U G1	House-side shield for 100 LED unit [23]
PUMBA DDBXD U G1*	Square and round pole universal mounting bracket (specify finish) [26]
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish) [12]
DSX2EGS (FINISH) U G1	External glare shield

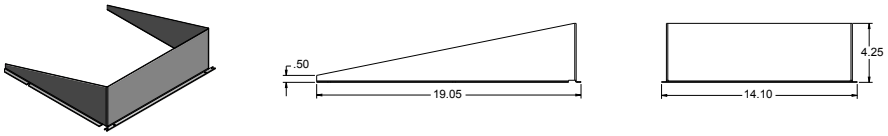
For more control options, visit DTL and ROAM online.

NOTES

1 HA not available with P5, P7, P8, P13, and P14.
2 P10, P11, P12, P13 or P14 and rotated optics (L90, R90) only available together.
3 Any Type 5 distribution with photocell, is not available with WBA.
4 Not available with HS.
5 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
6 XVOLT is only suitable for use with P5, P6, P7, P8, P13 and P14.
7 XVOLT works with any voltage between 277V and 480V.
8 XVOLT not available with fusing (SF or DF) and not available with PIRH or PIRH1FC3V.
9 Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V.
10 Suitable for mounting to round poles between 3.5" and 12" diameter.
11 Universal mounting bracket intended for retrofit on existing pre-drilled poles only. 1.5 G vibration load rating per ANCI C136.31. Only usable when pole's drill pattern is NOT Lithonia template #8.
12 Must order fixture with SPA option. KMA8 must be ordered as a separate accessory; see Accessories information. For use with 2-3/8" diameter mast arm (not included).
13 Must be ordered with PIRHN. Sensor cover only available in dark bronze, black, white or natural aluminum color.
14 Must be ordered with NLTAIR2. For more information on nLight Air 2 visit this link.
15 Photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Not available with DS option. Shorting Cap included.
16 If ROAM® node required, it must be ordered and shipped as a separate line item from Acuity Brands Controls. Node with integral dimming. .
17 DMG not available with PIRHN, PER5, PER7, PIR, PIRH, PIR1FC3V or PIRH1FC3V, FAO.
18 Requires (2) separately switched circuits.
19 Provides 50/50 fixture operation via (2) independent drivers. Not available with PER, PER5, PER7, PIR or PIRH. Not available with P1, P2, P10.
20 Reference Motion Sensor Default table on page 4 to see functionality.
21 Reference controls options table on page 4.
22 Not available with other dimming controls options.
23 Not available with BLC, LCCO and RCCO distribution. Also available as a separate accessories; see Accessories information.
24 Must be ordered with fixture for factory pre-drilling.
25 Requires luminaire to be specified with PER, PER5 and PER7 option. Ordered and shipped as a separate line item from Acuity Brands Controls.
26 For retrofit use only. Only usable when pole's drill pattern is NOT Lithonia template #8.

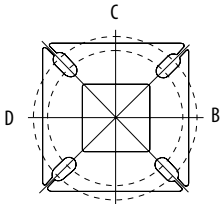
Options

EGS - External Glare Shield

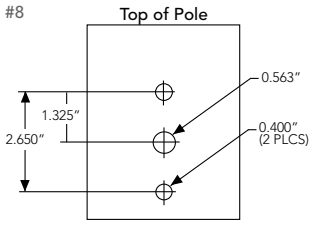


Drilling

HANDHOLE ORIENTATION



Template #8



Tenon Mounting Slipfitter

Tenon O.D.	Mounting	Single Unit	2 @ 180	2 @ 90	3 @ 90	3 @120	4 @ 90
2-3/8"	RPA	AS3-5 190	AS3-5 280	AS3-5 290	AS3-5 390	AS3-5 320	AS3-5 490
2-7/8"	RPA	AST25-190	AST25-280	AST25-290	AST25-390	AST25-320	AST25-490
4"	RPA	AST35-190	AST35-280	AST35-290	AST35-390	AST35-320	AST35-490

Mounting Option	Drilling Template	Single	2 @ 180	2 @ 90	3 @ 90	3 @ 120	4 @ 90
Head Location		Side B	Side B & D	Side B & C	Side B, C & D	Round Pole Only	Side A, B, C & D
Drill Nomenclature	#8	DM19AS	DM28AS	DM29AS	DM39AS	DM32AS	DM49AS

DSX2 Area Luminaire - EPA

*Includes luminaire and integral mounting arm. Other tenons, arms, brackets or other accessories are not included in this EPA data.

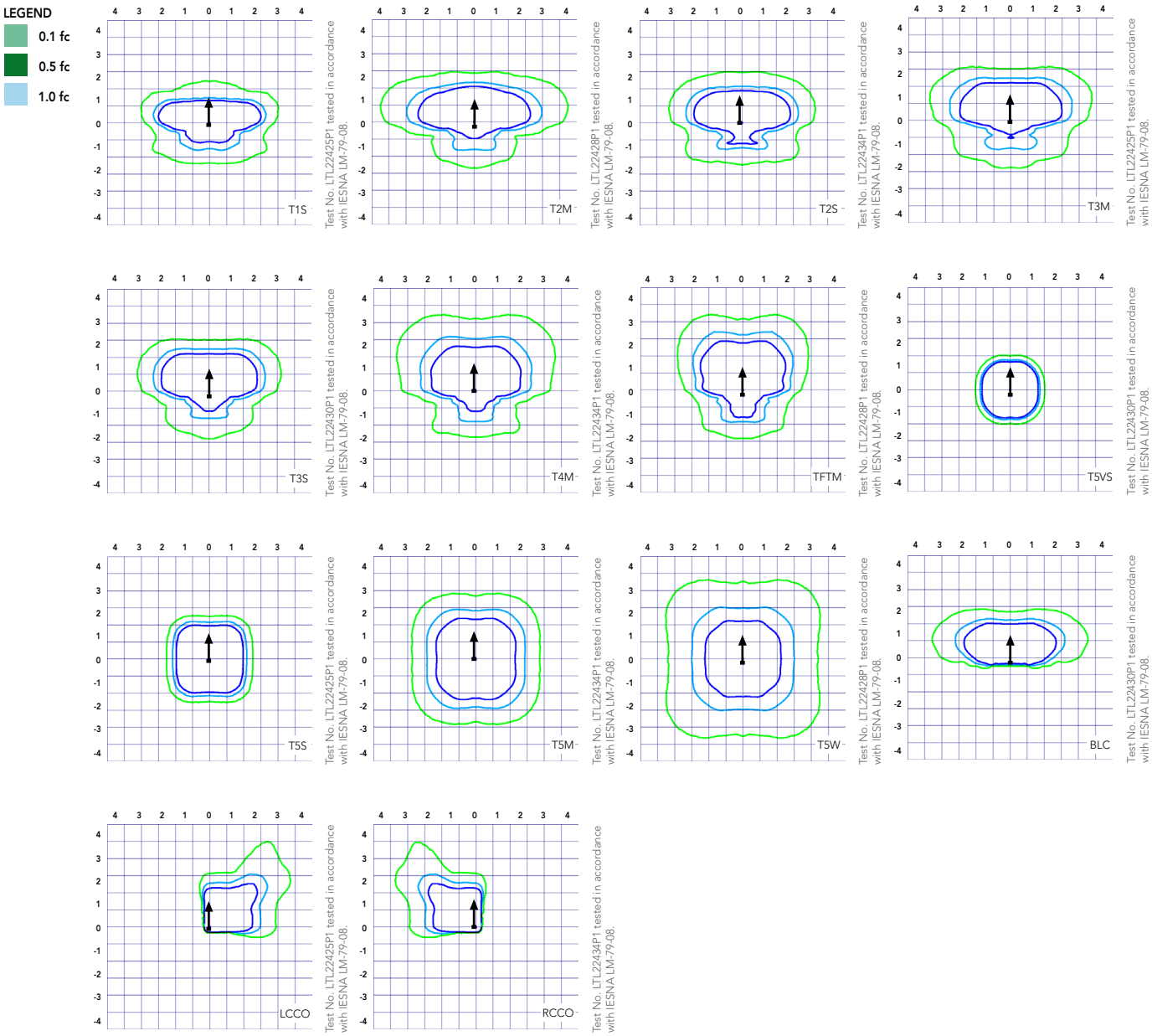
Fixture Quantity & Mounting Configuration	Single DM19	2 @ 180 DM28	2 @ 90 DM29	3 @ 90 DM39	3 @ 120 DM32	4 @ 90 DM49
Mounting Type						
DSX2 LED	1.100	2.200	2.120	3.300	2.850	4.064

