STORMWATER MANAGEMENT REPORT

Beaverton School District
Southridge High School
Athletic Field Improvements

Land Use Submittal
November 20, 2023

Prepared for:
Cameron McCarthy Landscape Architecture & Planning
133 SW 2nd Ave. Ste. 410
Portland, OR 97204

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

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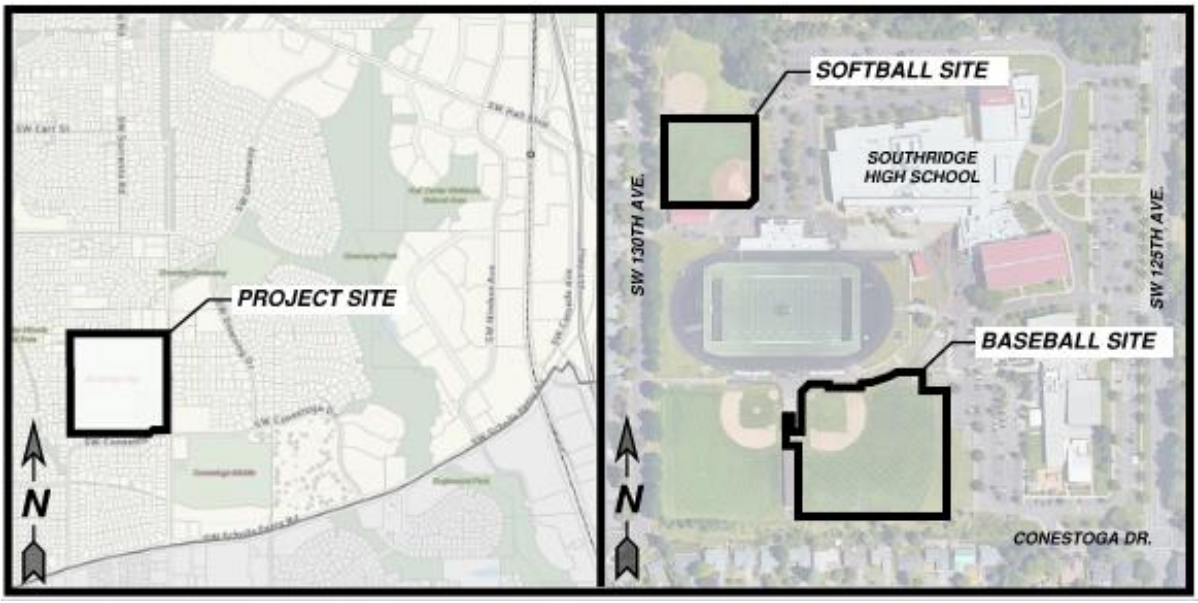
1.0. INTRODUCTION

This report is a summary of the stormwater management approach and design for the proposed Southridge High School Athletic Fields project. This report outlines the applicable stormwater regulatory requirements and summarizes the design methodology and calculations for the proposed stormwater facilities. The proposed stormwater management systems are designed in accordance with the Clean Water Services (CWS) Design and Construction Standards (DCS) and the City of Beaverton Engineering Design Manual (EDM).

2.0. PROJECT DESCRIPTION

Overview

The project includes improvements to the existing Varsity Softball and Varsity Baseball fields at Southridge High School. The project will include new stormwater detention systems to meet Clean Water Services (CWS) hydromodification and flow control requirements and will rely on the existing onsite stormwater management facilities to satisfy water quality requirements.



Tax Map / Lot:	*1S-1-28DD / 51-58*	*Zoning:*	*Residential Mixed C*
Site Size:	*32.39 Acres*	*Site Address:*	*9625 SW 125th*

Figure 2.1 - Vicinity Map and Site Data

Existing Conditions
The existing project areas consist of natural turf baseball and softball fields. The outfield areas are natural turf (grass), and the infields consist of a mix of bare soil, natural turf, and cinders. There is an existing perforated subdrainage system at the softball field. Record documents indicate the baseball field has no subdrainage system, but it is possible a system is in place.

The softball field drains to an existing stormwater conveyance system located at the north end of the site and discharges to an existing extended dry pond located at the northeast corner of the site.

The baseball field drains to a valley gutter located along the south edge of the field. The valley gutter drains to a single catch basin located at the midpoint of the south edge of the field, which is piped to an outfall to the existing open channel located south of the field. The existing open channel directs stormwater to an existing extended dry pond located at the southwest corner of the site.

Proposed Conditions
The project includes replacement of the existing natural turf Varsity Softball and Varsity Baseball fields with new synthetic turf fields. The project will include several new pedestrian pathways adjacent to the field (less than 1,000 SF in total) and concrete header/curbs around the perimeter of the synthetic turf field. Due to the presence of moisture-sensitive soils, cement-amendment has been recommended by the Geotechnical Engineer to stabilize the subgrade soils. The cement-amendment process involves mixing cement into the existing native soil and compacting to produce a firm subgrade surface. This process reduces the perviousness of the underlying soil significantly. The proposed synthetic turf field will consist of sand infill placed over a free-draining crushed aggregate section, placed over the cement-amended subgrade. A network of flat perforated pipes will be placed beneath the field (on top of the cement-amended subgrade) to provide year-round drainage of the fields.

3.0. STORMWATER REGULATORY REQUIREMENTS

Overview:
The stormwater regulatory requirements for the project are governed by the Clean Water Services (CWS) Design and Construction Standards (DCS) and the City of Beaverton Engineering Design Manual (EDM). The following is a summary of the applicable requirements.

Clean Water Services – Sensitive Areas
- CWS DCS Chapter 3 – Sensitive Areas
  The project submitted a Sensitive Area Prescreening Site Assessment to CWS in April 2023. CWS issued a Service Provider Letter (SPL) indicating the project will not significantly impact existing or potentially sensitive areas near the site. Refer to Appendix F for the CWS SPL.

Clean Water Services – Runoff Treatment and Control
- CWS DCS 4.02 – Water Quantity Control Requirements for Conveyance Capacity
  This section requires mitigation for impacts on the public stormwater system. The project will incorporate onsite detention per DCS Section 4.02.a and 4.08.6 to satisfy the mitigation criteria. Since onsite detention will be provided in accordance with DCS 4.08.6, a downstream analysis of the public storm drain system is not included.

- CWS DCS 4.03 - Hydromodification
  The project is required to implement hydromodification mitigation techniques to minimize impacts on downstream receiving waterways. A Hydromodification Assessment is included in Appendix G. Table 3.1 provides a summary of the assessment. The project will be classified as Hydromodification Category 2, which represents a moderate risk. The project will employ on-site Peak-Flow Matching Detention per DCS 4.03.5.b.2 and 4.08.6 to meet the hydromodification requirements. Refer to Section 4.0 for additional information.

Table 3.1 – Hydromodification Risk Assessment Summary

Site	Receiving Reach	Risk Level	Development Class	Project Size	Hydromodification Category
Baseball	Hiteon Creek	Moderate	Developed	Large	2
Softball	Downing Greenway Channel / Fanno Creek	Low	Developed	Large	2

- CWS DCS 4.04 – Water Quality Treatment Requirements
  Due to the cement-amendment of subgrade soils, the project will create over 1,000 SF of impervious surface and will therefore be required to address Water Quality Treatment Requirements. However, as noted above, runoff from the project area is already managed by the existing onsite extended dry basins. These extended dry basins have been recognized by the City of Beaverton as satisfying the water quality requirements for the site. As part of a 2014 redevelopment project at the site, the City noted that stormwater treatment for the site is addressed by the onsite treatment ponds. Refer to Appendix H for an excerpt from a 2014 redevelopment project with these findings. During the 05/03/23 Pre-Application conference for the current athletic field project, City staff noted that the existing stormwater facilities on the site adequately address water quality requirements but do not meet the current CWS hydromodification requirements.

- CWS DCS 4.05 – Low Impact Development Approach (LIDA)
  As noted above under DCS 4.04 – Water Quality, the existing onsite stormwater treatment facilities fully address stormwater treatment for the site. The existing extended dry basins are recognized as approved LIDA facilities per DCS Table 43.

City of Beaverton – Surface Water Management

- EDM 500 - General
  The City of Beaverton Engineering Design Manual (EDM) adopts the current version of the CWS DCS for stormwater (surface water) management standards. The EDM also prescribes onsite stormwater detention facilities to match pre-development runoff rates for the 2, 10, and 25-year storms.

Construction Erosion Control / DEQ 1200-CN

- Overview:
  The project will disturb under 5-acres of land and will therefore require coverage under the City of Beaverton 1200-CN erosion control permit. At the time of this report, the 1200-CN permit application has not yet been prepared.

4.0. STORMWATER MANAGEMENT APPROACH

Existing Stormwater Conveyance and Management Systems

- Receiving System for Softball Field
  The softball field drains to an existing onsite conveyance system within the north parking lot (12"-21" pipes). This system conveys runoff to an existing extended dry basin located at the northeast corner of the site. The existing northeast extended dry basin is a rectangular pond with graded side-slopes on all sides. Outflow from the extended dry basin is regulated with a multi-stage flow control structure. Refer to Figure 1.1 for a map of the existing storm drain system and existing water quality / detention facilities.

- Receiving System for Baseball Field
  The baseball field drains to an existing 8" storm drain pipe located at the south side of the field that discharges through an existing riprap lined outfall to an open channel located south of the field. The open channel conveys runoff to the west to an existing extended dry basin located at the southwest corner of the property. The existing southwest extended dry basin is contained on the north and south sides by retaining walls with side-slopes on the east and west sides. Outflow from the extended dry basin is regulated with a multi-stage flow control structure. Refer to Figure 1.1 for a map of the existing storm drain system and existing water quality / detention facilities.

Proposed Collection and Conveyance Systems

The proposed synthetic turf fields will consist of a sand/rubber infill material over a layer of drainage aggregate. Flat perforated pipes will be placed at regular intervals throughout the fields to prevent water from accumulating on the surface. Precipitation entering the fields will infiltrate vertically through the field sand/rubber infill material and then through the drainage aggregate layer. Rainwater will accumulate on the subgrade and will drain laterally through the drainage aggregate to reach the flat perforated pipes. Refer to Figure 4.1 for a diagram of the drainage patterns within the field cross-section.

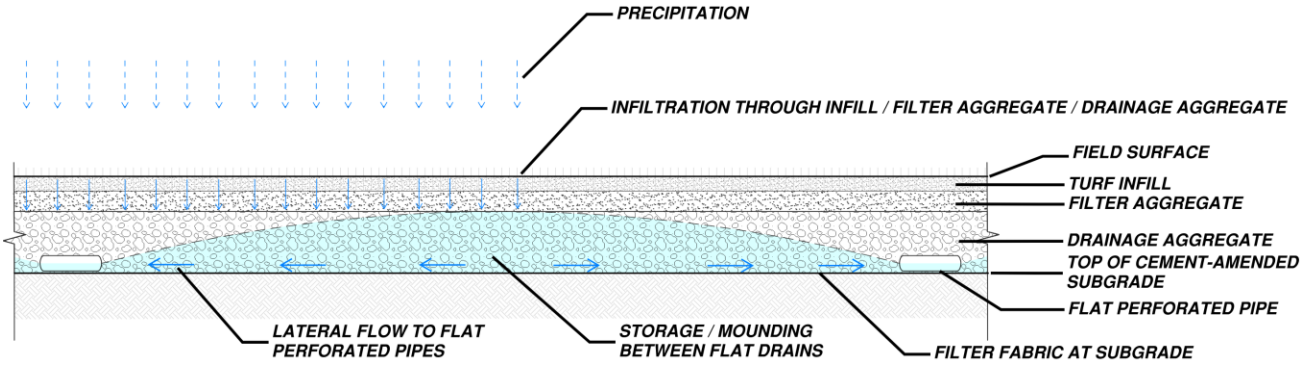


Figure 4.1 – Synthetic Turf Drainage Cross-Section

Once stormwater enters the flat perforated pipes, it will flow along the length of the pipes and will discharge to either a perimeter collection trench or will discharge directly to the detention trench. Manholes and cleanouts will be placed at regular intervals to facilitate maintenance. Refer to Figure 1.2B and 1.2S for diagrams of the proposed stormwater collection system. Refer to the permit drawings (Appendix B1) for system details.

Detention System

- Performance Standards:
  The detention systems are designed to satisfy the performance standards for Quantity Control under DCS 4.02.a / 4.08.6.b in addition to the Hydromodification Peak-Flow Matching criteria under DCS 4.03.5.b.2 / 4.08.6.c. The Hydromodification criteria governs the design for the 2-year design storm and the Quantity Control criteria governs the design for the 25-year storm. Table 4.1 summarizes the performance criteria used in design. Table 4.2B and 4.2S summarize the performance data for the Baseball and Softball detention systems, respectively.

Table 4.1 – Rainfall Data / Detention Design Criteria

Recurrence Interval	Design Storm 24-hour Precipitation Depth (in)	Post Development Design Criteria
2-Year	2.5	Match 50% of Predevelopment Rate
5-Year	3.10	Match Predevelopment Rate
10-Year	3.45	Match Predevelopment Rate
25-Year	3.90	Match Predevelopment Rate

Table 4.2B – Predevelopment and Post-Development Runoff Rates - Baseball

		Runoff Rate (CFS)			
Basin	**50% of 2-Yr**	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**
Pre-Development					
Basin B	0.14	0.27	0.53	0.71	0.95
Post-Development					
Basin B	--	0.13	0.38	0.53	0.79

Table 4.2S – Predevelopment and Post-Development Runoff Rates - Softball

		Runoff Rate (CFS)			
Basin	**50% of 2-Yr**	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**
Pre-Development					
Basin S	0.06	0.11	0.23	0.30	0.40
Post-Development					
Basin S	--	0.04	0.12	0.16	0.24

- Basin Characteristics:
  - Area Used in Design
    The detention systems are designed based on 100% of the new impervious surface created with the project, as required under DCS 4.08.1.d.2. The project will not modify existing impervious surfaces.

  - Basin Boundaries
    - Basin B: Basin B is the baseball field project area that will be managed by the proposed detention system. Basin B is separated into two subbasins, Basins B.1 and B.2, each with unique characteristics. Refer to Figure 2B for a map of the basins / subbasins. Basin B.1 is the synthetic turf field area and Basin B.2 is the existing perimeter area that drains into the field and detention systems. Basin B.2 includes a mix of pervious and impervious surface under existing and proposed conditions. However, Basin B.2 is modeled as fully impervious under post-development conditions in order to account for possible future redevelopment. Basin B.1 is modeled as fully impervious due to the cement-amended subgrade soils. Basin / subarea characteristics are summarized in Table 4.3B

- Basin S: Basin S is the softball field project area that will be managed by the proposed detention system. Basin S is separated into two subbasins, Basins S.1 and S.2, each with unique characteristics. Refer to Figure 2S for a map of the basins / subbasins. Basin S.1 is the synthetic turf field area and Basin S.2 is the existing perimeter area that drains into the field and detention systems. Basin / subarea characteristics are summarized in Table 4.3B

Table 4.3B – Basin Characteristics - Baseball

Basin	Description	Area Acres	Curve Number[1] --	Time of Concentration[2] Minutes
Pre-Development				
B.1	Existing Natural Turf Baseball Field	2.9	75	14.4
B.2	Existing Impervious Perimeter Area to Remain	0.38	75	5
B (Total)		3.28	--	--
Post-Development				
B.1	New Synthetic Turf Baseball Field	2.9	98	91
B.2	Existing Impervious Perimeter Area to Remain	0.38	98	5
B (Total)		3.28	--	--

Table 4.3S – Basin Characteristics - Softball

Basin	Description	Area Acres	Curve Number[1] --	Time of Concentration[2] Minutes
Pre-Development				
B.1	Existing Natural Turf Baseball Field	1.16	75	10.5
B.2	Existing Perimeter Area to Remain	0.14	75	5
B (Total)		1.3	--	--
Post-Development				
B.1	New Synthetic Turf Baseball Field	1.16	98	90
B.2	Existing Perimeter Area to Remain	0.14	98	5
B (Total)		1.3	--	--

- Pre-Development Basin Characteristics
  Under pre-development conditions, Subbasins B.1 and S.1 are the existing natural turf baseball and softball field areas that will be converted to synthetic turf. These areas are modeled as fully pervious, as shown in Tables 4.2B and 4.2S. The existing Subbasins B.2 and S.2 are the perimeter areas that drain into to the baseball and softball fields, respectively. These subbasins consist of a mix of pervious and impervious surfaces under pre-development conditions. However, in order to ensure the detention systems are sized for future redevelopment in these areas, the pre-development conditions are modeled as fully pervious, in accordance with DCS 4.08.6.d. Curve numbers and time of concentration are shown in Tables 4.2B and 4.2S. Refer to Appendix C2 for time of concentration calculations.

[1] Curve Number values are taken from NRCS TR-55 Table 2-2. Pervious areas are based on Open Space with >75% vegetation coverage, HSG C.
[2] Refer to Appendix C2 for Time of Concentration Calculations.

- Post-Development Basin Characteristics
  Under post-development conditions, Basins B.1 and S.1 are modeled as fully impervious due to the cement-amended subgrade soils. Refer to Tables 4.2B and 4.2S for basin characteristics. Basins B.2 and S.2 (perimeter areas draining into fields) will remain a mix of pervious and impervious surfaces under post-development conditions. However, to ensure the detention systems are sized to accommodate future redevelopment, both basins B.2 and S.2 are modeled as fully impervious under post-development conditions. Curve numbers and time of concentration are shown in Tables 4.2B and 4.2S. Refer to Appendix C2 for time of concentration calculations.

- Soils / Groundwater / Infiltration
  Based on NRCS soil mapping (Refer to Appendix D2), the soil within the project areas is Woodburn Silt Loam (45A), classified as Hydrologic Soil Group (HSG) "C". Based on the geotechnical report (Refer to Appendix D1), the soil profile consists of silt near the ground surface underlain by clay, which is similar to the composition of the NRCS Woodburn Silt Loam. The geotechnical investigation encountered fill soils within the softball field.

  Based on the geotechnical report, groundwater is expected to rise to near the ground surface during periods of extended wet weather. Groundwater was encountered at depths as shallow as 4' below the ground surface during the geotechnical investigation (performed in June). NRCS soil data indicates groundwater may rise to 2'-3' below the ground surface during the wet season.