	Drilling Template	Minimum Acceptable Outside Pole Dimension					
SPA	#8	2-7/8"	2-7/8"	3.5"	3.5"	3"	3.5"
RPA	#8	2-7/8"	2-7/8"	3.5"	3.5"	3"	3.5"
SPUMBA	#5	2-7/8"	3"	4"	4"	3.5"	4"
RPUMBA	#5	2-7/8"	3.5"	5"	5"	3.5"	5"

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's D-Series Area Size 2 homepage.

Isofootcandle plots for the DSX1 LED P9 40K G1. Distances are in units of mounting height (30').



One Lithonia Way • Conyers, Georgia 30012 • Phone: 1-800-705-SERV (7378) • www.lithonia.com

Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.04
5°C	41°F	1.04
10°C	50°F	1.03
15°C	50°F	1.02
20°C	68°F	1.01
25°C	**77°F**	**1.00**
30°C	86°F	0.99
35°C	95°F	0.98
40°C	104°F	0.97

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25000	50000	100000
Lumen Maintenance Factor	1.00	0.96	0.92	0.85

Electrical Load

					Current (A)					
	Performance Package	LED Count	Drive Current	Wattage	120	208	240	277	347	480
Forward Optics (Non-Rotated)	P1	80	530	140	1.18	0.68	0.59	0.51	0.40	0.32
	P2	80	700	185	1.56	0.90	0.78	0.66	0.52	0.39
	P3	80	850	217	1.82	1.05	0.90	0.80	0.63	0.48
	P4	80	1050	270	2.27	1.31	1.12	0.99	0.79	0.59
	P5	80	1250	321	2.68	1.54	1.34	1.17	0.93	0.68
	P6	100	1050	343	2.89	1.66	1.59	1.37	1.00	0.71
	P7	100	1250	398	3.31	1.91	1.66	1.45	1.16	0.81
	P8	100	1350	431	3.61	2.07	1.81	1.57	1.25	0.91
Rotated Optics (Requires L90 or R90)	P10	90	530	156	1.30	0.76	0.65	0.62	0.45	0.32
	P11	90	700	207	1.75	1.01	0.87	0.74	0.60	0.46
	P12	90	850	254	2.12	1.22	1.06	0.94	0.73	0.55
	P13	90	1200	344	2.88	1.65	1.44	1.25	1.00	0.73
	P14	90	1400	405	3.39	1.95	1.71	1.48	1.18	0.86

Motion Sensor Default Settings						
Option	Dimmed State	High Level (when triggered)	Photocell Operation	Dwell Time	Ramp-up Time	Ramp-down Time
PIR or PIRH	3V (37%) Output	10V (100%) Output	Enabled @ 5FC	5 min	3 sec	5 min
*PIR1FC3V or PIRH1FC3V	3V (37%) Output	10V (100%) Output	Enabled @ 1FC	5 min	3 sec	5 min
*for use when motion sensor is used as dusk to dawn control.						

Controls Options				
Nomenclature	Description	Functionality	Primary control device	Notes
FAO	Field adjustable output device installed inside the luminaire; wired to the driver dimming leads.	Allows the luminaire to be manually dimmed, effectively trimming the light output.	FAO device	Cannot be used with other controls options that need the 0-10V leads
DS	Drivers wired independently for 50/50 luminaire operation	The luminaire is wired to two separate circuits, allowing for 50/50 operation.	Independently wired drivers	Requires two separately switched circuits. Consider nLight AIR as a more cost effective alternative.
PER5 or PER7	Twist-lock photocell receptical	Compatible with standard twist-lock photocells for dusk to dawn operation, or advanced control nodes that provide 0-10V dimming signals.	Twist-lock photocells such as DLL Elite or advanced control nodes such as ROAM.	Pins 4 & 5 to dimming leads on driver, Pins 6 & 7 are capped inside luminaire
PIR or PIRH	Motion sensors with integral photocell. PIR for 8-15' mounting; PIRH for 15-30' mounting	Luminaires dim when no occupancy is detected.	Acuity Controls SBGR	Also available with PIRH1FC3V when the sensor photocell is used for dusk-to-dawn operation.
NLTAIR2 PIRHN	nLight AIR enabled luminaire for motion sensing, photocell and wireless communication.	Motion and ambient light sensing with group response. Scheduled dimming with motion sensor over-ride when wirelessly connected to the nLight Eclypse.	nLight Air rSBGR	nLight AIR sensors can be programmed and commissioned from the ground using the CIAIRity Pro app.

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08.