  Infiltration testing was conducted at the softball and baseball fields to evaluate feasibility of stormwater infiltration systems. Infiltration tests performed at the baseball field found no measurable infiltration rate. Infiltration tests performed at the softball field indicated low to moderate infiltration rates (1-5 inch/hour). However, the geotechnical report recommends against infiltration systems where 5' of groundwater separation cannot be maintained, which precludes infiltration at both softball and baseball fields. It should also be noted that Oregon DEQ Underground Injection Control (UIC) rules require that 5' minimum separation be maintained between the bottom of infiltration facilities and the seasonal high groundwater table.

- Detention System Design
  - Detention System Details / Cross-Section
    The detention systems for both Baseball and Softball fields consist of a perforated pipe placed within a trapezoidal trench, backfilled with crushed drain rock. The detention trench will be wrapped with an impermeable liner to prevent artificial dewatering the shallow groundwater into the storm drain system. Refer to Permit Drawings C2.2 and C2.3 in Appendix B1 for detention facility cross-sectional details. Refer to Tables 4.4B and 4.4S below for stage storage data.

  - Flow Control Structure
    Release rates for the Baseball and Softball detention systems are regulated with an orifice-controlled flow control structure meeting the requirements of CWS Standard Drawing No. 270. Both flow control structures include a single orifice, with an overflow weir housed within the flow control structure. The governing condition for both detention volume and the single orifice is the 2-yr design criteria. The flow control requirements for the 5, 10, and 25-yr design storms are satisfied without needing additional orifices.

Refer to Drawings C2.2 and C2.3 in Appendix B1 for flow control structure cross-sectional details. Refer to Tables 4.4B and 4.4S below for stage storage data.

Table 4.4B – Detention Facility Geometry and Stage / Storage Data - Baseball

Facility Geometry	
Detention Pipe Size (in)	60
Detention Pipe Invert (ft)	246.90
Orifice Elevation (ft)	245.60
Outlet Pipe Elevation (ft)	246.50
Orifice Size (in)	1.438
Overflow Weir Elevation	252.61

	Design Storm			
Detention Data	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**
Maximum Elevation (ft)	252.56	252.65	252.69	252.72
Maximum Stage / Depth (ft)	5.66	5.75	5.79	5.82
Maximum Storage Volume (cu-ft)	18,967	19,197	19,270	19,350

Table 4.4S – Detention Facility Geometry and Stage / Storage Data - Softball

Facility Geometry	
Detention Pipe Size (in)	42
Detention Pipe Invert (ft)	259.50
Orifice Elevation (ft)	256.28
Outlet Pipe Elevation (ft)	257.28
Orifice Size (in)	1.0
Overflow Weir Elevation	263.00

	Design Storm			
Detention Data	**2-Yr**	**5-Yr**	**10-Yr**	**25-Yr**
Maximum Elevation (ft)	262.98	263.02	263.03	263.05
Maximum Stage / Depth (ft)	3.48	3.52	3.53	3.55
Maximum Storage Volume (cu-ft)	7,641	7,702	7,722	7,753

- Pretreatment:
  Pretreatment is ordinarily required under CWS DCS 4.09.3 to minimize sedimentation within detention systems. However, the proposed synthetic turf collection/conveyance system is self-filtering and inherently protects the collection system and downstream detention system from sediment accumulation. The infill and synthetic turf system is designed with a backing system to prevent infill material from migrating below the turf backing. In addition, filter fabric will be placed at the subgrade elevation to prevent fine grained subgrade particles from entering the subdrainage system. The void space within the drainage aggregate throughout the field and beneath the detention systems provides a secondary zone for incidental sediment to accumulate prior to reaching the detention system. Refer to Figure 4.1 for an illustration of the field cross-section.

- Downstream Hydraulic Conditions
  Both Baseball and Softball Field detention systems are located within elevated areas, relative to the remainder of the site and both systems are located above the 10-year water surface elevation of the downstream storm drain systems. For context, the bottom of the Baseball detention system is approximately a 2.3' higher than the bottom of the adjacent receiving open channel, and approximately 4.5' higher than the overflow

elevation of the downstream receiving extended dry pond. Similarly, the bottom of the Softball field detention system is approximately 1.5' higher than the adjacent parking lot surface, and approximately 20' higher than the overflow elevation of the downstream receiving extended dry pond.

- Detention System Modeling Methodology
  - Hydrologic Methods
    Runoff calculations are performed using the Santa Barbara Urban Hydrograph (SBUH) method, which is derived from the NRCS unit hydrograph method. Calculations are performed using Hydraflow Hydrographs software. System inputs are summarized in Tables 4.1, 4.3B/S, and 4.4B/S and are shown in Appendix C1.

  - Routing Calculations / Modeling
    Runoff calculations and reservoir routing are performed simultaneously using the Hydraflow Hydrographs software. The routing procedure utilizes the storage-indication method. System inputs and outputs are summarized in Appendix C1.

6.0 OPERATIONS AND MAINTENANCE

Draft stormwater O&M data is included in Appendix E. At the time of building permit review, the City will require the Owner to submit the O&M documents presented in Appendix E and will require a private stormwater facilities agreement to be recorded on the property title.

Appendix A:
Stormwater Management Figures

Stormwater Management Figures

EXISTING EXTENDED DRY POND

21"SD

12"SD

SOFTBALL FIELD
REFER TO
FIGURE 1.2S

SOFTBALL
DETENTION SYSTEM

CONNECTION TO
EXISTING SYSTEM

SW 130th AVE.

SOUTHRIDGE
HIGH SCHOOL

SW 125th AVE.

12"SD

BASEBALL
CONVEYANCE SYSTEM

BASEBALL FIELD
REFER TO FIGURE 1.2B

BASEBALL
DETENTION SYSTEM

CONESTOGA
RECREATION AND
AQUATIC CENTER

10"SD

EXISTING EXTENDED DRY POND
(FOR AQUATICS CENTER)

12"SD

18"SD

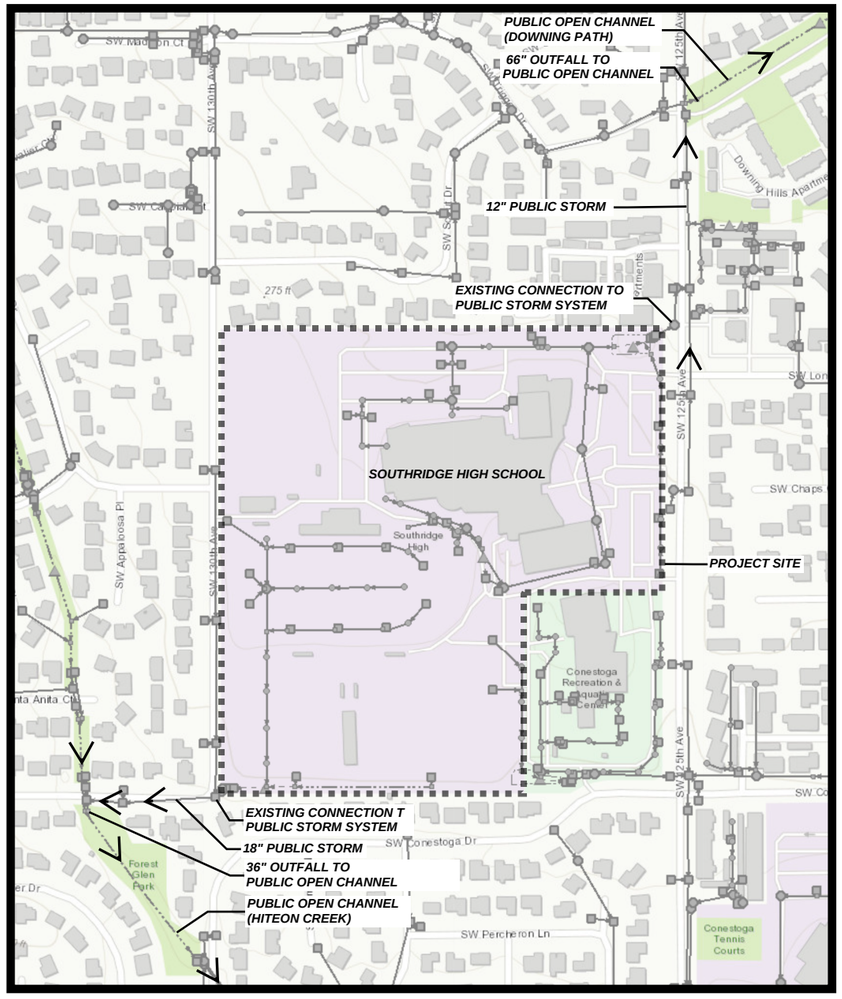
CONNECTION TO EXISTING SYSTEM

SW CONESTOGA DR.

PROPERTY LINE

EXISTING EXTENDED DRY POND

EXISTING OUTFALL TO OPEN CHANNEL



MAP OF PUBLIC STORM DRAIN SYSTEM

LEGEND

- OPEN CHANNEL - EXISTING
- STORM PIPE - EXISTING
- STORMWATER MANAGEMENT FACILITY - EXISTING
- MANHOLE - EXISTING
- STORM PIPE - PROPOSED
- MANHOLE - PROPOSED

N

0' 150'

Scale: 1"= 150' 11/20/23

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FIGURE 1.1

STORMWATER SYSTEM DIAGRAM - SITE MAP

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS

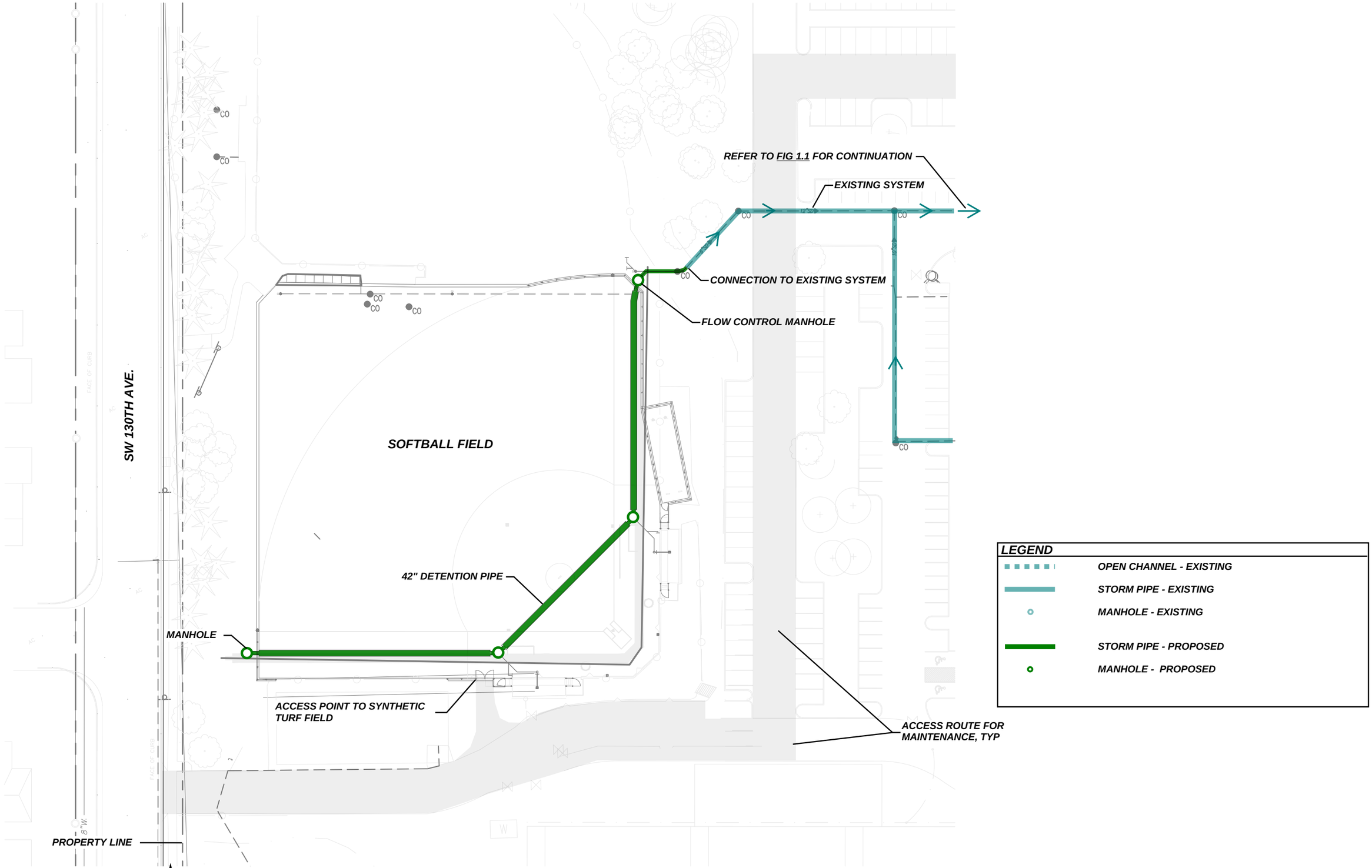

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FIGURE 1.2S

STORMWATER SYSTEM DIAGRAM - SOFTBALL

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS

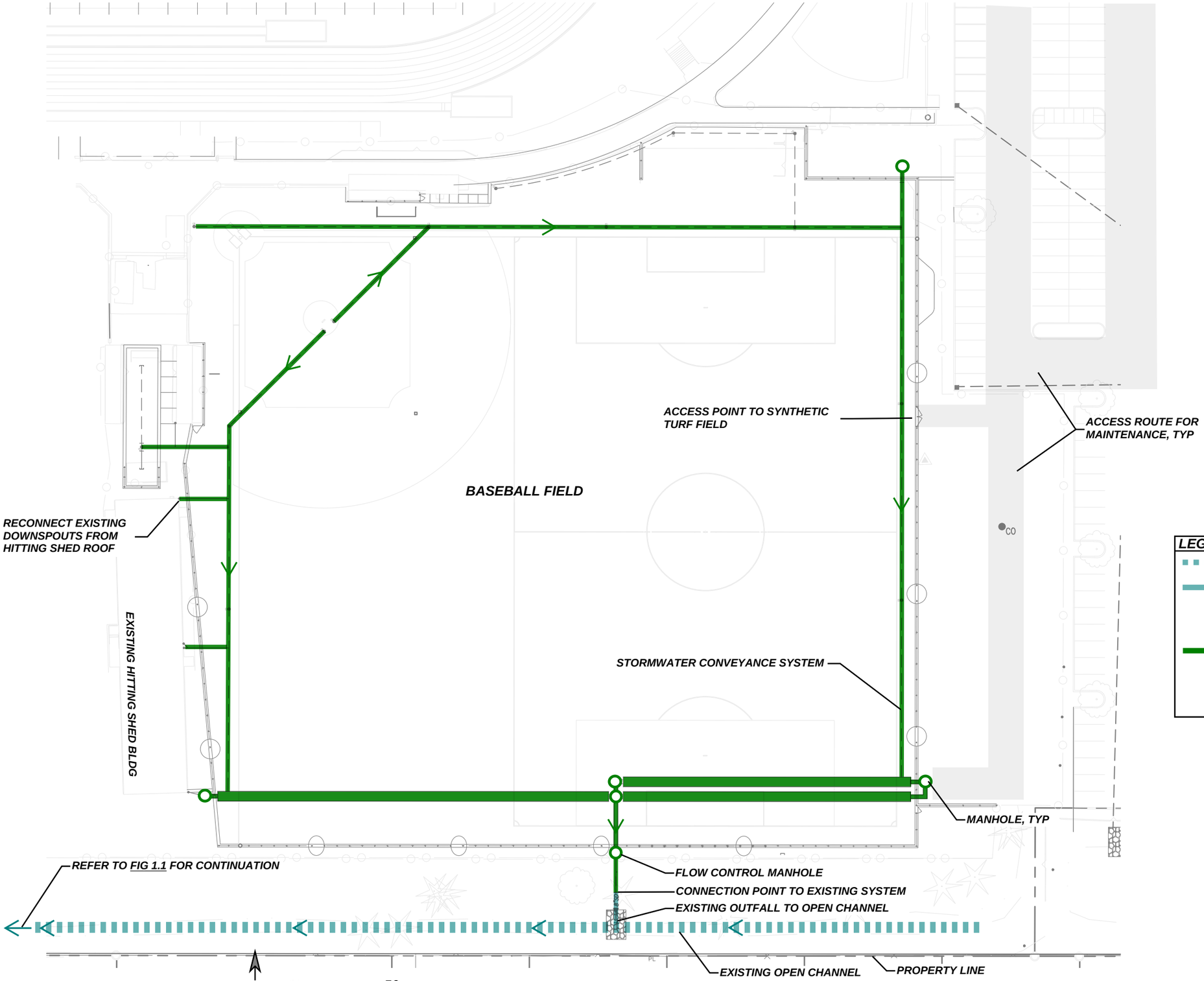

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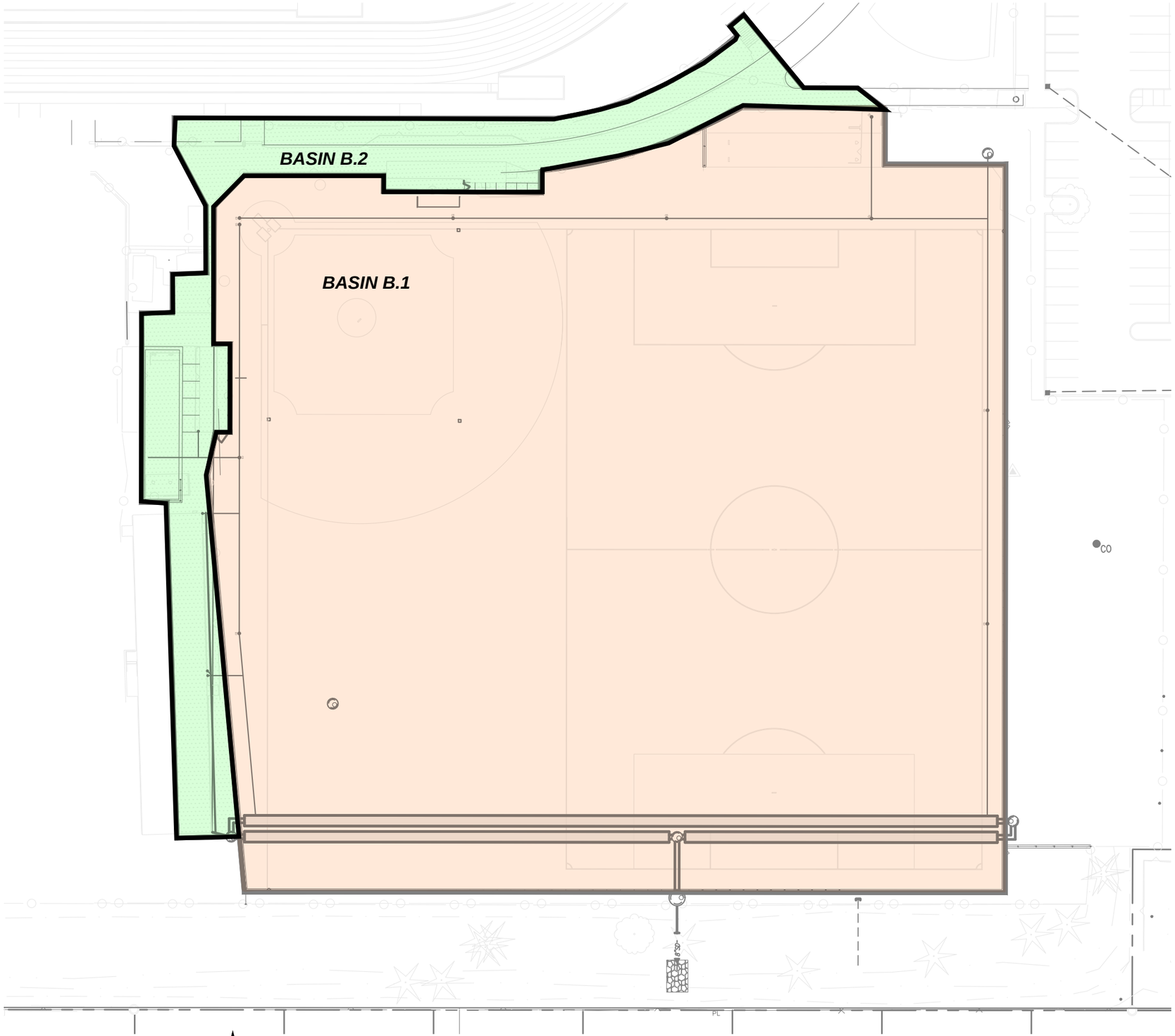
FIGURE 1.2B
STORMWATER SYSTEM DIAGRAM - BASEBALL
SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS



N

0' 50'

Scale: 1"= 50' 11/20/23

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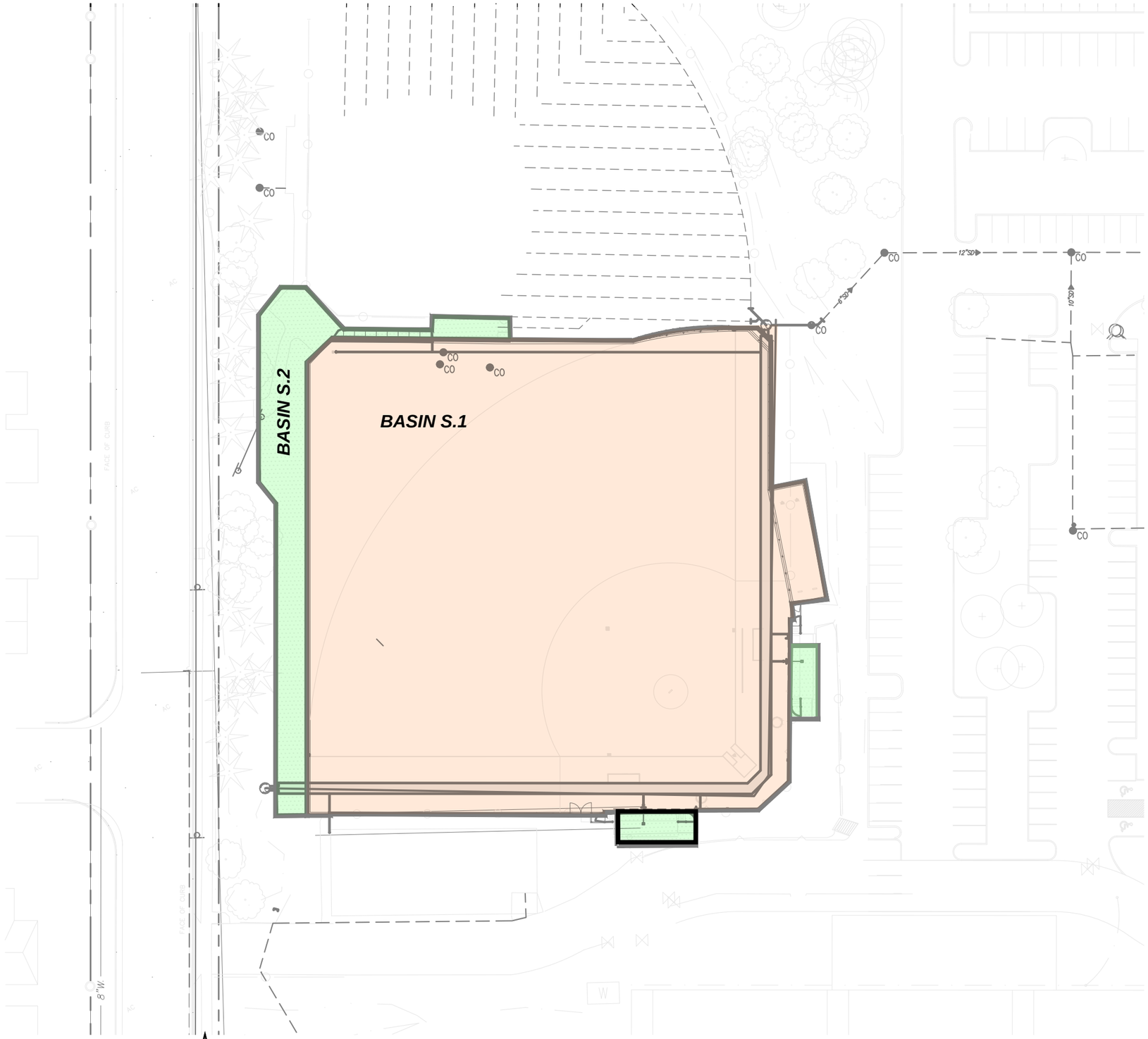
FIGURE 2B

BASIN MAP - BASEBALL

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS



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N

0' 50'

Scale: 1"= 50' 11/20/23

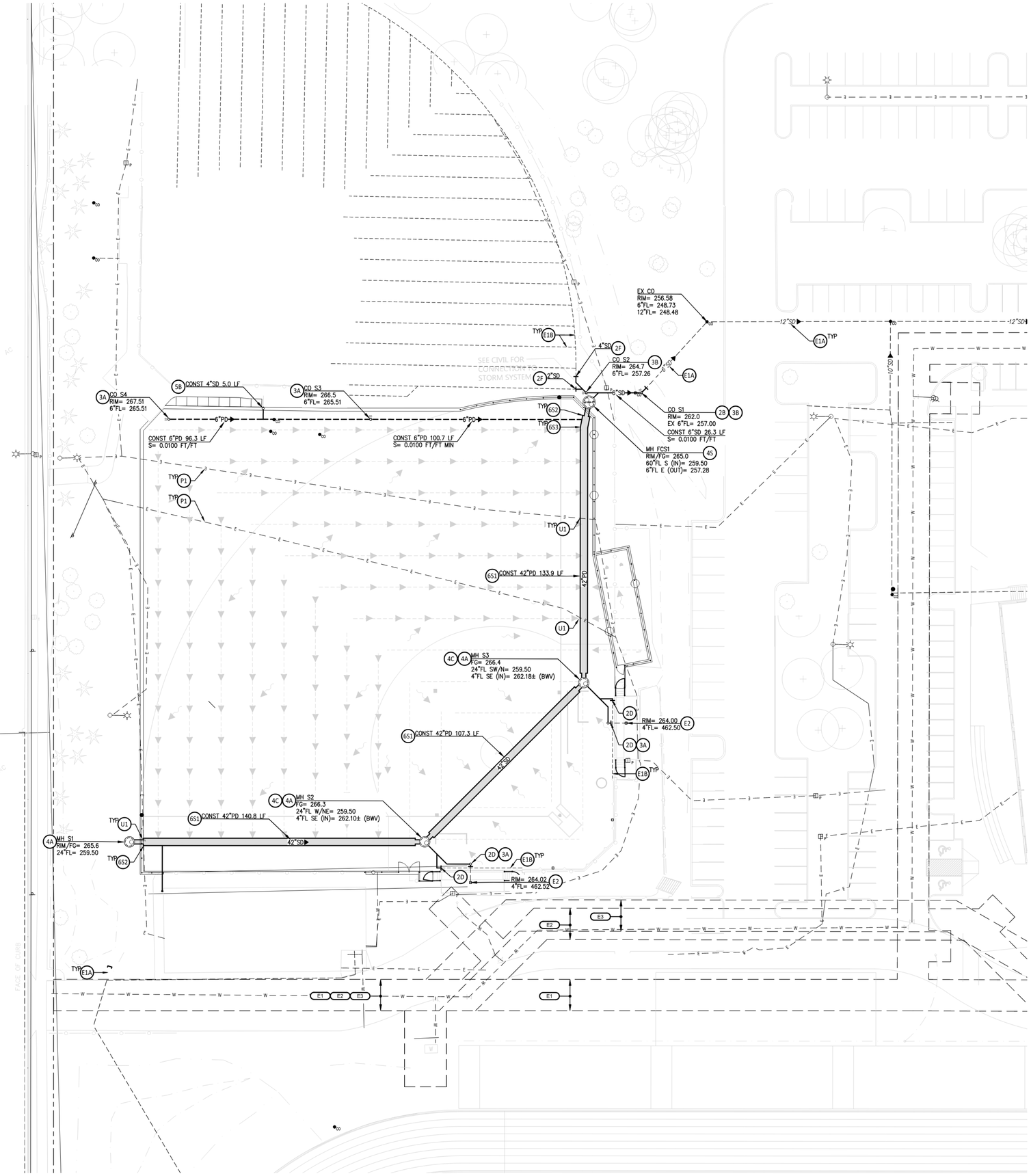
FIGURE 2S

BASIN MAP - SOFTBALL

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS

Appendix B1:
Civil Design Drawings

C1.0 – Storm Drain Site Map
C1.1 – Storm Drain Plan Softball
C1.2 – Storm Drain Plan Baseball
C2.0 – Civil General Notes and Details
C2.1 – Civil Details
C2.2 – Civil Details
C2.3 – Civil Details



1 STORM DRAIN PLAN - SOFTBALL

PLAN SCALE
0 20' 40'
SCALE: 1"= 20'

N

SHEET NOTES

1. REFER TO SHEET C2.1 FOR LEGENDS AND GENERAL NOTES.
2. CONSTRUCT TRENCHING AND BACKFILL PER DETAIL A/2.1 IN AREAS OUTSIDE OF SYNTHETIC TURF FIELD FOOTPRINT.
3. CONSTRUCT LATERAL CONNECTIONS PER DETAIL 3/C2.1.
4. BACKFILL USING CDF WHERE COMPACTION OF CRUSHED ROCK BACKFILL CANNOT BE ACHIEVED.
5. ALIGN UTILITY STRUCTURES WITH ADJOINING CONCRETE WORK. COORDINATE BETWEEN TRADES TO ENSURE CONSISTENT HORIZONTAL CONTROL IS USED.

SURVEY / UTILITY NOTES

1. SURVEY DATA IS BASED ON COMPILATION OF RECORD INFORMATION AND IS INCOMPLETE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.
2. LOCATIONS OF EXISTING UTILITIES ARE NOT KNOWN. CONTRACTOR IS RESPONSIBLE FOR OBTAINING UTILITY LOCATES (PRIVATE AND PUBLIC) AND COORDINATING WITH SERVING UTILITIES TO ESTABLISH LOCATIONS AND CONFIRM NECESSARY CLEARANCES.

CONSTRUCTION NOTES

1A . CONSTRUCT FIELD DRAINAGE HEADER PIPE PER LANDSCAPE DETAILS AND DETAIL 1/C2.1.
1B . DISCHARGE FLAT FIELD SUBDRAINAGE PIPE TO FIELD DRAINAGE HEADER PIPE PER LANDSCAPE DETAILS.

2A . CONNECT SOLID WALL PIPE TO PERFORATED PIPE
2B . CONNECT TO EXISTING PIPE.
2C . CONNECT TO EXISTING PIPE. POTHOLE PRIOR TO CONSTRUCTION TO DETERMINE ELEVATION.
2D . RECONNECT EXISTING DUGOUT AREA DRAIN AND FOUNDATION DRAIN. REFER TO C0.1 AND C0.2 FOR EXPLORATORY WORK.
2E . CONNECT TO EXISTING PIPE UPSTREAM FROM OUTFALL. ADJUST EXTENTS TO REACH REQUIRED ELEVATION. RECONSTRUCT SLOPE ANCHOR IF NEEDED.
2F. CONNECT TO EXISTING PERFORATED FIELD DRAINAGE PIPE. CONSTRUCT VERTICAL TRANSITION TO REACH ELEVATION OF EXISTING PIPE, S= 0.0200 FT/FT MIN. INCLUDE TRANSITION FITTINGS TO MATCH EXISTING PIPE SIZE. RECONNECT TRACER WIRE AND EXTEND TO NEAREST CLEANOUT.

3A . CONSTRUCT CLEANOUT WITHIN SYNTHETIC TURF PER DETAILS 1/C2.0 AND 5/C2.1.
3B . CONSTRUCT CLEANOUT OUTSIDE OF SYNTHETIC TURF PER DETAIL 1/C2.0.

4A . CONSTRUCT MANHOLE PER DETAIL 3/C2.1 AND 4/C2.1.
4C . CONSTRUCT MANHOLE FRAME AND COVER IN SYNTHETIC TURF PER DETAIL 3/C2.1.
4D . INSTALL TERMINAL BACKWATER VALVE IN MANHOLE FOR PIPE INDICATED WITH (BWV).
4B . CONSTRUCT FLOW CONTROL MANHOLE PER DETAIL 2B/C2.2 AND 3B/C2.2.
4S . CONSTRUCT FLOW CONTROL MANHOLE PER DETAIL 2S/C2.3 AND 3S/C2.3

5A . CONSTRUCT DOWNSPOUT CONNECTION PER DETAIL 2/C2.1.
5B . RECONNECT EXISTING DOWNSPOUT CONNECTION. CONSTRUCT 4"SD, S= 0.0200 FT/FT MIN.

6B1. CONSTRUCT BASEBALL DETENTION TRENCH PER DETAIL 1B/C2.2, LENGTH AS SHOWN (MEASURED BETWEEN MANHOLE STRUCTURES), NO SLOPE.
6B2. INSTALL 24"X60" ECCENTRIC TRANSITION FITTING.

6S1. CONSTRUCT SOFTBALL DETENTION TRENCH PER DETAIL 1S/C2.3, LENGTH AS SHOWN (MEASURED BETWEEN MANHOLE STRUCTURES), NO SLOPE.
6S2. INSTALL 24"X42" ECCENTRIC TRANSITION FITTING.
6S3. INSTALL 42" 11.25° BEND.

7 . INSTALL BEND FITTINGS (11.25° MAX) AND DEFLECT PIPE PER MANUFACTURER RECOMMENDATIONS TO FOLLOW CURVED ALIGNMENT SHOWN.

E1A. EXISTING STORM DRAIN TO REMAIN.
E1B. EXISTING SUBDRAINAGE PIPE TO TO REMAIN.
E2 . EXISTING AREA DRAIN TO REMAIN.
E3 . EXISTING CATCH BASIN TO REMAIN

U1 . CROSSING UNDER EXISTING POWER UTILITY. MAINTAIN 12" MINIMUM CLEARANCE BETWEEN BOTTOM OF EXISTING UTILITIES AND NEW STORM DRAIN. LOCATION OF EXISTING UTILITIES UNKNOWN. POTHOLE AT CROSSING POINTS AND VERIFY CLEARANCE CAN BE ACHIEVED. PROVIDE TEMPORARY SUPPORT/SHORING TO PROTECT EXISTING UTILITIES AS NEEDED.

L1 . FLAT SUBDRAINAGE PIPE PER LANDSCAPE DRAWINGS.
L2 . REFER TO LANDSCAPE DRAWINGS FOR TREE PROTECTION.

P1 . EXISTING UNDERGROUND POWER: RECONSTRUCT TO MAINTAIN MINIMUM COVER (MATCH EXISTING). CONDUIT MAY REMAIN IN PLACE IF MINIMUM COVER CAN BE MAINTAINED AND PROTECTED DURING CONSTRUCTION

EASEMENTS

E1. EXISTING 20' WIDE PRIVATE EASEMENT BETWEEN CLACKAMAS COUNTY SCHOOL DISTRICT #7 AND OF QUEST PER THAT UNRECORDED DOCUMENT PREPARED OCTOBER 31, 2013. [NOTE: DIMENSION SHOWN IN SURVEY AND DIMENSION IN EASEMENT DOCUMENT DO NOT MATCH].

E2. 4' WIDE EASEMENT TO PGE FOR GUY ANCHOR (INSTRUMENT 98-108247)

E3. PROPOSED 10' WIDE PUBLIC UTILITY EASEMENT UNDER LORAC PROJECT.

E4. PROPOSED VARIABLE WIDTH ACCESS EASEMENT UNDER LORAC PROJECT.

E5. PROPOSED STORM DRAIN EASEMENT.