Forward Optics

LED Count	Drive Current	Power Package	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
80	530	P1	140W	T1S	17,575	3	0	3	126	18,933	3	0	3	135	19,173	3	0	3	137
				T2S	17,647	3	0	3	126	19,010	3	0	3	136	19,251	3	0	3	138
				T2M	17,556	3	0	3	125	18,913	3	0	3	135	19,152	3	0	3	137
				T3S	17,604	3	0	3	126	18,964	3	0	3	135	19,204	3	0	3	137
				T3M	17,090	3	0	3	122	18,411	3	0	3	132	18,644	3	0	3	133
				T4M	17,221	3	0	3	123	18,552	3	0	4	133	18,787	3	0	4	134
				TFTM	17,593	3	0	3	126	18,952	3	0	4	135	19,192	3	0	4	137
				T5VS	18,297	4	0	1	131	19,711	4	0	1	141	19,961	4	0	1	143
				T5S	18,312	4	0	2	131	19,727	4	0	2	141	19,977	4	0	2	143
				T5M	18,266	4	0	2	130	19,677	4	0	2	141	19,926	4	0	2	142
				T5W	18,146	5	0	3	130	19,548	5	0	3	140	19,796	5	0	3	141
				BLC	14,424	2	0	2	103	15,539	2	0	3	111	15,736	2	0	3	112
				LCCO	10,733	1	0	3	77	11,562	1	0	3	83	11,709	2	0	3	84
				RCCO	10,733	1	0	3	77	11,562	1	0	3	83	11,709	2	0	3	84
80	700	P2	185W	T1S	22,305	3	0	3	121	24,029	3	0	3	130	24,333	3	0	3	132
				T2S	22,396	3	0	3	121	24,127	3	0	3	130	24,432	3	0	3	132
				T2M	22,282	3	0	4	120	24,003	3	0	4	130	24,307	3	0	4	131
				T3S	22,342	3	0	4	121	24,068	3	0	4	130	24,373	3	0	4	132
				T3M	21,690	3	0	4	117	23,366	3	0	4	126	23,662	3	0	4	128
				T4M	21,857	3	0	4	118	23,545	3	0	4	127	23,844	3	0	4	129
				TFTM	22,328	3	0	4	121	24,054	3	0	4	130	24,358	3	0	4	132
				T5VS	23,222	5	0	1	126	25,016	5	0	1	135	25,333	5	0	1	137
				T5S	23,241	4	0	2	126	25,037	4	0	2	135	25,354	4	0	2	137
				T5M	23,182	5	0	3	125	24,974	5	0	3	135	25,290	5	0	3	137
				T5W	23,030	5	0	4	124	24,810	5	0	4	134	25,124	5	0	4	136
				BLC	18,307	2	0	3	99	19,721	2	0	3	107	19,971	2	0	3	108
				LCCO	13,622	2	0	3	74	14,674	2	0	4	79	14,860	2	0	4	80
				RCCO	13,622	2	0	3	74	14,674	2	0	4	79	14,860	2	0	4	80
80	850	P3	217W	T1S	26,202	3	0	3	121	28,226	3	0	3	130	28,584	3	0	3	132
				T2S	26,309	3	0	3	121	28,342	3	0	3	131	28,700	3	0	3	132
				T2M	26,174	3	0	4	121	28,196	3	0	4	130	28,533	3	0	4	132
				T3S	26,245	3	0	4	121	28,273	3	0	4	130	28,631	3	0	4	132
				T3M	25,479	3	0	4	117	27,448	3	0	4	126	27,795	3	0	4	128
				T4M	25,675	3	0	4	118	27,659	3	0	4	127	28,009	3	0	4	129
				TFTM	26,229	3	0	4	121	28,255	3	0	4	130	28,613	3	0	4	132
				T5VS	27,279	5	0	1	126	29,387	5	0	1	135	29,759	5	0	1	137
				T5S	27,301	4	0	2	126	29,410	5	0	2	136	29,783	5	0	2	137
				T5M	27,232	5	0	3	125	29,336	5	0	3	135	29,707	5	0	3	137
				T5W	27,053	5	0	4	125	29,144	5	0	4	134	29,513	5	0	4	136
				BLC	21,504	2	0	3	99	23,166	2	0	3	107	23,459	2	0	4	108
				LCCO	16,001	2	0	4	74	17,238	2	0	4	79	17,456	2	0	4	80
				RCCO	16,001	2	0	4	74	17,238	2	0	4	79	17,456	2	0	4	80
80	1050	P4	270W	T1S	30,963	4	0	4	115	33,355	4	0	4	124	33,777	4	0	4	125
				T2S	31,089	3	0	4	115	33,491	3	0	4	124	33,915	3	0	4	126
				T2M	30,930	4	0	4	115	33,320	4	0	4	123	33,742	4	0	4	125
				T3S	30,014	3	0	4	115	33,410	3	0	5	124	33,833	3	0	4	125
				T3M	30,108	4	0	4	112	32,435	4	0	5	120	32,845	4	0	5	122
				T4M	30,340	3	0	5	112	32,684	3	0	5	121	33,098	3	0	5	123
				TFTM	30,995	3	0	5	115	33,390	3	0	5	124	33,812	3	0	5	125
				T5VS	32,235	5	0	1	119	34,726	5	0	1	129	35,166	5	0	1	130
				T5S	32,261	5	0	2	119	34,754	5	0	2	129	35,194	5	0	2	130
				T5M	32,180	5	0	4	119	34,667	5	0	4	128	35,105	5	0	4	130
				T5W	31,969	5	0	4	118	34,439	5	0	5	128	34,875	5	0	5	129
				BLC	25,412	2	0	4	94	27,376	2	0	4	101	27,722	2	0	4	103
				LCCO	18,909	2	0	4	70	20,370	2	0	4	75	20,628	2	0	4	76
				RCCO	18,909	2	0	4	70	20,370	2	0	4	75	20,628	2	0	4	76