CAMERON McCARTHY
Landscape Architecture & Planning
160 E Broadway, Eugene, OR 97401
220 NW 8th Avenue, Portland OR 97209
541-485-7385
www.cameronmccarthy.com

MAZZETTI
940 Willamette Street, Suite 310
Eugene, OR 97401
TEL: 541.686.8478
www.mazzetti.com

Project Number:

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELD IMPROVEMENTS

9625 SW 125th Ave.
Beaverton, OR 97008

STAMP

REGISTERED PROFESSIONAL ENGINEER
74512PE
DIGITAL SIGNATURE
OREGON
JUNE 11, 2021
GEOFF T. LARSEN
EXPIRES 12/31/24

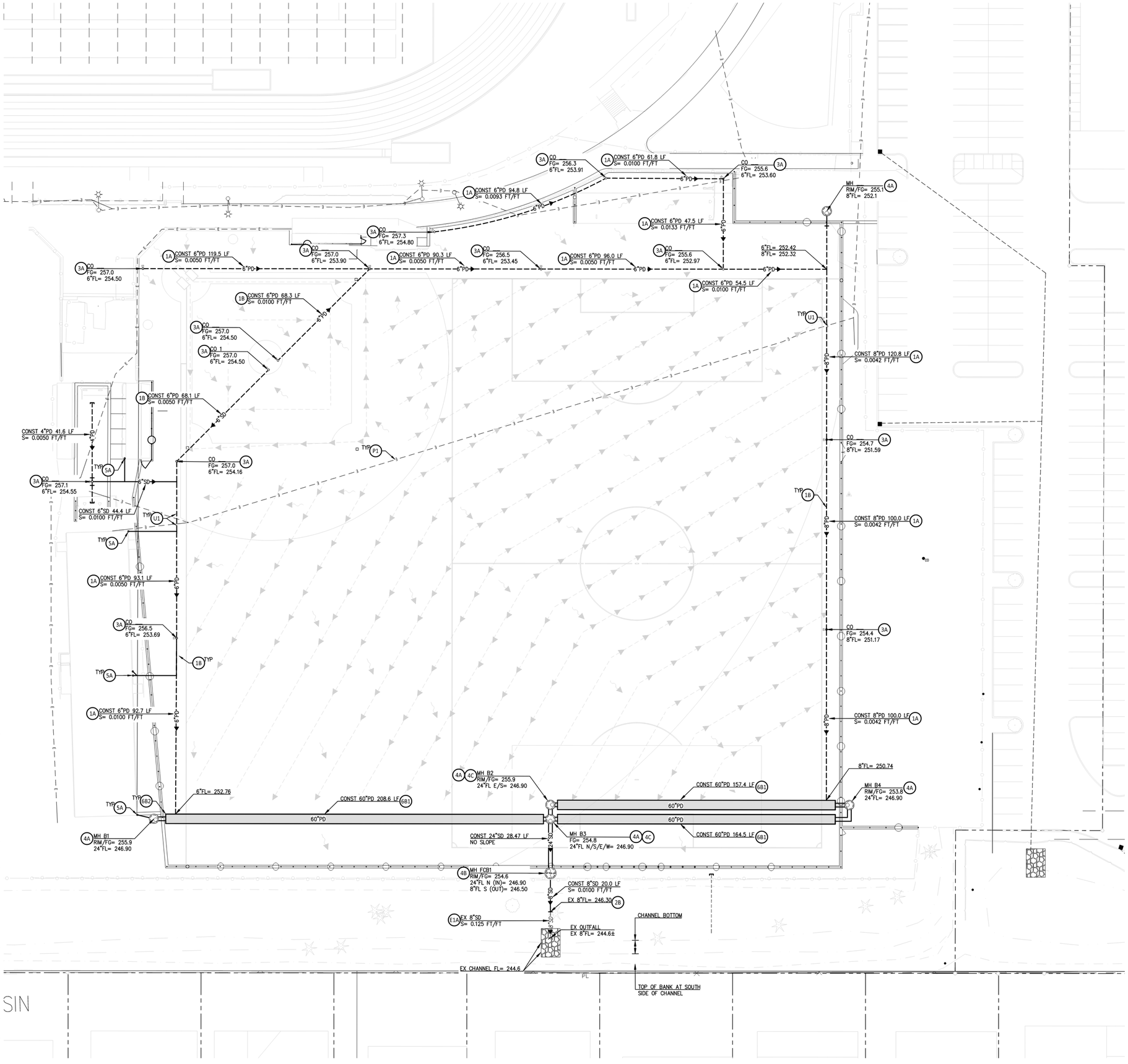
Drawn By:	GL/CL
Checked:	GL
Project #:	23.004
Date:	11/20/2023

Rev. #:	Date:
#	dd/mm/yy

PERMIT SET

SHEET TITLE
STORM DRAIN PLAN SOFTBALL

SHEET #
C1.1



1 STORM DRAIN PLAN - BASEBALL

PLAN SCALE
0 20' 40'
SCALE: 1"= 20'

N

SHEET NOTES

1. REFER TO SHEET C2.1 FOR LEGENDS AND GENERAL NOTES.
2. CONSTRUCT TRENCHING AND BACKFILL PER DETAIL A/2.1 IN AREAS OUTSIDE OF SYNTHETIC TURF FIELD FOOTPRINT.
3. CONSTRUCT LATERAL CONNECTIONS PER DETAIL 3/C2.1.
4. BACKFILL USING CDF WHERE COMPACTION OF CRUSHED ROCK BACKFILL CANNOT BE ACHIEVED.
5. ALIGN UTILITY STRUCTURES WITH ADJOINING CONCRETE WORK. COORDINATE BETWEEN TRADES TO ENSURE CONSISTENT HORIZONTAL CONTROL IS USED.

SURVEY / UTILITY NOTES

1. SURVEY DATA IS BASED ON COMPILATION OF RECORD INFORMATION AND IS INCOMPLETE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING SITE CONDITIONS PRIOR TO BIDDING AND PRIOR TO CONSTRUCTION.
2. LOCATIONS OF EXISTING UTILITIES ARE NOT KNOWN. CONTRACTOR IS RESPONSIBLE FOR OBTAINING UTILITY LOCATES (PRIVATE AND PUBLIC) AND COORDINATING WITH SERVING UTILITIES TO ESTABLISH LOCATIONS AND CONFIRM NECESSARY CLEARANCES.

CONSTRUCTION NOTES

1A . CONSTRUCT FIELD DRAINAGE HEADER PIPE PER LANDSCAPE DETAILS AND DETAIL 1/C2.1.
1B . DISCHARGE FLAT FIELD SUBDRAINAGE PIPE TO FIELD DRAINAGE HEADER PIPE PER LANDSCAPE DETAILS.

2A . CONNECT SOLID WALL PIPE TO PERFORATED PIPE
2B . CONNECT TO EXISTING PIPE.
2C . CONNECT TO EXISTING PIPE. POTHOLE PRIOR TO CONSTRUCTION TO DETERMINE ELEVATION.
2D . RECONNECT EXISTING DUGOUT AREA DRAIN AND FOUNDATION DRAIN. REFER TO C0.1 AND C0.2 FOR EXPLORATORY WORK.
2E . CONNECT TO EXISTING PIPE UPSTREAM FROM OUTFALL. ADJUST EXTENTS TO REACH REQUIRED ELEVATION. RECONSTRUCT SLOPE ANCHOR IF NEEDED.
2F. CONNECT TO EXISTING PERFORATED FIELD DRAINAGE PIPE. CONSTRUCT VERTICAL TRANSITION TO REACH ELEVATION OF EXISTING PIPE, S= 0.0200 FT/FT MIN. INCLUDE TRANSITION FITTINGS TO MATCH EXISTING PIPE SIZE. RECONNECT TRACER WIRE AND EXTEND TO NEAREST CLEANOUT.

3A . CONSTRUCT CLEANOUT WITHIN SYNTHETIC TURF PER DETAILS 1/C2.0 AND 5/C2.1.
3B . CONSTRUCT CLEANOUT OUTSIDE OF SYNTHETIC TURF PER DETAIL 1/C2.0.

4A . CONSTRUCT MANHOLE PER DETAIL 3/C2.1 AND 4/C2.1.
4C . CONSTRUCT MANHOLE FRAME AND COVER IN SYNTHETIC TURF PER DETAIL 3/C2.1.
4D . INSTALL TERMINAL BACKWATER VALVE IN MANHOLE FOR PIPE INDICATED WITH (BWV).
4B . CONSTRUCT FLOW CONTROL MANHOLE PER DETAIL 2B/C2.2 AND 3B/C2.2.
4S . CONSTRUCT FLOW CONTROL MANHOLE PER DETAIL 2S/C2.3 AND 3S/C2.3

5A . CONSTRUCT DOWNSPOUT CONNECTION PER DETAIL 2/C2.1.
5B . RECONNECT EXISTING DOWNSPOUT CONNECTION. CONSTRUCT 4"SD, S= 0.0200 FT/FT MIN.

6B1. CONSTRUCT BASEBALL DETENTION TRENCH PER DETAIL 1B/C2.2, LENGTH AS SHOWN (MEASURED BETWEEN MANHOLE STRUCTURES), NO SLOPE.
6B2. INSTALL 24"X60" ECCENTRIC TRANSITION FITTING.

6S1. CONSTRUCT SOFTBALL DETENTION TRENCH PER DETAIL 1S/C2.3, LENGTH AS SHOWN (MEASURED BETWEEN MANHOLE STRUCTURES), NO SLOPE.
6S2. INSTALL 24"X42" ECCENTRIC TRANSITION FITTING.
6S3. INSTALL 42" 11.25° BEND.

7 . INSTALL BEND FITTINGS (11.25° MAX) AND DEFLECT PIPE PER MANUFACTURER RECOMMENDATIONS TO FOLLOW CURVED ALIGNMENT SHOWN.

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U1 . CROSSING UNDER EXISTING POWER UTILITY. MAINTAIN 12" MINIMUM CLEARANCE BETWEEN BOTTOM OF EXISTING UTILITIES AND NEW STORM DRAIN. LOCATION OF EXISTING UTILITIES UNKNOWN. POTHOLE AT CROSSING POINTS AND VERIFY CLEARANCE CAN BE ACHIEVED. PROVIDE TEMPORARY SUPPORT/SHORING TO PROTECT EXISTING UTILITIES AS NEEDED.

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L2 . REFER TO LANDSCAPE DRAWINGS FOR TREE PROTECTION.

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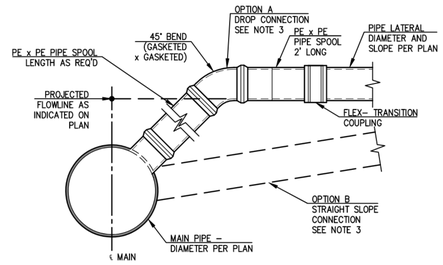
PERMIT SET

SHEET TITLE
STORM DRAIN PLAN BASEBALL

SHEET #
C1.2

GENERAL NOTES:

1. THE CONTRACTOR SHALL LOCATE AND MARK ALL EXISTING PROPERTY AND STREET MONUMENTS PRIOR TO CONSTRUCTION. ANY MONUMENTS DISTURBED DURING CONSTRUCTION OF THE PROJECT SHALL BE REPLACED BY A REGISTERED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE. THE MONUMENTS SHALL BE REPLACED WITHIN A MAXIMUM OF 90 DAYS, AND THE COUNTY SURVEYOR SHALL BE NOTIFIED IN WRITING AS REQUIRED BY ORS 209.150.
2. LOCATIONS OF EXISTING UTILITIES ARE ASSUMED FROM INFORMATION AVAILABLE AND ARE NOT GUARANTEED TO BE COMPLETE AND ACCURATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF EXISTING UTILITIES.
3. PRIOR TO CONSTRUCTION, POTHOLE AND VERIFY LOCATION AND ELEVATION OF EXISTING STORM, SANITARY, AND WATER UTILITIES AT CONNECTION POINT(S) SHOWN ON PLANS, AND OF OTHER UTILITIES AT CROSSINGS WITH NEW UTILITIES. NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN PLANS AND FIELD CONDITIONS.
4. CONTRACTOR SHALL NOTIFY EACH UNDERGROUND UTILITY PRIOR TO EXCAVATING, BORING, OR POTHOLING. ATTENTION: OREGON LAW REQUIRES THE CONTRACTOR TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN O.A.R. 952-001-0010 – 952-001-0090. THE CONTRACTOR MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 1-800-332-2344)
5. CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS AND COMPLY WITH REQUIREMENTS AND SPECIFICATIONS OF ANY RESPECTIVE UTILITY COMPANY FOR UTILITIES TO BE CUT, MOVED, RELOCATED, OR RE-CONNECTED TO AN EXISTING FACILITY.
6. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH ANY SERVING UTILITY COMPANY INSTALLING UTILITIES ON SITE. CONSTRUCTION OF OTHER UTILITIES MAY OCCUR AT SAME TIME ON SITE.
7. QUANTITIES SHOWN ARE FOR THE PURPOSE OF IDENTIFYING LENGTHS. ACTUAL QUANTITIES MAY VARY. CONTRACTOR TO PROVIDE QUANTITIES NEEDED FOR LAYOUT OF SYSTEM.
8. CONTRACTOR SHALL PROVIDE AND INSTALL FITTINGS AS REQUIRED TO COMPLETE PIPE CONNECTIONS AND TRANSITIONS PER PLAN, AND TO CONFORM TO TRENCHING REQUIREMENTS AND SITE GRADES.
9. MANHOLE AND CLEANOUT RIM ELEVATIONS ARE APPROXIMATE. FINAL ELEVATIONS MAY VARY AND SHALL MATCH FINISHED ELEVATIONS OF ADJACENT SURFACES.
10. TRACER WIRE SHALL ENTER ALL MANHOLE, CATCH BASIN, INLET, CLEANOUT, AND VALVE BOX STRUCTURES. EXTEND TRACER WIRE INTO STRUCTURE FAR ENOUGH TO PROVIDE ADEQUATE FREE WIRE TO EXTEND END OF WIRE 24" ABOVE/OUTSIDE OF STRUCTURE TO FACILITATE TESTING. COIL AND SECURE TRACER WIRE WITHIN EASY REACH OF STRUCTURE OPENING. VERIFY WIRE IS CLEAR OF ALL FILL MATERIAL IN CLEANOUT AND VALVE BOX STRUCTURES.
11. ALL STORM DRAIN AND SANITARY SEWER LATERAL CONNECTIONS TO BE CONSTRUCTED USING WYE FITTINGS OR MANHOLES. HORIZONTAL BENDS SHALL BE MADE USING FITTINGS WITH MAXIMUM 45° BEND.
12. CAP AND MARK ALL STORM PIPE ENDS WITH A 2"x4" BOARD STUCK IN GROUND. END OF BOARD SHALL BE PAINTED WHITE AND EXTEND MINIMUM 18" ABOVE GROUND SURFACE.
13. REFER TO SHEET EC-SERIES DRAWINGS, FOR EROSION SEDIMENT CONTROL MEASURES AND ADDITIONAL CONSTRUCTION REQUIREMENTS.

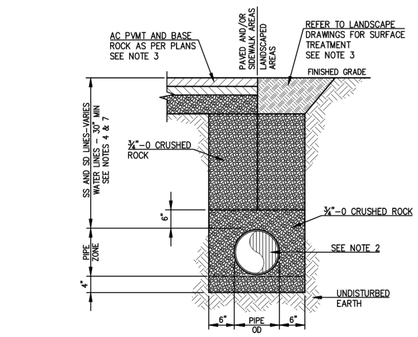


NOTES
1. DIAMETER OF ALL PIPE AND FITTINGS TO MATCH LATERAL DIAMETER UNLESS NOTED OTHERWISE.
2. MANUFACTURED WYE FITTING REQ'D FOR ALL CONNECTIONS UNLESS OTHERWISE NOTED. ROTATE WYE FITTING ABOUT MAIN PIPE AXIS, AND 45° BEND FITTING ABOUT LATERAL PIPE AXIS TO OBTAIN PROPER CONNECTION ALIGNMENT.
3. FOR LATERAL CONNECTIONS TO EXISTING STORM DRAIN MAINS:
   FOR MAINLINES 15" AND SMALLER, INSTALL WYE FITTING.
   FOR MAINLINES 18" AND LARGER, CONNECT USING WYE FITTING OR INSERTA-TEE, INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
4. CONTRACTOR'S OPTION TO CONNECT LATERAL TO MAIN USING OPTION A – DROP CONNECTION OR OPTION B – STRAIGHT SLOPE CONNECTION. STRAIGHT SLOPE CONNECTION REQUIRES SLOPE= 0.0100 FT/FT MINIMUM.
5. SLOPES FOR LATERALS SHOWN IN STORM DRAIN PLANS ARE BASED ON OPTION A.

3 LATERAL CONNECTION
NO SCALE

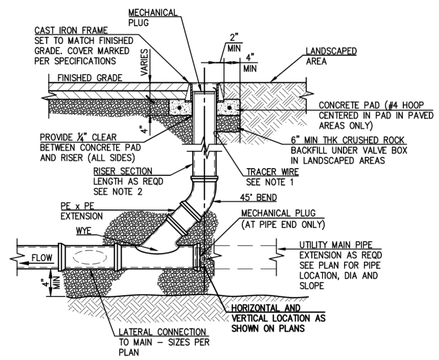
CIVIL SYMBOLS AND ABBREVIATIONS LIST

SYMBOL	ABBR.	DESCRIPTION	ABBR.	DESCRIPTION
12"SD	SD	STORM DRAIN	AC	ASPHALT CONCRETE
12"PD	PD	PERFORATED STORM DRAIN	BLDG	BUILDING
			BMP	BEST MANAGEMENT PRACTICE
60"PD	–	DETENTION PIPE	CONC	CONCRETE
			CONST	CONSTRUCT
	–	FLOW DIRECTION	DI	DUCTILE IRON PIPE MATERIAL
			DIA	DIAMETER
	FC MC	FLOW CONTROL MANHOLE STRUCTURE	ELEV	ELEVATION
			ESC	EROSION SEDIMENTATION CONTROL
	MH	MANHOLE STRUCTURE	EX	EXISTING
	CB	SINGLE CHAMBER CATCH BASIN	FFE	FINISHED FLOOR ELEVATION
	AD	AREA DRAIN (ROUND OR SQUARE)	FL	FLOWLINE
	CO	STANDARD CLEANOUT	FS	FINISHED SURFACE ELEVATION (LANDSCAPE AREAS)
	–	PIPE TERMINATION (PLUG & MARK)		
10 C-500	DET	DETAIL REFERENCE – DETAIL # OVER SHEET #	LF	LINEAR FEET
			MAX	MAXIMUM
22A	–	CONSTRUCTION NOTE WITH REFERENCE NUMBER	ME	MATCH EXISTING
			MIN	MINIMUM
A C-500	–	SECTION REFERENCE – SECTION # OVER SHEET #	PCC	PORTLAND CEMENT CONCRETE
			PL	PROPERTY LINE
			PUE	PUBLIC UTILITY EASEMENT
			S=	SLOPE=
			TYP	TYPICAL
			STD	STANDARD



NOTES
1. WATER LINES THAT PARALLEL SANITARY SEWER LINES SHALL BE LOCATED A MINIMUM OF 12" ABOVE SEWER LINES, WHERE SERVICES ARE NOT HORIZONTALLY SEPARATED BY 10'.
2. WITHIN 5' OF A BUILDING STRUCTURE, BUILDING CODE APPROVED PIPE MATERIAL AND ¾"-0 CRUSHED ROCK BACKFILL SHALL BE USED.
3. IN AREAS OUTSIDE OF PROPOSED IMPROVEMENTS, SAWCUT, REMOVE AND REPAIR EXISTING SURFACES TO MATCH EXISTING ASPHALT, CONCRETE, OR LANDSCAPING IN AREAS WHICH DO NOT RECEIVE NEW IMPROVEMENTS. PROVIDE 4" MIN DEPTH ASPHALT PAVEMENT, 4" MIN DEPTH CONCRETE PAVEMENT, OR MATCH EXISTING PAVEMENT DEPTH, WHICHEVER IS GREATER.
4. 36" MINIMUM FOR FIRE SERVICE PIPES UNDER AREAS TRAFFICKED BY VEHICLES. (NFPA 24, 10-4)
5. INSTALL TRACER WIRE ON ANY PIPELINE(S) CONSTRUCTED OF NON-METALLIC PIPE MATERIAL.
6. BACKFILL WITH CDF WHERE COMPACTION WITH CRUSHED ROCK BACKFILL CANNOT BE ACHIEVED.