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LED Count	Drive Current	Power Package	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
80	1250	**P5**	321W	T1S	35,193	4	0	4	110	37,912	4	0	4	118	38,392	4	0	4	120
				T2S	35,336	4	0	4	110	38,067	4	0	4	119	38,549	4	0	4	120
				T2M	35,155	4	0	5	110	37,872	4	0	5	118	38,351	4	0	5	119
				T3S	35,251	3	0	4	110	37,974	4	0	5	118	38,455	4	0	5	120
				T3M	34,222	4	0	5	107	36,866	3	0	5	115	37,333	4	0	5	116
				T4M	34,485	3	0	5	107	37,149	4	0	5	116	37,620	4	0	5	117
				TFTM	35,229	3	0	5	110	37,951	3	0	5	118	38,431	3	0	5	120
				T5VS	36,639	5	0	1	114	39,470	5	0	1	123	39,970	5	0	1	125
				T5S	36,669	5	0	2	114	39,502	5	0	2	123	40,002	5	0	2	125
				T5M	36,576	5	0	4	114	39,403	5	0	4	123	39,901	5	0	4	124
				T5W	36,336	5	0	5	113	39,144	5	0	5	122	39,640	5	0	5	123
				BLC	28,884	3	0	4	90	31,115	3	0	4	97	31,509	3	0	4	98
				LCCO	21,492	2	0	4	67	23,153	2	0	5	72	23,446	3	0	5	73
				RCCO	21,492	2	0	4	67	23,153	2	0	5	72	23,446	3	0	5	73
100	1050	**P6**	343W	T1S	37,824	4	0	4	110	40,747	4	0	4	119	41,263	4	0	4	120
				T2S	37,979	4	0	4	111	40,913	4	0	4	119	41,431	4	0	4	121
				T2M	37,784	4	0	5	110	40,704	4	0	4	119	41,219	4	0	5	120
				T3S	37,886	3	0	5	110	40,814	4	0	5	119	41,331	4	0	5	120
				T3M	36,780	4	0	4	107	39,623	4	0	5	116	40,124	4	0	5	117
				T4M	37,063	4	0	5	108	39,927	4	0	5	116	40,433	4	0	5	118
				TFTM	37,863	3	0	5	110	40,789	4	0	5	119	41,305	4	0	5	120
				T5VS	39,379	5	0	1	115	42,422	5	0	1	124	42,959	5	0	1	125
				T5S	39,411	5	0	2	115	42,456	5	0	2	124	42,993	5	0	2	125
				T5M	39,311	5	0	4	115	42,349	5	0	4	123	42,885	5	0	4	125
				T5W	39,053	5	0	5	114	42,071	5	0	5	123	42,604	5	0	5	124
				BLC	31,043	3	0	4	91	33,442	3	0	4	97	33,865	3	0	4	99
				LCCO	23,099	2	0	5	67	24,884	3	0	5	73	25,199	3	0	5	73
				RCCO	23,099	2	0	5	67	24,884	3	0	5	73	25,199	3	0	5	73
100	1250	**P7**	398W	T1S	42,599	4	0	4	107	45,890	4	0	4	115	46,471	4	0	4	117
				T2S	42,773	4	0	4	107	46,078	4	0	4	116	46,661	4	0	5	117
				T2M	42,553	4	0	5	107	45,842	4	0	5	115	46,422	4	0	5	117
				T3S	42,669	4	0	5	107	45,966	4	0	5	115	46,548	4	0	5	117
				T3M	41,423	4	0	5	104	44,624	4	0	5	112	45,189	4	0	5	114
				T4M	41,742	4	0	5	105	44,967	4	0	5	113	45,537	4	0	5	114
				TFTM	42,643	4	0	5	107	45,938	4	0	5	115	46,519	4	0	5	117
				T5VS	44,350	5	0	1	111	47,777	5	0	1	120	48,381	5	0	1	122
				T5S	44,385	5	0	2	112	47,815	5	0	3	120	48,420	5	0	3	122
				T5M	44,273	5	0	4	111	47,695	5	0	4	120	48,298	5	0	4	121
				T5W	43,983	5	0	5	111	47,382	5	0	5	119	47,982	5	0	5	121
				BLC	34,962	3	0	4	88	37,664	3	0	5	95	38,140	3	0	5	96
				LCCO	26,015	3	0	5	65	28,025	3	0	5	70	28,380	3	0	5	71
				RCCO	26,015	3	0	5	65	28,025	3	0	5	70	28,380	3	0	5	71
100	1350	**P8**	448W	T1S	45,610	4	0	4	106	49,135	4	0	4	114	49,757	4	0	4	115
				T2S	45,797	4	0	4	106	49,336	4	0	5	114	49,960	4	0	5	116
				T2M	45,562	4	0	5	106	49,083	4	0	5	114	49,704	4	0	5	115
				T3S	45,686	4	0	5	106	49,216	4	0	5	114	49,839	4	0	5	116
				T3M	44,352	4	0	5	103	47,779	4	0	5	111	48,384	4	0	5	112
				T4M	44,693	4	0	5	104	48,147	4	0	5	112	48,756	4	0	5	113
				TFTM	45,657	4	0	5	106	49,186	4	0	5	114	49,808	4	0	5	116
				T5VS	47,485	5	0	1	110	51,155	5	0	1	119	51,802	5	0	1	120
				T5S	47,524	5	0	3	110	51,196	5	0	3	119	51,844	5	0	3	120
				T5M	47,404	5	0	4	110	51,067	5	0	5	118	51,713	5	0	5	120
				T5W	47,093	5	0	5	109	50,732	5	0	5	118	51,374	5	0	5	119
				BLC	37,434	3	0	5	87	40,326	3	0	5	94	40,837	3	0	5	95
				LCCO	27,854	3	0	5	65	30,006	3	0	5	70	30,386	3	0	5	71
				RCCO	27,854	3	0	5	65	30,006	3	0	5	70	30,386	3	0	5	71

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Rotated Optics

LED Count	Drive Current	Power Package	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
90	530	**P10**	156W	T1S	20,145	4	0	4	129	21,702	4	0	4	139	21,977	4	0	4	141
				T2S	20,391	4	0	4	131	21,967	4	0	4	141	22,245	4	0	4	143
				T2M	20,029	4	0	4	128	21,577	4	0	4	138	21,850	4	0	4	140
				T3S	20,379	4	0	4	131	21,954	4	0	4	141	22,232	4	0	4	143
				T3M	19,719	4	0	4	126	21,242	5	0	5	136	21,511	5	0	5	138
				T4M	19,995	4	0	4	128	21,540	4	0	4	138	21,812	5	0	5	140
				TFTM	20,511	4	0	4	131	22,096	5	0	5	142	22,376	5	0	5	143
				T5VS	20,655	4	0	1	132	22,251	4	0	1	143	22,533	4	0	1	144
				T5S	20,482	4	0	2	131	22,064	4	0	2	141	22,343	4	0	2	143
				T5M	20,477	5	0	3	131	22,059	5	0	3	141	22,338	5	0	3	143
				T5W	20,293	5	0	3	130	21,861	5	0	3	140	22,138	5	0	4	142
				BLC	16,846	4	0	4	108	18,148	4	0	4	116	18,378	4	0	4	118
				LCCO	12,032	2	0	3	77	12,961	2	0	3	83	13,125	2	0	3	84
				RCCO	12,016	4	0	4	77	12,944	4	0	4	83	13,108	4	0	4	84
90	700	**P11**	207W	T1S	25,518	4	0	4	123	27,490	4	0	4	133	27,837	4	0	4	134
				T2S	25,829	4	0	4	125	27,825	4	0	4	134	28,177	4	0	4	136
				T2M	25,371	5	0	5	123	27,331	5	0	5	132	27,677	5	0	5	134
				T3S	25,814	5	0	5	125	27,809	5	0	5	134	28,161	5	0	5	136
				T3M	24,977	5	0	5	121	26,907	5	0	5	130	27,248	5	0	5	132
				T4M	25,327	5	0	5	122	27,284	5	0	5	132	27,629	5	0	5	133
				TFTM	25,981	5	0	5	126	27,989	5	0	5	135	28,343	5	0	5	137
				T5VS	26,164	5	0	1	126	28,185	5	0	1	136	28,542	5	0	1	138
				T5S	25,943	4	0	2	125	27,948	5	0	2	135	28,302	5	0	2	137
				T5M	25,937	5	0	3	125	27,941	5	0	3	135	28,295	5	0	3	137
				T5W	25,704	5	0	4	124	27,691	5	0	4	134	28,041	5	0	4	135
				BLC	21,339	4	0	4	103	22,988	4	0	4	111	23,279	4	0	4	112
				LCCO	15,240	2	0	4	74	16,418	2	0	4	79	16,626	2	0	4	80
				RCCO	15,220	5	0	5	74	16,396	5	0	5	79	16,604	5	0	5	80
90	850	**P12**	254W	T1S	29,912	4	0	4	118	32,223	4	0	4	127	32,631	5	0	4	128
				T2S	30,277	5	0	5	119	32,616	5	0	5	128	33,029	5	0	5	130
				T2M	29,740	5	0	5	117	32,038	5	0	5	126	32,443	5	0	5	128
				T3S	30,259	5	0	5	119	32,597	5	0	5	128	33,010	5	0	5	130
				T3M	29,278	5	0	5	115	31,540	5	0	5	124	31,940	5	0	5	126
				T4M	29,688	5	0	5	117	31,982	5	0	5	126	32,387	5	0	5	128
				TFTM	30,455	5	0	5	120	32,808	5	0	5	129	33,224	5	0	5	131
				T5VS	30,669	5	0	1	121	33,039	5	0	1	130	33,457	5	0	1	132
				T5S	30,411	5	0	2	120	32,761	5	0	2	129	33,176	5	0	2	131
				T5M	30,404	5	0	3	120	32,753	5	0	4	129	33,168	5	0	4	131
				T5W	30,131	5	0	4	119	32,459	5	0	4	128	32,870	5	0	4	129
				BLC	25,013	4	0	4	98	26,946	4	0	4	106	27,287	4	0	4	107
				LCCO	17,865	2	0	4	70	19,245	2	0	4	76	19,489	2	0	4	77
				RCCO	17,841	5	0	5	70	19,220	5	0	5	76	19,463	5	0	5	77
90	1200	**P13**	344W	T1S	38,768	5	0	5	113	41,764	5	0	5	121	42,292	5	0	5	123
				T2S	39,241	5	0	5	114	42,273	5	0	5	123	42,808	5	0	5	124
				T2M	38,545	5	0	5	112	41,523	5	0	5	121	42,049	5	0	5	122
				T3S	39,218	5	0	5	114	42,249	5	0	5	123	42,783	5	0	5	124
				T3M	37,947	5	0	5	110	40,879	5	0	5	119	41,396	5	0	5	120
				T4M	38,478	5	0	5	112	41,451	5	0	5	120	41,976	5	0	5	122
				TFTM	39,472	5	0	5	115	42,522	5	0	5	124	43,060	5	0	5	125
				T5VS	39,749	5	0	1	116	42,821	5	0	1	124	43,363	5	0	1	126
				T5S	39,415	5	0	2	115	42,461	5	0	2	123	42,998	5	0	2	125
				T5M	39,405	5	0	4	115	42,450	5	0	4	123	42,988	5	0	4	125
				T5W	39,052	5	0	5	114	42,069	5	0	5	122	42,602	5	0	5	124
				BLC	32,419	5	0	5	94	34,925	5	0	5	102	35,367	5	0	5	103
				LCCO	23,154	3	0	5	67	24,943	3	0	5	73	25,259	3	0	5	73
				RCCO	23,124	5	0	5	67	24,910	5	0	5	72	25,226	5	0	5	73
90	1400	**P14**	405W	T1S	42,867	5	0	5	106	46,180	5	0	5	114	46,764	5	0	5	115
				T2S	43,390	5	0	5	107	46,743	5	0	5	115	47,335	5	0	5	117
				T2M	42,621	5	0	5	105	45,914	5	0	5	113	46,495	5	0	5	115
				T3S	43,365	5	0	5	107	46,716	5	0	5	115	47,307	5	0	5	117
				T3M	41,959	5	0	5	104	45,201	5	0	5	112	45,773	5	0	5	113
				T4M	42,547	5	0	5	105	45,834	5	0	5	113	46,414	5	0	5	115
				TFTM	43,646	5	0	5	108	47,018	5	0	5	116	47,614	5	0	5	118
				T5VS	43,952	5	0	1	109	47,349	5	0	1	117	47,948	5	0	1	118
				T5S	43,583	5	0	2	108	46,950	5	0	2	116	47,545	5	0	3	117
				T5M	43,572	5	0	4	108	46,939	5	0	4	116	47,533	5	0	4	117
				T5W	43,181	5	0	5	107	46,518	5	0	5	115	47,107	5	0	5	116
				BLC	35,847	5	0	5	89	38,617	5	0	5	95	39,106	5	0	5	97
				LCCO	25,602	3	0	5	63	27,580	3	0	5	68	27,930	3	0	5	69
				RCCO	25,569	5	0	5	63	27,544	5	0	5	68	27,893	5	0	5	69

FEATURES & SPECIFICATIONS

INTENDED USE
The sleek design of the D-Series Area Size 2 reflects the embedded high performance LED technology. It is ideal for applications like car dealerships and large parking lots adjacent to malls, transit stations, grocery stores, home centers, and other big-box retailers.

CONSTRUCTION
Single-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED drivers are mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65). Low EPA (1.1 ft^2) for optimized pole wind loading.

FINISH
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in both textured and non-textured finishes.

OPTICS
Precision-molded proprietary acrylic lenses are engineered for superior area lighting distribution, uniformity, and pole spacing. Light engines are available in 3000 K, 4000 K, or 5000 K (70 CRI) configurations. The D-Series Size 2 has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL
Light engine configurations consist of high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L85/100,000 hrs at 25°C). Class 1 electronic drivers are designed to have a power factor >90%, THD <20%, and an expected life of 100,000 hours with <1% failure rate. Easily-serviceable 10kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

INSTALLATION
Included mounting block and integral arm facilitate quick and easy installation. Stainless steel bolts fasten the mounting block securely to poles and walls, enabling the D-Series Size 2 to withstand up to a 2.0 G vibration load rating per ANSI C136.31. The D-Series Size 2 utilizes the AERIS™ series pole drilling pattern (Template #8). NEMA photocontrol receptacle is available.

STANDARD CONTROLS
The DSX2 LED area luminaire has a number of control options. DSX Size 2, comes standard with 0-10V dimming drivers. Dusk to dawn controls can be utilized via optional NEMA twist-lock photocell receptacles. Integrated motion sensors with on-board photocells feature field-adjustable programing and are suitable for mounting heights up to 30 feet.

nLIGHT AIR CONTROLS
The DSX2 LED area luminaire is also available with nLight® AIR for the ultimate in wireless control. This powerful controls platform provides out-of-the-box basic motion sensing and photocontrol functionality and is suitable for mounting heights up to 40 feet. Once commissioned using a smartphone and the easy-to-use CLAIRITY app, nLight AIR equipped luminaries can be grouped, resulting in motion sensor and photocell group response without the need for additional equipment. Scheduled dimming with motion sensor over-ride can be achieved when used with the nLight Eclypse. Additional information about nLight Air can be found here.

LISTINGS
UL listed to meet U.S. and Canadian standards. UL Listed for wet locations. Light engines are IP66 rated; luminaire is IP65 rated. Rated for -40ºC minimum ambient. U.S. Patent No. D670,857 S. International patent pending.

DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

International Dark-Sky Association (IDA) Fixture Seal of Approval (FSA) is available for all products on this page utilizing 3000K color temperature only.

BUY AMERICAN
Product with the BAA option is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT.
Please refer to www.acuitybrands.com/buy-american for additional information.

WARRANTY
5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

WDGE3 LED
Architectural Wall Sconce

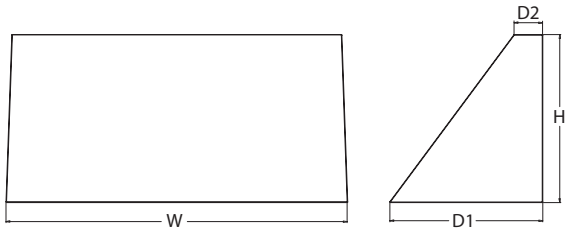
Buy American

Catalog Number	WDGE LED P1 40K 70CRI R3 MVOLT DDBXD
Notes	Wall mounted at 11' AFG
Type	Type BB

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

Depth (D1): 8"
Depth (D2): 1.5"
Height: 9"
Width: 18"
Weight: (without options) 19.5 lbs



Introduction

The WDGE LED family is designed to meet specifier's every wall-mounted lighting need in a widely accepted shape that blends with any architecture. The clean rectilinear design comes in four sizes with lumen packages ranging from 1,200 to 25,000 lumens, providing a true site-wide solution. Embedded with nLight® AIR wireless controls, the WDGE family provides additional energy savings and code compliance.