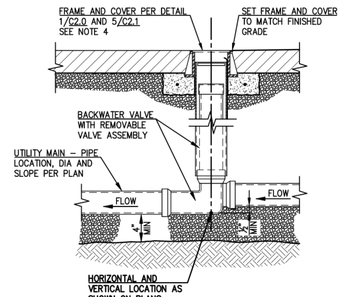
A TYPICAL TRENCHING & BACKFILL SECTION
NO SCALE



GENERAL CONSTRUCTION

NOTES
1. TRACER WIRE SHALL ENTER STRUCTURE WITH RISER PIPE. PROVIDE ENOUGH FREE WIRE TO EXTEND 24" ABOVE FINISHED GRADE TO FACILITATE TESTING. VERIFY FREE END OF WIRE IS WITHIN EASY REACH OF OPENING IN TOP SECTION.
2. RISER PIPE SIZE:
   4", 6", AND 8" DIA MAIN – DIA TO MATCH MAIN
   10" DIA AND LARGER MAIN – 8" DIA RISER PIPE
3. ADJUST END OF RISER PIPE TO MAINTAIN 2" MIN AND 4" MAX CLEARANCE BETWEEN END PIPE AND BOTTOM OF VALVE BOX LID.

1 STANDARD CLEANOUT (CO)
NO SCALE



NOTES
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2. RISER PIPE SIZE TO MATCH MAIN DIAMETER.
3. ADJUST END OF RISER PIPE TO MAINTAIN 2" MIN AND 4" MAX CLEARANCE BETWEEN END PIPE AND BOTTOM OF VALVE BOX LID.
4. FRAME AND COVER IN SYNTHETIC TURF AREAS TO MATCH DETAIL 5/C2.1.

2 IN-LINE BACKWATER VALVE
NO SCALE

CAMERON McCARTHY
Landscape Architecture & Planning
160 E Broadway, Eugene, OR 97401
220 NW 8th Avenue, Portland OR 97209
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940 Willamette Street, Suite 310
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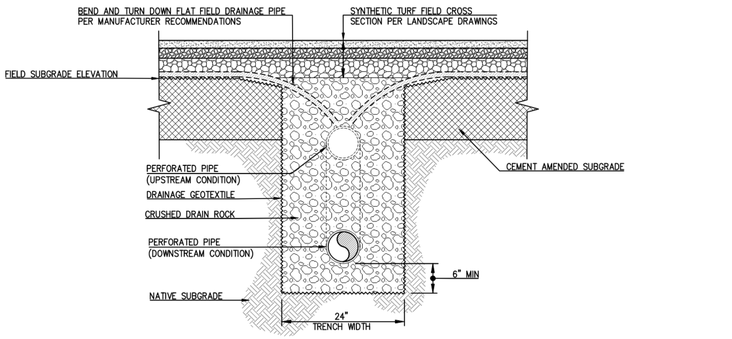
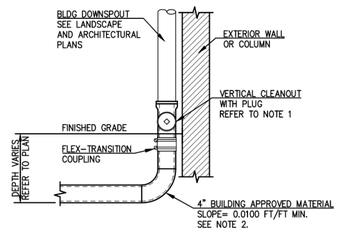
SHEET TITLE
CIVIL GENERAL NOTES, LEGEND, AND DETAILS

SHEET #
C2.0



1 PERFORATED FIELD COLLECTOR PIPE TRENCH

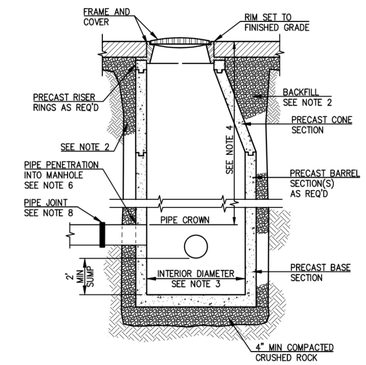
NO SCALE



NOTES:
1. VERTICAL CLEANOUT SHALL BE CAST IRON TAPPED TEE WITH THREADED PLUG.
2. ALL PIPING WITHIN 5' OF THE STRUCTURE ROOF SHALL BE BUILDING APPROVED MATERIAL.

2 DOWNSPOUT WITH CLEANOUT

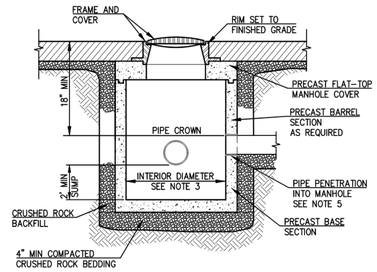
NO SCALE



NOTES
1. TRACER WIRE: WIRE SHALL ENTER STRUCTURE UNDER RISER AND DIRECTLY ABOVE THE PIPE THAT WIRE IS TRACING. PROVIDE ENOUGH FREE WIRE TO EXTEND 24" ABOVE TOP OF MANHOLE COVER TO FACILITATE TESTING. COIL WIRE AND SECURE WITH NON-CORROSIVE FASTENER 2" UNDER FRAME.
2. BACKFILL AROUND BASE SECTION USING CRUSHED ROCK IN PAVED OR SIDEWALK AREAS, OR NATIVE MATERIALS IN LANDSCAPE AREAS.
3. SELECT DIAMETER TO ACCOMMODATE PIPE SIZES, ANGLES, AND MINIMUM CLEARANCES SHOWN, 48" MINIMUM DIAMETER.
4. USE FLAT-TOP MANHOLE WITH 2' SUMP WHERE DISTANCE BETWEEN RIM AND PIPE CROWN IS 3½' OR LESS.
5. LOCATION SPECIFIED ON PLAN INDICATES CENTER OF BASE SECTION.
6. INSTALL SEAL AS SPECIFIED BETWEEN MANHOLE AND PIPE TO FORM A WATER TIGHT SEAL. PIPES TO BE TRIMMED FLUSH WITH MANHOLE INTERIOR WALL. GROUT BETWEEN TRIMMED PIPE AND MANHOLE INTERIOR WALL, AS REQ'D, TO PROVIDE A SMOOTH TRANSITION.
7. MAINTAIN 12" CLEAR BETWEEN PIPE PENETRATIONS AT INSIDE OF MANHOLE. MAINTAIN 8" CLEAR BETWEEN PIPE PENETRATION AND MANHOLE JOINT.
8. PROVIDE FLEXIBLE, GASKETED, AND UNRESTRAINED JOINT BETWEEN 12"-18" OF MANHOLE WALL AT ALL PIPE PENETRATIONS.

3 STANDARD STORM DRAIN MANHOLE

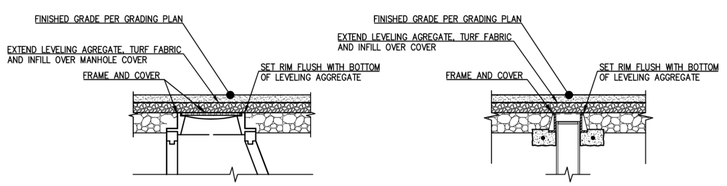
NO SCALE



NOTES
1. TRACER WIRE: WIRE SHALL ENTER STRUCTURE UNDER RISER AND DIRECTLY ABOVE THE PIPE THAT WIRE IS TRACING. PROVIDE ENOUGH FREE WIRE TO EXTEND 24" ABOVE TOP OF MANHOLE COVER TO FACILITATE TESTING. COIL WIRE AND SECURE WITH NON-CORROSIVE FASTENER 2" UNDER FRAME.
2. NOT USED.
3. SELECT DIAMETER TO ACCOMMODATE PIPE SIZES, ANGLES, AND MINIMUM CLEARANCES SHOWN, 48" MINIMUM DIAMETER.
4. LOCATION SPECIFIED ON PLAN INDICATES CENTER OF BASE SECTION.
5. INSTALL SEAL AS SPECIFIED BETWEEN MANHOLE AND PIPE TO FORM A WATER TIGHT SEAL. PIPES TO BE TRIMMED FLUSH WITH MANHOLE INTERIOR WALL. GROUT BETWEEN TRIMMED PIPE AND MANHOLE INTERIOR WALL, AS REQ'D, TO PROVIDE A SMOOTH TRANSITION.
6. MAINTAIN 12" CLEAR BETWEEN PIPE PENETRATIONS AT INSIDE OF MANHOLE. MAINTAIN 8" CLEAR BETWEEN PIPE PENETRATION AND MANHOLE JOINT.

4 FLAT-TOP MANHOLE WITH SUMP

NO SCALE



5 MANHOLE AND CLEANOUT COVERS IN SYNTHETIC TURF AREAS

NO SCALE

CAMERON McCARTHY
Landscape Architecture & Planning
160 E Broadway, Eugene, OR 97401
220 NW 8th Avenue, Portland OR 97209
541-485-7385
www.cameronmccarthy.com

MAZZETTI
940 Willamette Street, Suite 310
Eugene, OR 97401
TEL: 541.686.8478
www.mazzetti.com

Project Number:

SOUTHRIDGE HIGH SCHOOL
ATHLETIC FIELD IMPROVEMENTS

9625 SW 125th Ave.
Beaverton, OR 97008

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REGISTERED PROFESSIONAL ENGINEER 74512PE
DIGITAL SIGNATURE
OREGON
JUNE 11, 2015
GEOFF T. LARSEN
EXPIRES 12/31/24

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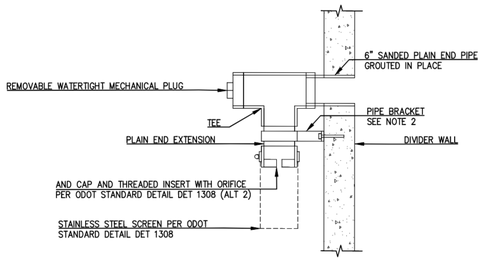
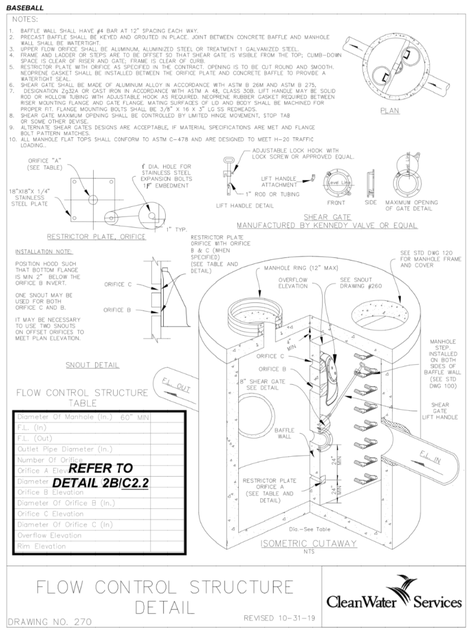
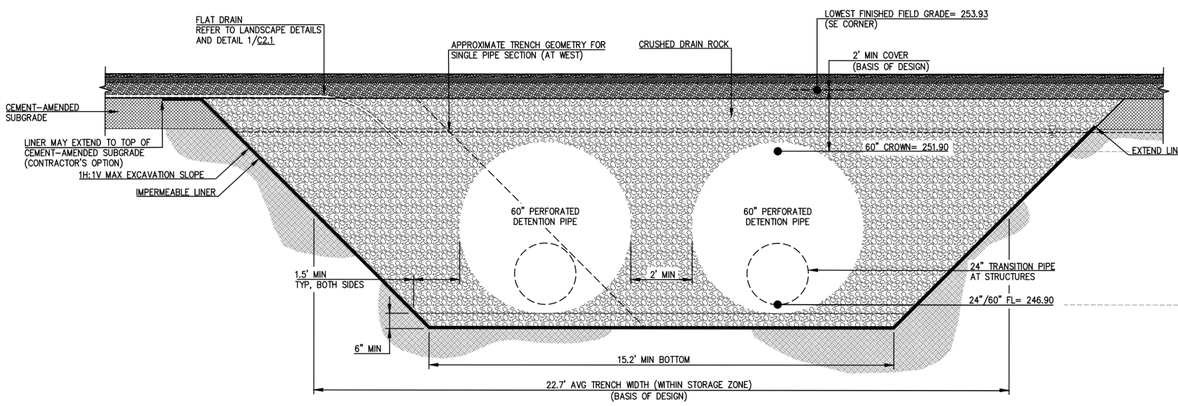


NOTES:
1. PIPE AND FITTINGS TO BE SCHEDULE 40 PVC SOLVENT-CEMENT PRESSURE PIPE.
2. PIPE BRACKET TO BE RELINER BRACKET, SIZED TO FIT PIPE / FITTINGS. MOUNT TO DIVIDER WALL WITH STAINLES STEEL EXPANSION BOLTS.

4 ORIFICE DETAIL



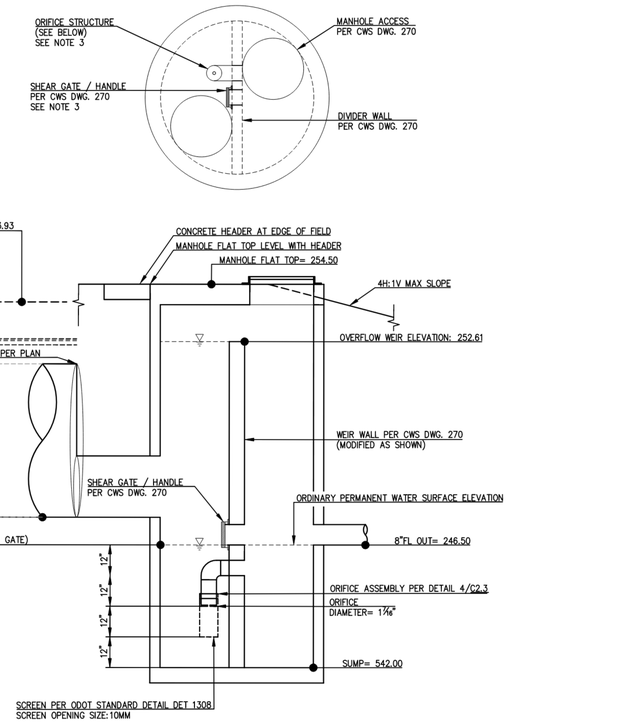
3B BASEBALL STORMWATER FLOW CONTROL STRUCTURE



NOTES:
1. OBTAIN SUBGRADE INSPECTION BY GEOTECHNICAL ENGINEER PRIOR TO PLACING LINER AND BACKFILL.
2. DO NOT OPERATE CONSTRUCTION TRAFFIC OVER DETENTION PIPE UNLESS THE MANUFACTURER-REQUIRED MINIMUM DEPTH OF FILL IS PLACED OVER THE PIPE.
3. OFFSET SHEAR GATE OPENING AND ORIFICE OPENIGN IN WEIR WALL TO ACCOMMODATE CLEARANCE AND ACCESS REQUIREMENTS.

1B BASEBALL STORMWATER DETENTION TRENCH

PLAN SCALE 0 2' 4'
SCALE: 1"= 2'



2B BASEBALL FLOW CONTROL STRUCTURE / STAGE-STORAGE

PLAN SCALE 0 2' 4'
SCALE: 1"= 2'

CAMERON McCARTHY
Landscape Architecture & Planning
160 E Broadway, Eugene, OR 97401
220 NW 8th Avenue, Portland OR 97209
541-485-7385
www.cameronmccarthy.com

MAZZETTI
940 Willamette Street, Suite 310
Eugene, OR 97401
TEL: 541.686.8478
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Project Number:

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELD IMPROVEMENTS

9625 SW 125th Ave.
Beaverton, OR 97008

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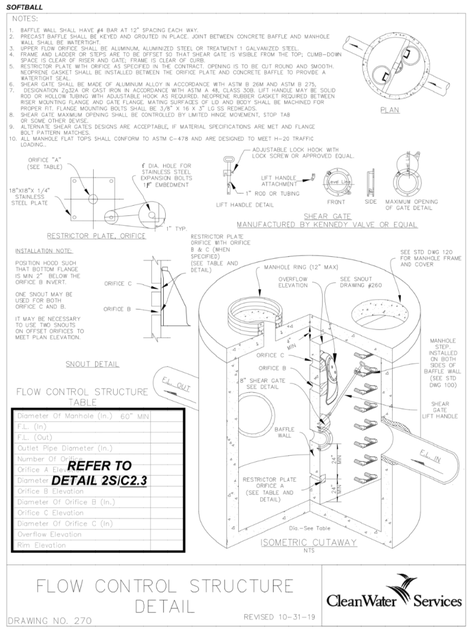
C2.2

SOFTBALL

NOTES:
1. BAFFLE WALL SHALL HAVE #4 BAR AT 12" SPACING EACH WAY.
2. BAFFLE WALL SHALL BE DOWELED AND GROUTED IN PLACE. JOINT BETWEEN CONCRETE BAFFLE AND MANHOLE WALL SHALL BE WATERTIGHT.
3. UPPER FLOW ORIFICE SHALL BE ALUMINUM, ALUMINIZED STEEL OR TREATMENT-1 GALVANIZED STEEL.
4. FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT SHEAR GATE IS VISIBLE FROM THE TOP; CLIMB-DOWN SPACE IS CLEAR OF RISER AND GATE; FRAME IS CLEAR OF CURB.
5. RESTRICTOR PLATE WITH ORIFICE AS SPECIFIED IN THE CONTRACT. OPENING IS TO BE CUT ROUND AND SMOOTH. NEOPRENE GASKET SHALL BE INSTALLED BETWEEN THE ORIFICE PLATE AND CONCRETE BAFFLE TO PROVIDE A WATERTIGHT SEAL.
6. SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26M AND ASTM B 275.
7. DESIGNATION Zg32A OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B. LIFT HANDLE MAY BE SOLID ROD OR HOLLOW TUBING WITH ADJUSTABLE HOOK AS REQUIRED. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE. MATING SURFACES OF LID AND BODY SHALL BE MACHINED FOR PROPER FIT. FLANGE MOUNTING BOLTS SHALL BE 3/8" X 16 X 3" LG SS RE-HEAD.
8. SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, STOP TAB
9. ALTERNATE SHEAR GATE DESIGNS ARE ACCEPTABLE, IF MATERIAL SPECIFICATIONS ARE MET AND FLANGE BOLT PATTERN MATCHES.
10. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING.