WDGE3 has been designed to deliver up to 12,000 lumens through a precision refractive lens with wide distribution, perfect for augmenting the lighting from pole mounted luminaires.

WDGE LED Family Overview

Luminaire	Standard EM, 0°C	Cold EM, -20°C	Sensor	Lumens (4000K)					
				P1	P2	P3	P4	P5	P6
WDGE1 LED	4W	--	--	1,200	2,000	--	--	--	--
WDGE2 LED	10W	18W	Standalone / nLight	1,200	2,000	3,000	4,500	6,000	--
WDGE3 LED	15W	18W	Standalone / nLight	7,500	8,500	10,000	12,000	--	--
WDGE4 LED	--	--	Standalone / nLight	12,000	16,000	18,000	20,000	22,000	25,000

Ordering Information

EXAMPLE: WDGE3 LED P3 40K 70CRI R3 MVOLT SRM DDBXD

Series	Package	Color Temperature	CRI	Distribution	Voltage	Mounting
WDGE3 LED	P1 P2 P3 P4	30K 3000K 40K 4000K 50K 5000K	70CRI 80CRI	R2 Type 2 R3 Type 3 R4 Type 4 RFT Forward Throw	MVOLT 347[1] 480[1]	**Shipped included** SRM Surface mounting bracket ICW Indirect Canopy/Ceiling Washer bracket (dry/damp locations only)[4] **Shipped separately** AWS 3/8inch Architectural wall spacer PBBW Surface-mounted back box (top, left, right conduit entry). Use when there is no junction box available.

Options

E15WH	Emergency battery backup, Certified in CA Title 20 MAEDBS (15W, 5°C min)
E20WC	Emergency battery backup, Certified in CA Title 20 MAEDBS (18W, -20°C min)
PE[2]	Photocell, Button Type
DMG[3]	0-10V dimming wires pulled outside fixture (for use with an external control, ordered separately)
BCE	Bottom conduit entry for back box (PBBW). Total of 4 entry points.
SPD10KV	10kV Surge pack
BAA	Buy America(n) Act Compliant

Standalone Sensors/Controls

PIR	Bi-level (100/35%) motion sensor for 8-15' mounting heights. Intended for use on switched circuits with external dusk to dawn switching.
PIRH	Bi-level (100/35%) motion sensor for 15-30' mounting heights. Intended for use on switched circuits with external dusk to dawn switching
PIR1FC3V	Bi-level (100/35%) motion sensor for 8-15' mounting heights with photocell pre-programmed for dusk to dawn operation.
PIRH1FC3V	Bi-level (100/35%) motion sensor for 15-30' mounting heights with photocell pre-programmed for dusk to dawn operation.

Networked Sensors/Controls

NLTAIR2 PIR	nLightAIR Wireless enabled bi-level motion/ambient sensor for 8-15' mounting heights.
NLTAIR2 PIRH	nLightAIR Wireless enabled bi-level motion/ambient sensor for 15-30' mounting heights.

See page 4 for out of box functionality

Finish

DDBXD	Dark bronze
DBLXD	Black
DNAXD	Natural aluminum
DWHXD	White
DSSXD	Sandstone
DDBTXD	Textured dark bronze
DBLBXD	Textured black
DNATXD	Textured natural aluminum
DWHGXD	Textured white
DSSTXD	Textured sandstone

Accessories

Ordered and shipped separately.

WDGEAWS DDBXD	WDGE 3/8inch Architectural Wall Spacer (specify finish)
WDGE3PBBW DDBXD U	WDGE3 surface-mounted back box (specify finish)

NOTES

1. 347V and 480V not available with E15WH and E20WC.
2. PE not available in 480V and with sensors/controls.
3. DMG option not available with sensors/controls.
4. Not qualified for DLC. Not available with emergency battery backup or sensors/controls

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Performance Package	System Watts	Dist. Type	30K (3000K, 70 CRI)					40K (4000K, 70 CRI)					50K (5000K, 70 CRI)				
			Lumens	LPW	B	U	G	Lumens	LPW	B	U	G	Lumens	LPW	B	U	G
P1	52W	R2	7,037	136	1	0	1	7,649	148	2	0	1	7,649	148	2	0	1
		R3	6,922	134	1	0	2	7,524	145	1	0	2	7,524	145	1	0	2
		R4	7,133	138	1	0	2	7,753	150	1	0	2	7,753	150	1	0	2
		RFT	6,985	135	1	0	2	7,592	147	1	0	2	7,592	147	1	0	2
P2	59W	R2	7,968	135	2	0	1	8,661	147	2	0	1	8,661	147	2	0	1
		R3	7,838	133	1	0	2	8,519	144	1	0	2	8,519	144	1	0	2
		R4	8,077	137	1	0	2	8,779	149	1	0	2	8,779	149	1	0	2
		RFT	7,909	134	1	0	2	8,597	146	2	0	2	8,597	146	2	0	2
P3	71W	R2	9,404	132	2	0	1	10,221	143	2	0	1	10,221	143	2	0	1
		R3	9,250	130	2	0	2	10,054	141	2	0	2	10,054	141	2	0	2
		R4	9,532	134	2	0	2	10,361	145	2	0	2	10,361	145	2	0	2
		RFT	9,334	131	2	0	2	10,146	142	2	0	2	10,146	142	2	0	2
P4	88W	R2	11,380	129	2	0	1	12,369	140	2	0	1	12,369	140	2	0	1
		R3	11,194	127	2	0	2	12,167	138	2	0	2	12,167	138	2	0	2
		R4	11,535	131	2	0	2	12,538	142	2	0	2	12,538	142	2	0	2
		RFT	11,295	128	2	0	2	12,277	139	2	0	2	12,277	139	2	0	2

Electrical Load

Performance Package	System Watts	Current (A)					
		120V	208V	240V	277V	347V	480V
P1	52W	0.437	0.246	0.213	0.186	0.150	0.110
P2	59W	0.498	0.287	0.251	0.220	0.175	0.126
P3	71W	0.598	0.344	0.300	0.262	0.210	0.152
P4	88W	0.727	0.424	0.373	0.333	0.260	0.190

Lumen Output in Emergency Mode (4000K, 70 CRI)

Option	Dist. Type	Lumens
E15WH	R2	3,185
	R3	3,133
	R4	3,229
	RFT	3,162
E20WC	R2	3,669
	R3	3,609
	R4	3,719
	RFT	3,642

Lumen Multiplier for 80CRI

CCT	Multiplier
30K	0.891
40K	0.906
50K	0.906

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.05
10°C	50°F	1.03
20°C	68°F	1.01
25°C	77°F	1.00
30°C	86°F	0.99
40°C	104°F	0.97

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a 25°C ambient, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	1.0	>0.98	>0.97	>0.92

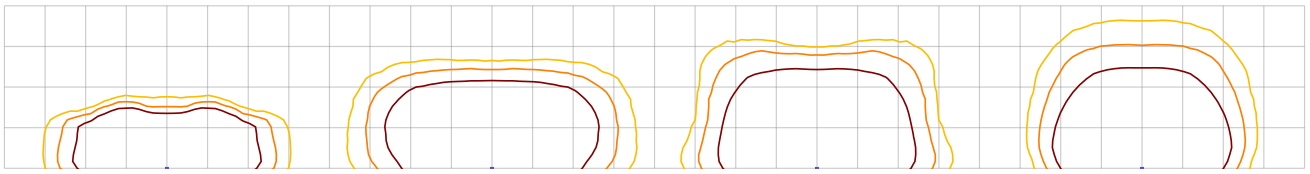
Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit the Lithonia Lighting WDGE LED homepage. Tested in accordance with IESNA LM-79 and LM-80 standards.