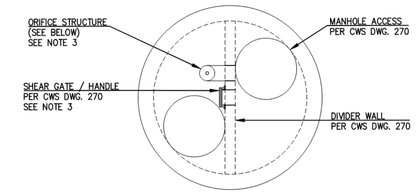
FLOW CONTROL STRUCTURE DETAIL

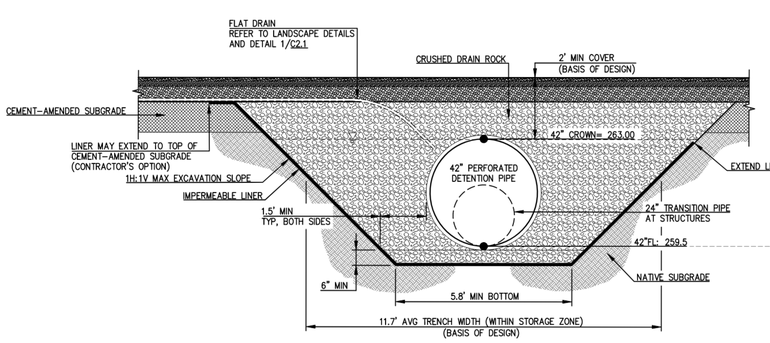
DRAWING NO. 270

REVISED 10-31-19

CleanWater Services

3S SOFTBALL STORMWATER FLOW CONTROL STRUCTURE



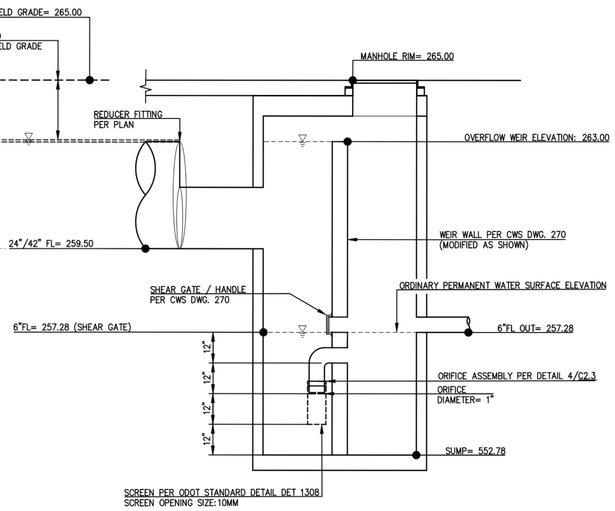


NOTES:
1. OBTAIN SUBGRADE INSPECTION BY GEOTECHNICAL ENGINEER PRIOR TO PLACING LINER AND BACKFILL.
2. DO NOT OPERATE CONSTRUCTION TRAFFIC OVER DETENTION PIPE UNLESS THE MANUFACTURER-REQUIRED MINIMUM DEPTH OF FILL IS PLACED OVER THE PIPE.
3. OFFSET SHEAR GATE OPENING AND ORIFICE OPENIGN IN WEIR WALL TO ACCOMMODATE CLEARANCE AND ACCESS REQUIREMENTS.

1S SOFTBALL STORMWATER DETENTION TRENCH

PLAN SCALE 0 2' 4'

SCALE: 1"= 2'



2S SOFTBALL FLOW CONTROL STRUCTURE / STAGE-STORAGE

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SCALE: 1"= 2'

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Landscape Architecture & Planning
160 E Broadway, Eugene, OR 97401
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Appendix C1B:
Calculations – Runoff and Routing - Baseball

Calculation Summary Report

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	-------	0.231	-------	0.465	0.617	0.828	-------	-------	Basin B.1 Pre
2	SBUH Runoff	------	-------	0.037	-------	0.073	0.097	0.129	-------	-------	Basin B.2 Pre
3	Combine	1, 2	-------	0.267	-------	0.532	0.705	0.948	-------	-------	Basin B-Pre
5	SBUH Runoff	------	-------	0.773	-------	0.974	1.090	1.240	-------	-------	Basin B.1 Post
6	SBUH Runoff	------	-------	0.219	-------	0.274	0.306	0.348	-------	-------	Basin B.2 Post
7	Combine	5, 6	-------	0.940	-------	1.184	1.325	1.507	-------	-------	Basin B-Post
9	Reservoir	7	-------	0.129	-------	0.383	0.530	0.789	-------	-------	Baseball Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

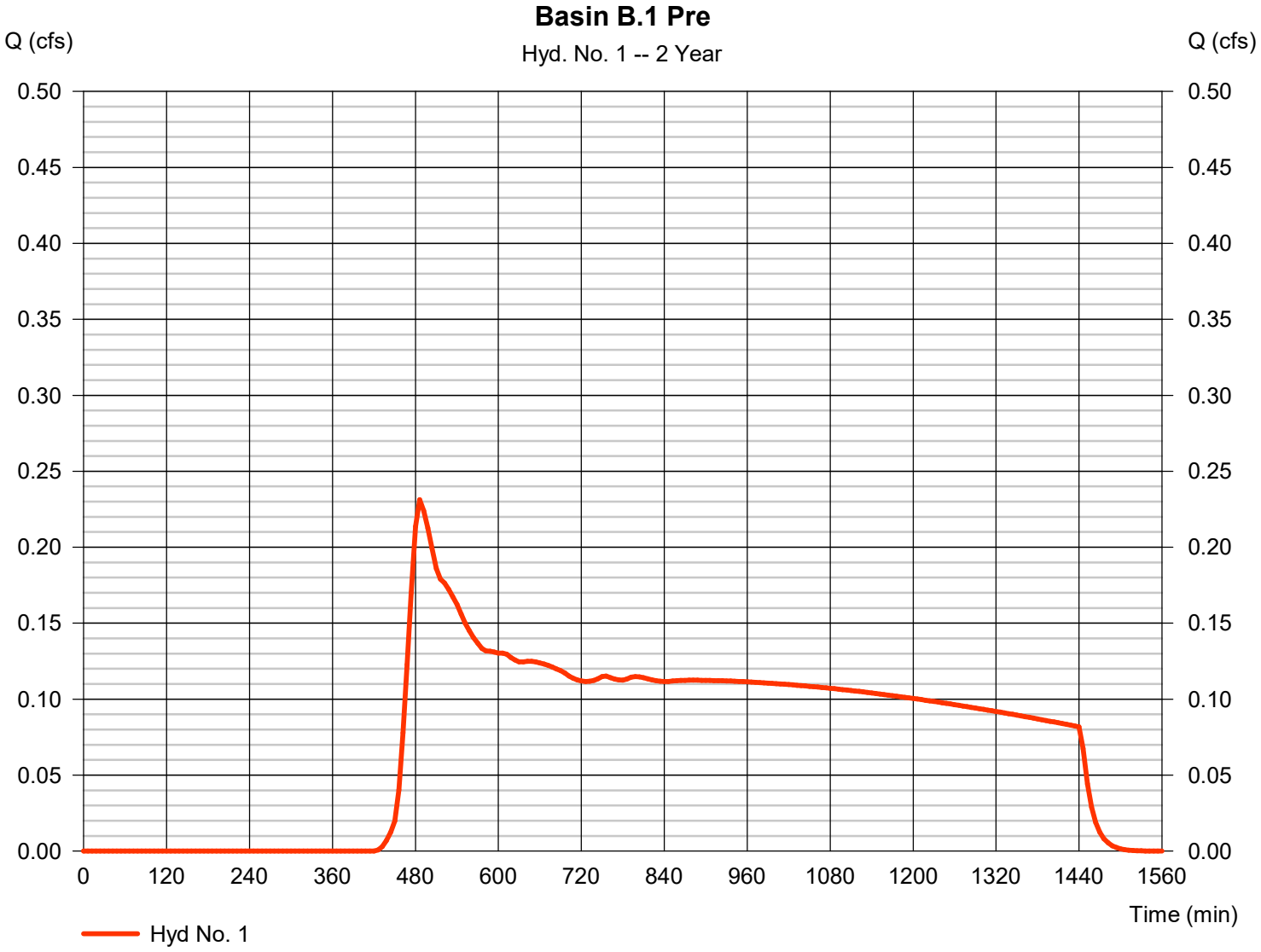
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.231	6	486	6,848	------	------	------	Basin B.1 Pre
2	SBUH Runoff	0.037	6	480	897	------	------	------	Basin B.2 Pre
3	Combine	0.267	6	486	7,746	1, 2	------	------	Basin B-Pre
5	SBUH Runoff	0.773	6	498	23,904	------	------	------	Basin B.1 Post
6	SBUH Runoff	0.219	6	474	3,132	------	------	------	Basin B.2 Post
7	Combine	0.940	6	486	27,036	5, 6	------	------	Basin B-Post
9	Reservoir	0.129	6	1458	27,018	7	252.56	18,967	Baseball Detention

Hydrograph Report

Hyd. No. 1

Basin B.1 Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.231 cfs
Storm frequency	= 2 yrs	Time to peak	= 486 min
Time interval	= 6 min	Hyd. volume	= 6,848 cuft
Drainage area	= 2.900 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

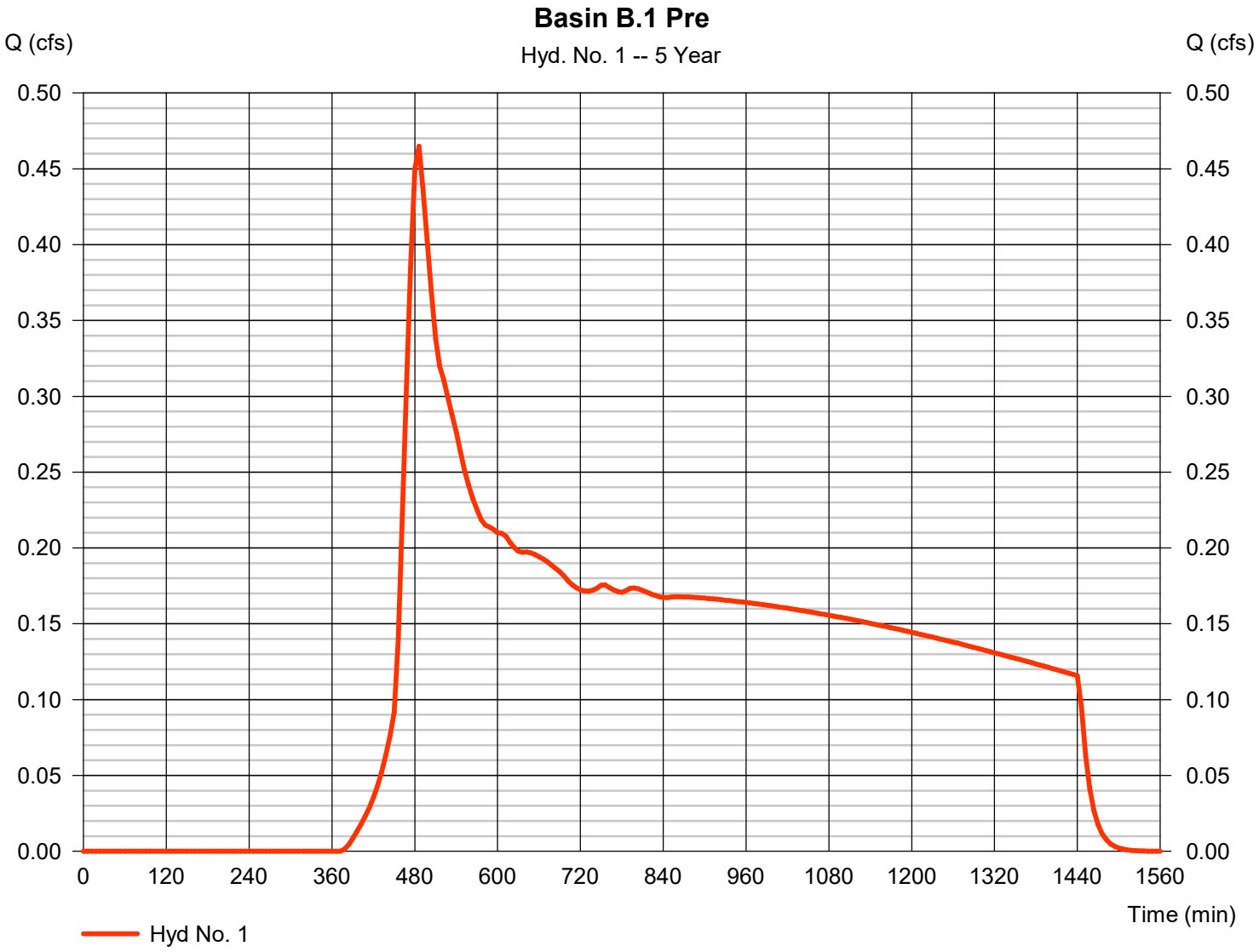
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.465	6	486	10,809	------	------	------	Basin B.1 Pre
2	SBUH Runoff	0.073	6	480	1,416	------	------	------	Basin B.2 Pre
3	Combine	0.532	6	486	12,225	1, 2	------	------	Basin B-Pre
5	SBUH Runoff	0.974	6	498	30,190	------	------	------	Basin B.1 Post
6	SBUH Runoff	0.274	6	474	3,956	------	------	------	Basin B.2 Post
7	Combine	1.184	6	486	34,146	5, 6	------	------	Basin B-Post
9	Reservoir	0.383	6	870	34,128	7	252.65	19,197	Baseball Detention

Hydrograph Report

Hyd. No. 1

Basin B.1 Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.465 cfs
Storm frequency	= 5 yrs	Time to peak	= 486 min
Time interval	= 6 min	Hyd. volume	= 10,809 cuft
Drainage area	= 2.900 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 3.10 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

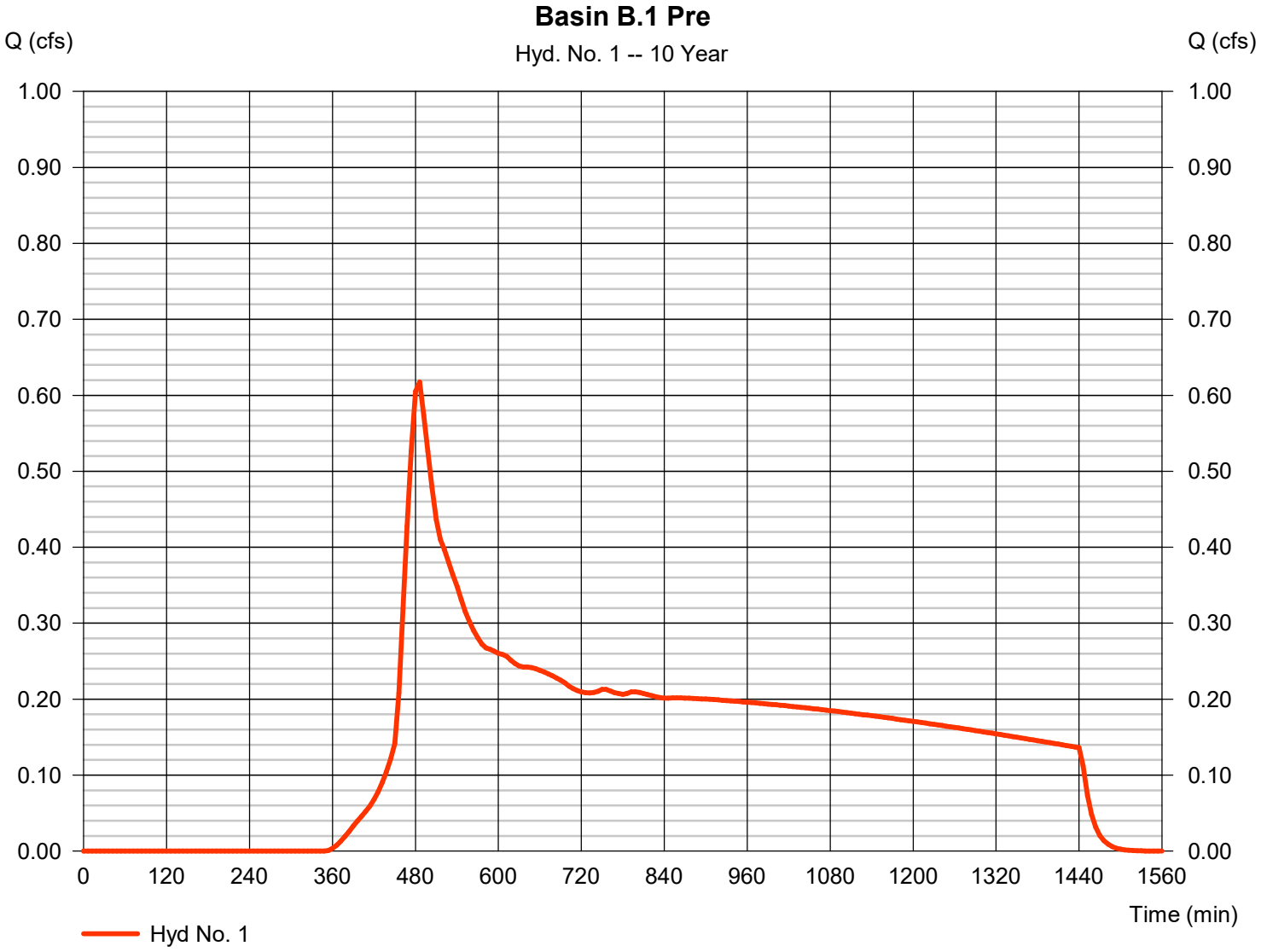
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.617	6	486	13,333	------	------	------	Basin B.1 Pre
2	SBUH Runoff	0.097	6	480	1,747	------	------	------	Basin B.2 Pre
3	Combine	0.705	6	486	15,080	1, 2	------	------	Basin B-Pre
5	SBUH Runoff	1.090	6	498	33,861	------	------	------	Basin B.1 Post
6	SBUH Runoff	0.306	6	474	4,437	------	------	------	Basin B.2 Post
7	Combine	1.325	6	486	38,298	5, 6	------	------	Basin B-Post
9	Reservoir	0.530	6	750	38,280	7	252.69	19,270	Baseball Detention