LEGEND

- 0.25 fc
- 0.5 fc
- 1.0 fc

MH = 15ft
Grid = 15ft x 15ft



WDGE3 LED P3 40K 70CRI R2 | WDGE3 LED P3 40K 70CRI R3 | WDGE3 LED P3 40K 70CRI R4 | WDGE3 LED P3 40K 70CRI RFT

Emergency Egress Options

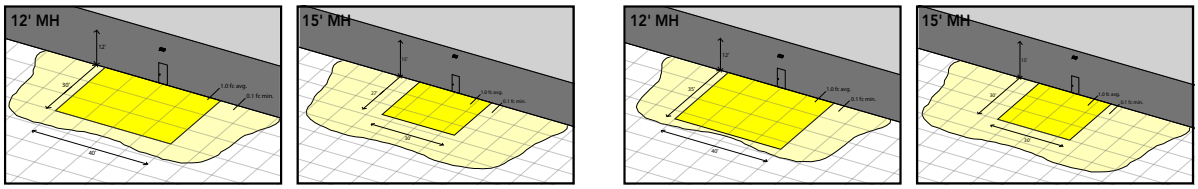
Emergency Battery Backup

The emergency battery backup is integral to the luminaire — no external housing required! This design provides reliable emergency operation while maintaining the aesthetics of the product. All emergency battery backup configurations include an independent secondary driver with an integral relay to immediately detect loss of normal power and automatically energize the luminaire. The emergency battery will power the luminaire for a minimum duration of 90 minutes (maximum duration of three hours) from the time normal power is lost and maintain, minimum of 60% of the light output at the end of 90minutes.

Applicable codes: NFPA 70/NEC – section 700.16, NFPA 101 Life Safety Code Section 7.9

The examples below show illuminance of 1 fc average and 0.1 fc minimum in emergency mode with E15WH or E20WC and R4 distribution.

Grid = 10ft x 10ft



WDGE3 LED xx 40K 70CRI R4 MVOLT E15WH | WDGE3 LED xx 40K 70CRI R4 MVOLT E20WC

Control / Sensor Options

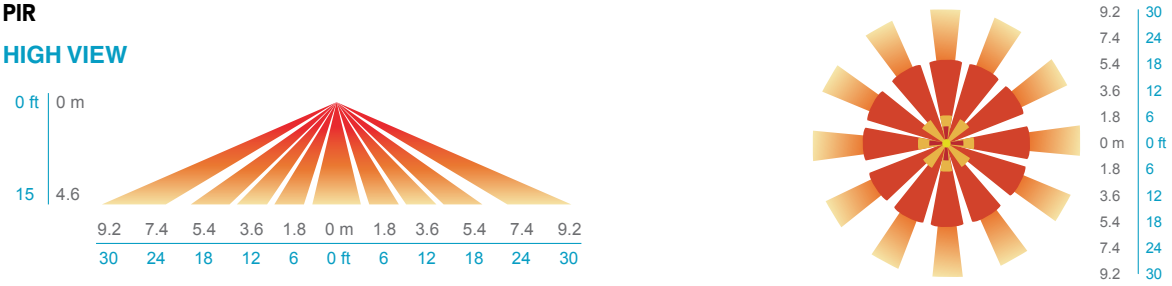
Motion/Ambient Sensor (PIR_, PIRH_)

Motion/Ambeint sensor (Sensor Switch MSOD) is integrated into the the luminaire. The sensor provides both Motion and Daylight based dimming of the luminaire. For motion detection, the sensor utilizes 100% Digital Passive Infrared (PIR) technology that is tuned for walking size motion while preventing false tripping from the environment. The integrated photocell enables additional energy savings during daytime periods when there is sufficient daylight. Optimize sensor coverage by either selecting PIR or PIRH option. PIR option comes with a sensor lens that is optimized to provide maximum coverage for mounting heights between 8-15ft, while PIRH is optimized for 15-40ft mounting height.

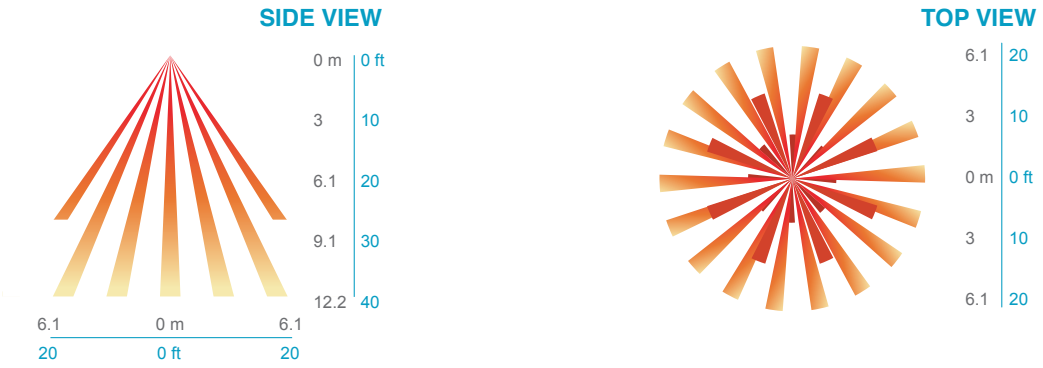
Networked Control (NLTAIR2)

nLight® AIR is a wireless lighting controls platform that allows for seamless integration of both indoor and outdoor luminaires. Five-tier security architecture, 900 MHz wireless communication and app (CLAIRITY™ Pro) based configurability combined together make nLight® AIR a secure, reliable and easy to use platform.

PIR



PIRH



Motion/Ambient Sensor Default Settings

Option	Dim Level	High Level (when triggered	Photocell Operation	Motion Time Delay	Ramp-down Time	Ramp-up Time
PIR or PIRH	Motion - 3V (37% of full output) Photocell - 0V (turned off)	10V (100% output)	Enabled @ 5fc	5 min	5 min	Motion - 3 sec Photocell - 45 sec
PIR1FC3V, PIRH1FC3V	Motion - 3V (37% of full output) Photocell - 0V (turned off)	10V (100% output)	Enabled @ 1fc	5 min	5 min	Motion - 3 sec Photocell - 45 sec
NLTAIR2 PIR, NLTAIR2 PIRH (out of box)	Motion - 3V (37% of full output) Photocell - 0V (turned off)	10V (100% output)	Enabled @ 5fc	7.5 min	5 min	Motion - 3 sec Photocell - 45 sec

Mounting, Options & Accessories

NLTAIR2 PIR – nLight AIR Motion/Ambient Sensor

D = 8"

H = 11"

W = 18"

PBBW – Surface-Mounted Back Box
Use when there is no junction box available.

D = 1.75"

H = 9"

W = 18"

AWS – 3/8inch Architectural Wall Spacer

D = 0.38"

H = 4.4"

W = 7.5"

FEATURES & SPECIFICATIONS

INTENDED USE
Common architectural look, with clean rectilinear shape, of the WDGE LED was designed to blend with any type of construction, whether it be tilt-up, frame or brick. Applications include commercial offices, warehouses, hospitals, schools, malls, restaurants, and other commercial buildings.

CONSTRUCTION
The single-piece die-cast aluminum housing to optimize thermal transfer from the light engine and promote long life. The driver is mounted in direct contact with the casting for a low operating temperature and long life. The die-cast door frame is fully gasketed with a one-piece solid silicone gasket to keep out moisture and dust, providing an IP65 rating for the luminaire.

FINISH
Exterior painted parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Standard Super Durable colors include dark bronze, black, natural aluminum, sandstone and white. Available in textured and non-textured finishes.

OPTICS
Individually formed acrylic lenses are engineered for superior application efficiency which maximizes the light in the areas where it is most needed. Light engines are available in 3000 K, 4000 K or 5000 K configurations. The WDGE LED has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL
Light engine consists of high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L92/100,000 hours at 25°C). The electronic driver has a power factor of >90%, THD <20%. Luminaire comes with built in 6kV surge protection, which meets a minimum Category C low exposure (per ANSI/IEEE C62.41.2). Fixture ships standard with 0-10v dimmable driver.

INSTALLATION
A universal mounting plate with integral mounting support arms allows the fixture to hinge down for easy access while making wiring connections. The 3/8" Architectural Wall Spacer (AWS) can be used to create a floating appearance or to accommodate small imperfections in the wall surface. The ICW option can be used to mount the luminaire inverted for indirect lighting in dry and damp locations. Design can withstand up to a 1.5 G vibration load rating per ANSI C136.31.

LISTINGS
CSA certified to U.S. and Canadian standards. Light engines are IP66 rated; luminaire is IP65 rated. PIR options are rated for wet location. Rated for -40°C minimum ambient. DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified. International Dark-Sky Association (IDA) Fixture Seal of Approval (FSA) is available for all products on this page utilizing 3000K color temperature and SRM mounting only.

BUY AMERICAN
Product with the BAA option is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/buy-american for additional information.

WARRANTY
5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

PARCEL ID	OWNER	PROPERTY ADDRESS
792536201067	HURD WINDSOR LLC	2000 FULLER RD WEST DES MOINES, IA 50265-5601
792536201020		2032 64TH ST
792536201019	ABBY & JASON JEWETT	WINDSOR HEIGHTS, IA 50324
792536201033	PETERSON PAINTING	2110 63RD ST WINDSOR HEIGHTS, IA 50324

The Subject Property was visited on October 12, 2022 for the purpose of performing a visual reconnaissance. Selected photographs taken on the reconnaissance date are attached (see Site Photographs appendix).

9.1 Methodology and Limiting Conditions

During the reconnaissance, reasonably-accessible portions of the Subject Property and its boundaries, as well as surrounding roadways, were traversed on foot or in a vehicle and evaluated for conditions indicative of RECs in connection with the Subject Property. All adjacent properties that could be viewed from the Subject Property were observed; however, no adjacent properties were traversed. A BL Companies' representative was unaccompanied during the reconnaissance.

9.2 PCBs

Polychlorinated biphenyls (PCBs) belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons and were domestically manufactured from 1929 until their manufacture was banned in 1979. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment (e.g., transformers, hydraulic lifts, elevators, etc.). It should be noted that the evaluation of the potential for PCB-containing fluorescent light ballasts is not required by ASTM, and thus, is not addressed as part of this assessment.

No equipment suspected or likely to contain PCBs was observed on the Subject Property at the time of the reconnaissance.

9.3 Storage Tanks

No evidence of current or former USTs or ASTs was observed on the Subject Property at the time of the reconnaissance.

The Subject Property previously contained one 6,000-gallon and two 10,000-gallon gasoline USTs that were removed from the Subject Property in July 1991. Three 12,000-gallon gasoline USTs were installed in the Subject Property in 1991 and were removed in March 2011.

9.4 Drums and/or Unidentified Substance Containers

No drums or unidentified substance containers were observed on the Subject Property at the time of the reconnaissance.

NAMES & ADDRESSES OF PROPERTIES WITHIN 200 FT

WESTOVER BAPTIST CHURCH 2330 62ND ST DES MOINES, IA 50322
ILES FUNERAL HOMES REAL ESTATE LLC 6337 HICKMAN RD DES MOINES, IA 50322
MY IOWA HOMES LLC 6315 HICKMAN RD DES MOINES, IA 50322
CARLA J BATES 6311 HICKMAN RD DES MOINES, IA 50322
DOUGLAS & JAMIE KILIAN 6307 HICKMAN RD DES MOINES, IA 50322
ELIZABETH J THATCHER 6301 HICKMAN RD DES MOINES, IA 50322
HURD WINDSOR LLC 2000 FULLER RD WEST DES MOINES, IA 50265-5601
COLAMAN RE HOLDINGS LLC 2221 63RD ST DES MOINES, IA 50322
QUAN TONG & THU NGUYEN 2201 63RD ST DES MOINES, IA 50322
NDAYAHUNDWA EVANCE & SHWILIMA EZINOEL 2117 63RD ST DES MOINES, IA 50322
THAT THI TRAN & THIET NGUYEN 2111 63RD ST DES MOINES, IA 50322
ROMAN A PUENTES CRUZ 2107 63RD ST DES MOINES, IA 50322
WINDSOR CROSSING SENIOR APARTMENTS LLC 6336 HICKMAN RD WINDSOR HEIGHTS, IA 50324
ABBY & JASON JEWETT 2032 64TH ST WINDSOR HEIGHTS, IA 50324
GREGORY L TIEMENS 2028 64TH ST WINDSOR HEIGHTS, IA 50324

BROCK & DAWN BRODERSEN 2024 64TH ST WINDSOR HEIGHTS, IA 50324
CHARLES H HANNAM 6405 LINCOLN AVE WINDSOR HEIGHTS, IA 50324
DANIAL RAY ANDERSON 2031 64TH ST WINDSOR HEIGHTS, IA 50324
MAX S BRIDGEWATER 2025 64TH ST WINDSOR HEIGHTS, IA 50324
PETERSON PAINTING 2110 63RD ST WINDSOR HEIGHTS, IA 50324
CURTIS L KALLESEN 2108 63RD ST WINDSOR HEIGHTS, IA 50324
PATRICIA PARK PROPERTIES INC POB 13263 DES MOINES, IA 50310-0263