Hydrograph Report

Hyd. No. 1

Basin B.1 Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.617 cfs
Storm frequency	= 10 yrs	Time to peak	= 486 min
Time interval	= 6 min	Hyd. volume	= 13,333 cuft
Drainage area	= 2.900 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 3.45 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

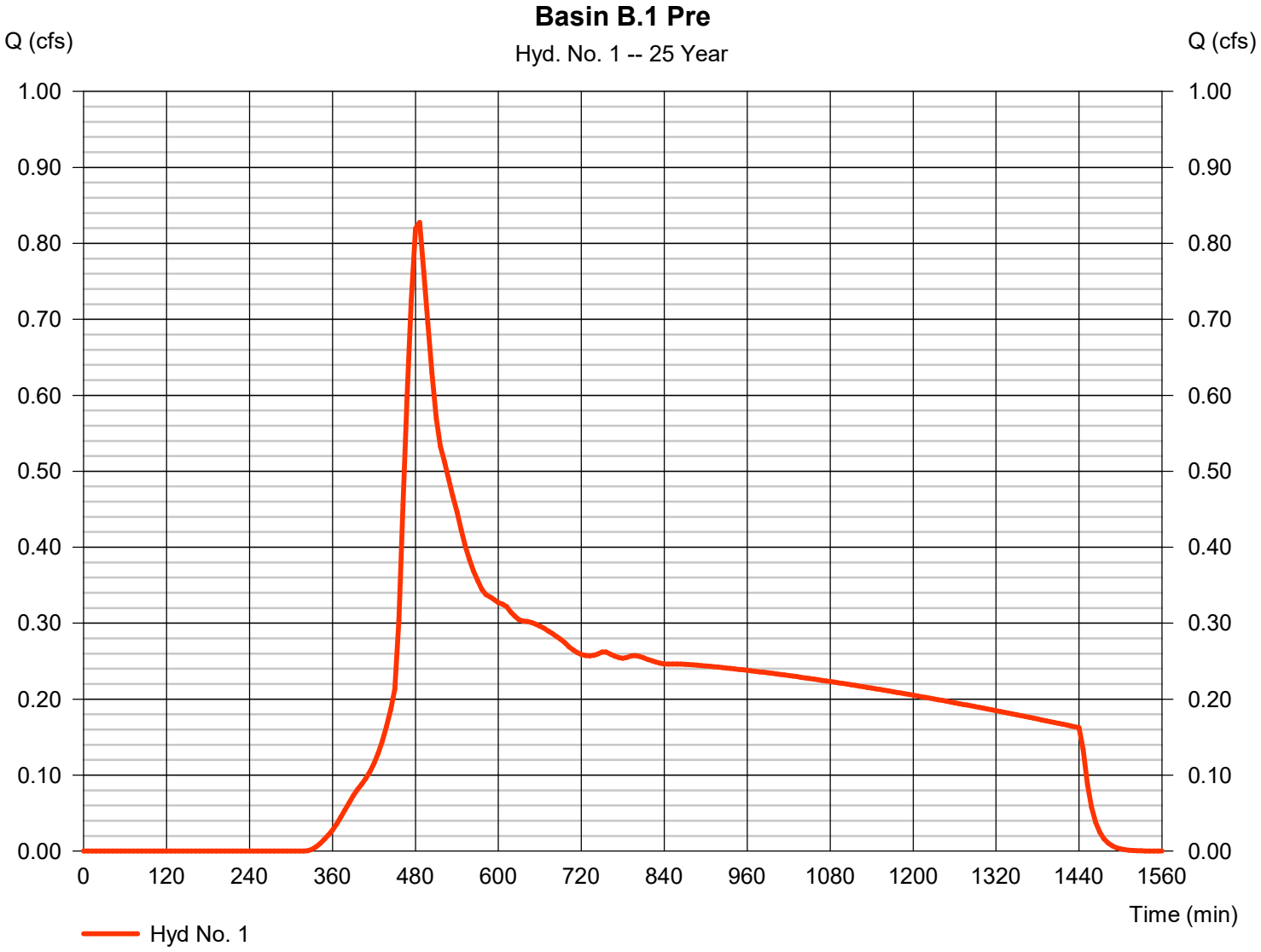
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.828	6	486	16,759	------	------	------	Basin B.1 Pre
2	SBUH Runoff	0.129	6	480	2,196	------	------	------	Basin B.2 Pre
3	Combine	0.948	6	480	18,956	1, 2	------	------	Basin B-Pre
5	SBUH Runoff	1.240	6	498	38,585	------	------	------	Basin B.1 Post
6	SBUH Runoff	0.348	6	474	5,056	------	------	------	Basin B.2 Post
7	Combine	1.507	6	486	43,641	5, 6	------	------	Basin B-Post
9	Reservoir	0.789	6	660	43,623	7	252.72	19,350	Baseball Detention

Hydrograph Report

Hyd. No. 1

Basin B.1 Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.828 cfs
Storm frequency	= 25 yrs	Time to peak	= 486 min
Time interval	= 6 min	Hyd. volume	= 16,759 cuft
Drainage area	= 2.900 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Appendix C1S:
Calculations – Runoff and Routing - Softball

Calculation Summary Report

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	-------	0.100	-------	0.198	0.264	0.356	-------	-------	Basin S.1-Pre
2	SBUH Runoff	------	-------	0.014	-------	0.027	0.036	0.047	-------	-------	Basin S.2-Pre
3	Combine	1, 2	-------	0.113	-------	0.225	0.300	0.404	-------	-------	Basin S-Pre
6	SBUH Runoff	------	-------	0.311	-------	0.391	0.438	0.498	-------	-------	Basin S.1-Post
7	SBUH Runoff	------	-------	0.081	-------	0.101	0.113	0.128	-------	-------	Basin S.2-Post
8	Combine	6, 7	-------	0.372	-------	0.468	0.524	0.596	-------	-------	Basin B Post
10	Reservoir	8	-------	0.049	-------	0.152	0.212	0.308	-------	-------	ADS-48

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

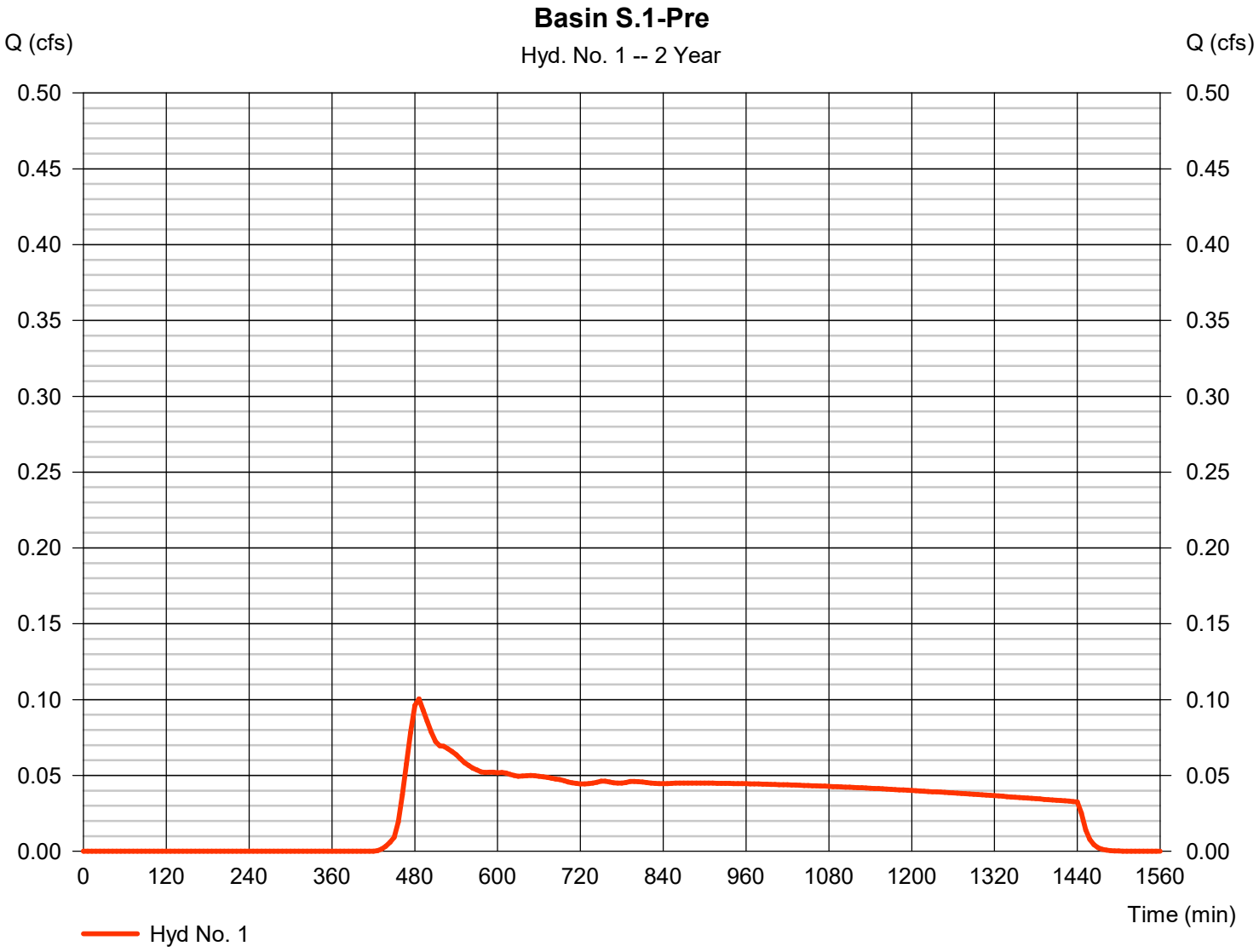
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.100	6	486	2,739	------	------	------	Basin S.1-Pre
2	SBUH Runoff	0.014	6	480	331	------	------	------	Basin S.2-Pre
3	Combine	0.113	6	486	3,070	1, 2	------	------	Basin S-Pre
6	SBUH Runoff	0.311	6	498	9,562	------	------	------	Basin S.1-Post
7	SBUH Runoff	0.081	6	474	1,154	------	------	------	Basin S.2-Post
8	Combine	0.372	6	486	10,716	6, 7	------	------	Basin B Post
10	Reservoir	0.049	6	1464	10,690	8	262.98	7,641	ADS-48

Hydrograph Report

Hyd. No. 1

Basin S.1-Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.100 cfs
Storm frequency	= 2 yrs	Time to peak	= 486 min
Time interval	= 6 min	Hyd. volume	= 2,739 cuft
Drainage area	= 1.160 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 2.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

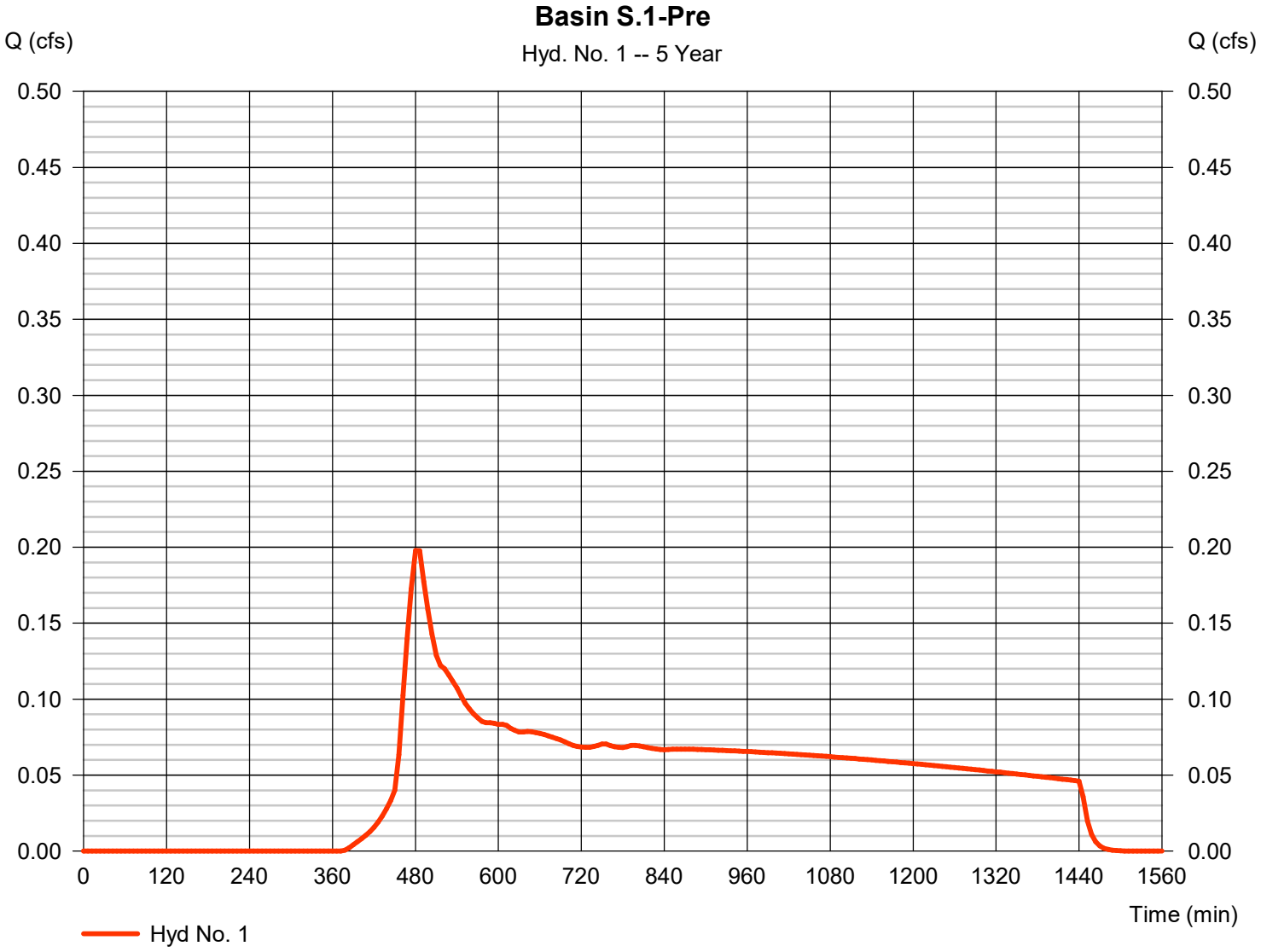
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.198	6	480	4,324	------	------	------	Basin S.1-Pre
2	SBUH Runoff	0.027	6	480	522	------	------	------	Basin S.2-Pre
3	Combine	0.225	6	480	4,845	1, 2	------	------	Basin S-Pre
6	SBUH Runoff	0.391	6	498	12,076	------	------	------	Basin S.1-Post
7	SBUH Runoff	0.101	6	474	1,457	------	------	------	Basin S.2-Post
8	Combine	0.468	6	486	13,533	6, 7	------	------	Basin B Post
10	Reservoir	0.152	6	870	13,508	8	263.02	7,702	ADS-48

Hydrograph Report

Hyd. No. 1

Basin S.1-Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.198 cfs
Storm frequency	= 5 yrs	Time to peak	= 480 min
Time interval	= 6 min	Hyd. volume	= 4,324 cuft
Drainage area	= 1.160 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 3.10 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

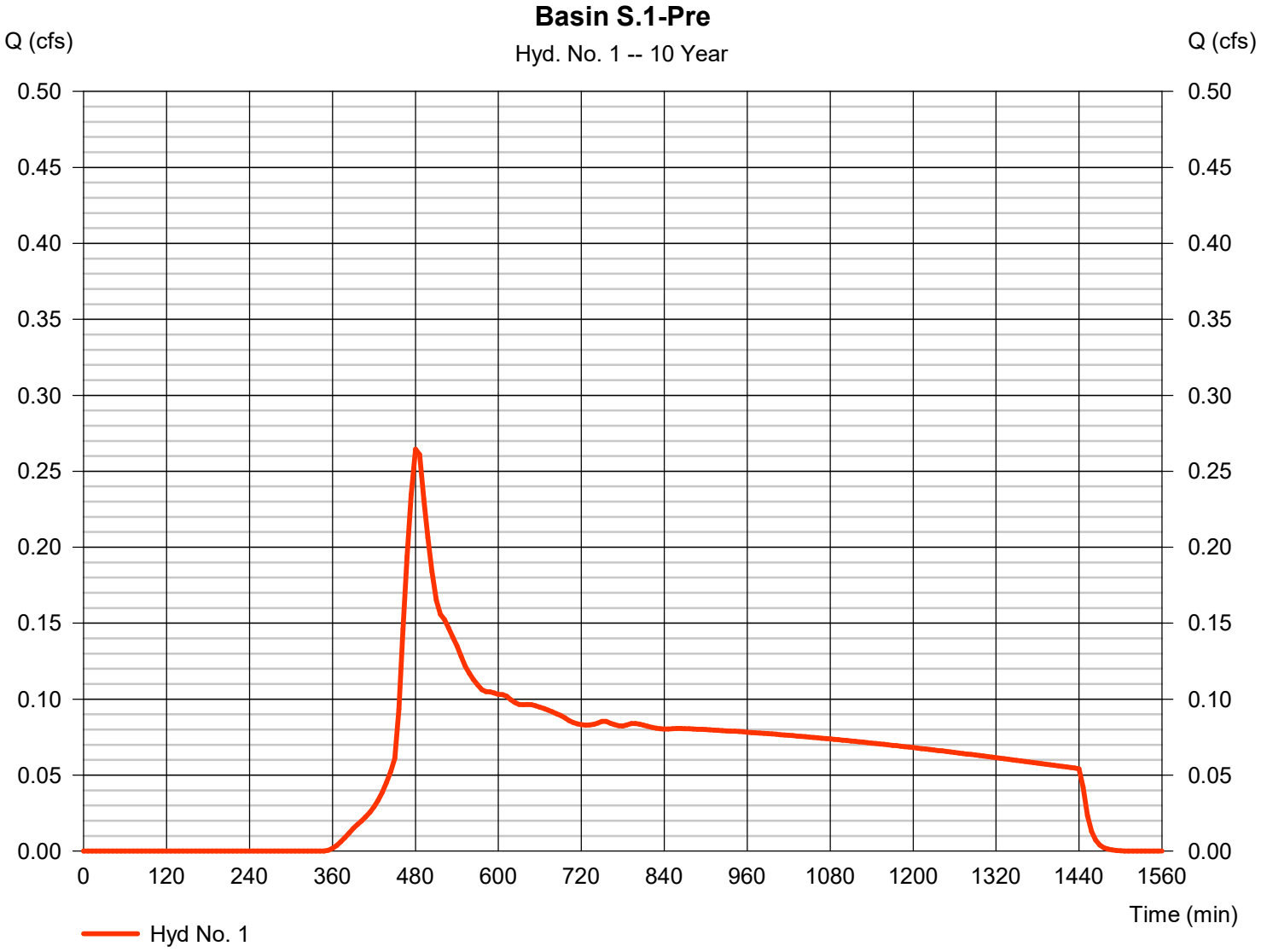
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.264	6	480	5,333	------	------	------	Basin S.1-Pre
2	SBUH Runoff	0.036	6	480	644	------	------	------	Basin S.2-Pre
3	Combine	0.300	6	480	5,977	1, 2	------	------	Basin S-Pre
6	SBUH Runoff	0.438	6	498	13,545	------	------	------	Basin S.1-Post
7	SBUH Runoff	0.113	6	474	1,635	------	------	------	Basin S.2-Post
8	Combine	0.524	6	486	15,179	6, 7	------	------	Basin B Post
10	Reservoir	0.212	6	750	15,154	8	263.03	7,722	ADS-48

Hydrograph Report

Hyd. No. 1

Basin S.1-Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.264 cfs
Storm frequency	= 10 yrs	Time to peak	= 480 min
Time interval	= 6 min	Hyd. volume	= 5,333 cuft
Drainage area	= 1.160 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 3.45 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

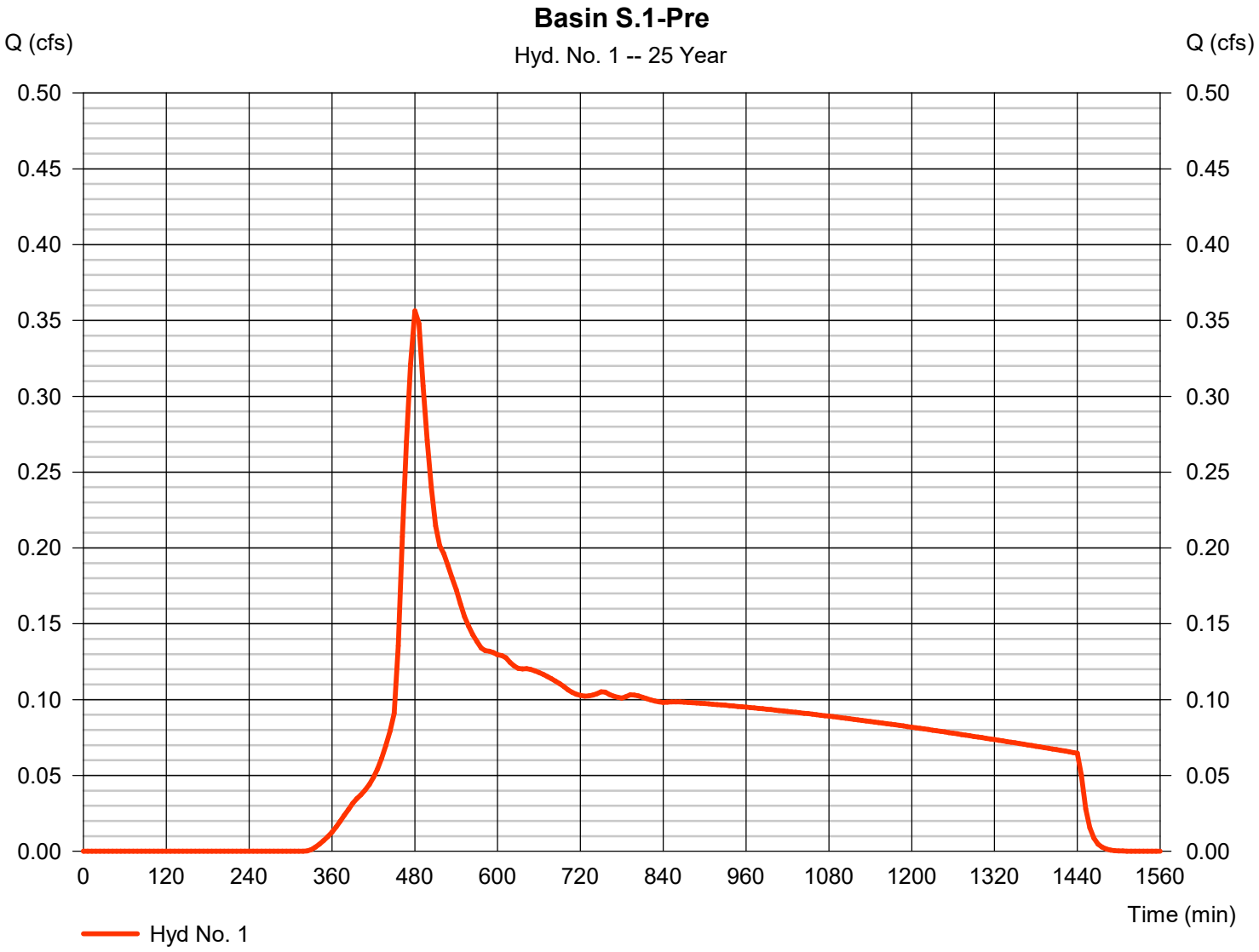
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	0.356	6	480	6,704	------	------	------	Basin S.1-Pre
2	SBUH Runoff	0.047	6	480	809	------	------	------	Basin S.2-Pre
3	Combine	0.404	6	480	7,513	1, 2	------	------	Basin S-Pre
6	SBUH Runoff	0.498	6	498	15,434	------	------	------	Basin S.1-Post
7	SBUH Runoff	0.128	6	474	1,863	------	------	------	Basin S.2-Post
8	Combine	0.596	6	486	17,297	6, 7	------	------	Basin B Post
10	Reservoir	0.308	6	666	17,271	8	263.05	7,753	ADS-48

Hydrograph Report

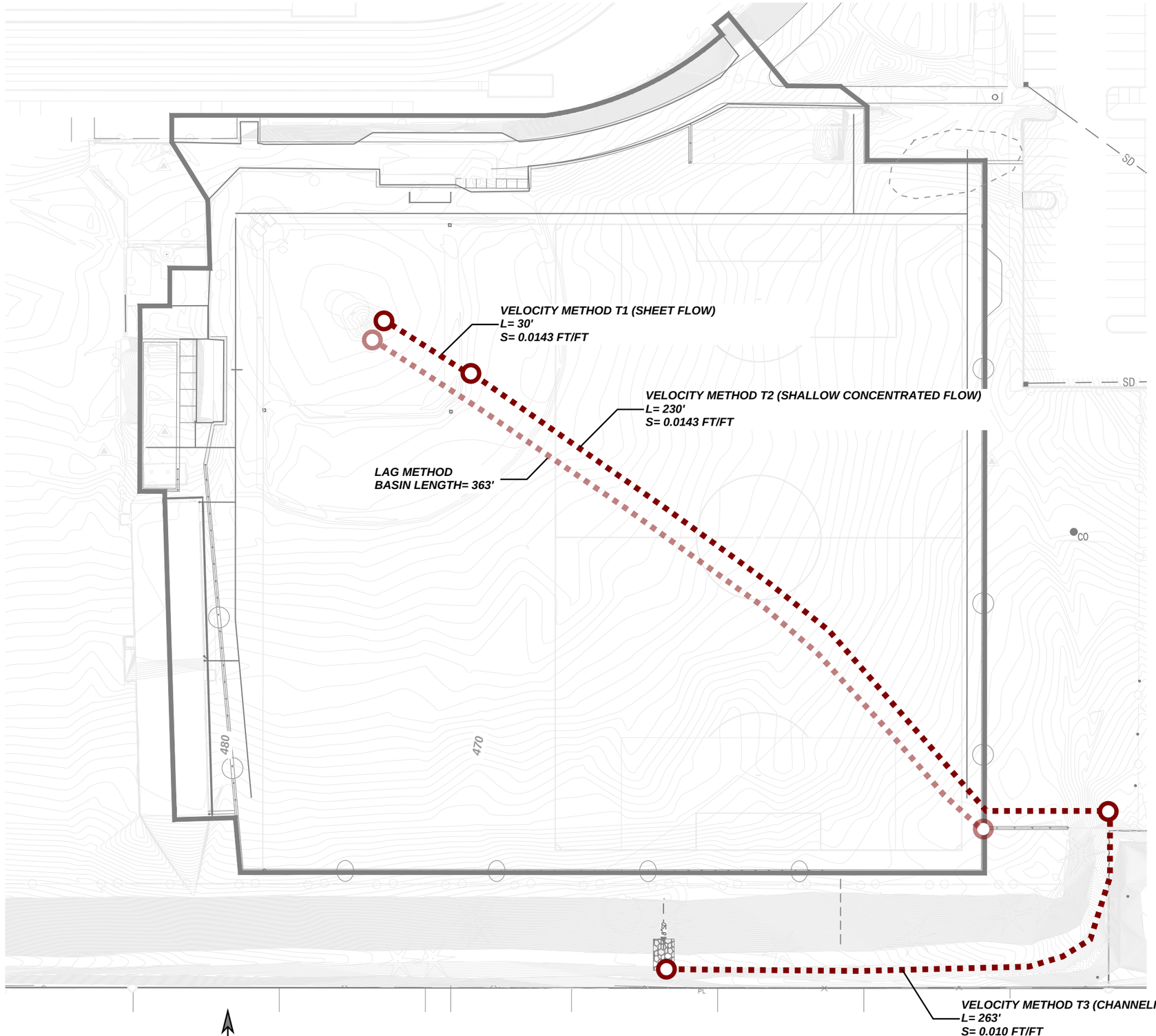
Hyd. No. 1

Basin S.1-Pre

Hydrograph type	= SBUH Runoff	Peak discharge	= 0.356 cfs
Storm frequency	= 25 yrs	Time to peak	= 480 min
Time interval	= 6 min	Hyd. volume	= 6,704 cuft
Drainage area	= 1.160 ac	Curve number	= 75
Basin Slope	= 1.0 %	Hydraulic length	= 1 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a



Appendix C2:
Calculations – Time of Concentration



PRE-DEVELOPMENT T_c CALCULATIONS

LAG METHOD (NEH 630.1502(a))

$$T_c = \frac{\ell^{0.8}\left(S+1\right)^{0.7}}{1{,}140Y^{0.5}}$$

T_c = time of concentration, h
ℓ = flow length, ft
Y = average watershed land slope, %
S = maximum potential retention, in $= \frac{1{,}000}{cn'} - 10$

l= 363 ft
Y= 1.43 % (0.0143 FT/FT)
cn'= CN= 75
S= (1000/75)-10= 3.33

$T_c = \frac{363^{0.8}(3.33+1)^{0.7}}{1140*1.43^{0.5}} = 0.229$ hr

T_c= 0.229 hr= 13.7 MIN

VELOCITY METHOD (NEH 630.1502(b))

SHEET FLOW (T_{sf}):

$$T_t = \frac{0.007(n\ell)^{0.8}}{(P_2)^{0.5}S^{0.4}}$$

where:
T_t = travel time, h
n = Manning's roughness coefficient (table 15–1)
ℓ = sheet flow length, ft
P_2 = 2-year, 24-hour rainfall, in
S = slope of land surface, ft/ft

n= 0.41 (BERMUDA GRASS (SEE TABLE 15-1)
L= 30 FT (SEE NRCS NEH EQ 5-9)
P_2= 2.5 INCH
S= 0.0143 FT/FT

$T_t = \frac{0.007(0.41x30)^{0.8}}{(2.5)^{0.5}X0.0143^{0.4}}$

T_t= 0.18 HR= 10.8 MIN

SHALLOW OVERLAND FLOW (T_{sf}):

$$T_t = \frac{L}{3600V}$$

T_t = travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours.

SEGMENT T2
L= 230 FT
V= 0.85 FT/S (NEH FIG 15-4, SHORT GRASS PRAIRIE)
T2= 230/(3600 x 0.85)= 0.075 HR= 4.5 MIN

SEGMENT T3
L= 263'
V= 1.6 FT/S (NEH FIG 15-4, GRASSED WATERWAYS)
T3= 263/(3600 x 1.6)= 0.046 HR= 2.7 MIN

TOTAL TIME OF CONCENTRATION
TC= T1 + T2 +T3 = 10.8 MIN + 4.5 MIN + 2.7 MIN
TC= 18 MIN

AVERAGE OF LAG AND VELOCITY METHOD (BASIS OF DESIGN)

T_c= 14.4 MIN

NOTES:
1. LAG METHOD BASED ON NRCS NEH 630.1502(a)
2. PRE-DEVELOPMENT LAND SLOPE BASED ON ACTUAL PREDEVELOPED CONDITIONS.

MAZZETTI

N

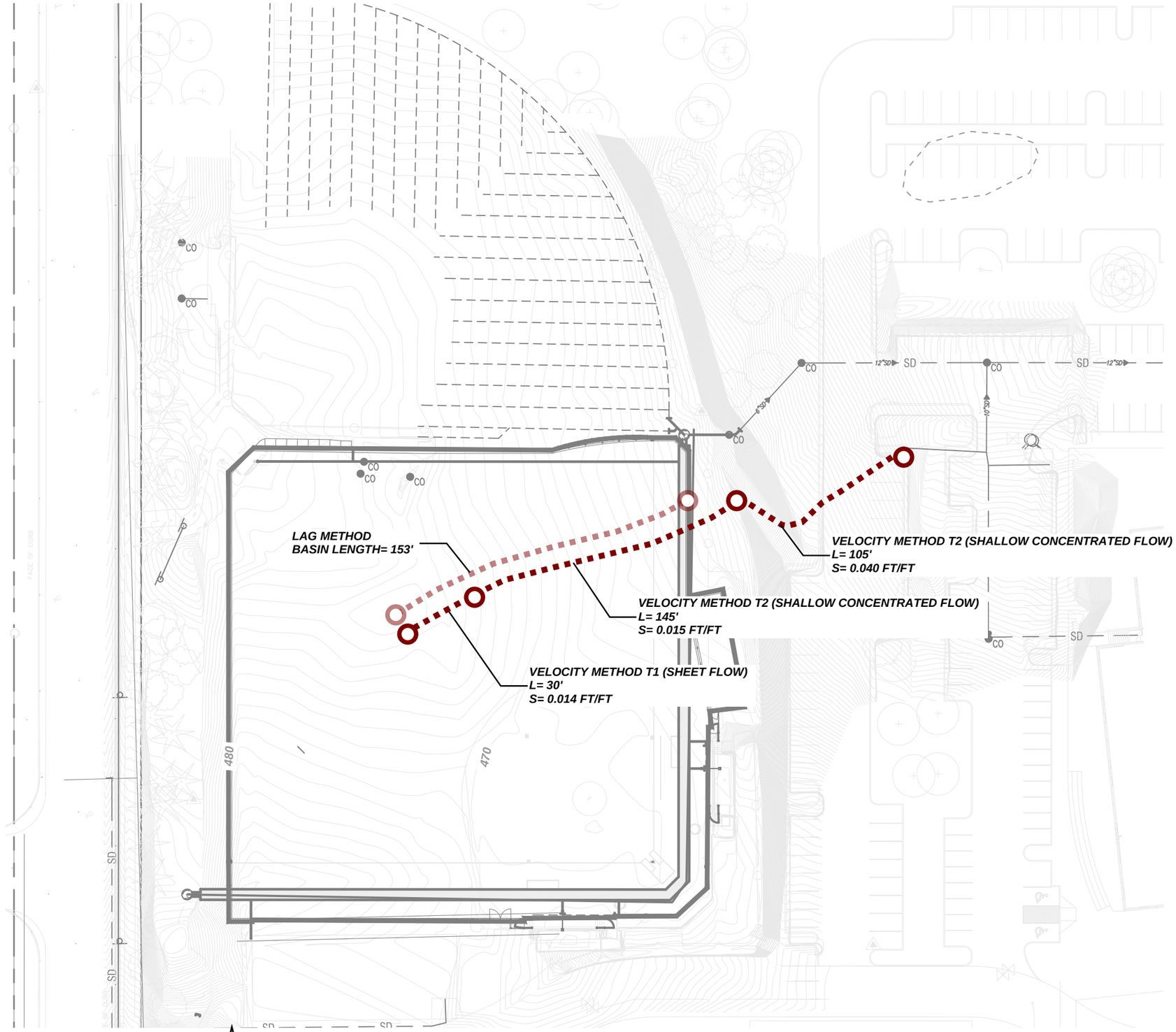
0' 50'

Scale: 1"= 50' 11/20/23

FIGURE T1B

TIME OF CONCENTRATION CALCULATIONS - PRE-DEVELOPMENT BASEBALL

SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS



PRE-DEVELOPMENT T_c CALCULATIONS

LAG METHOD (NEH 630.1502(a))

$$T_c = \frac{\ell^{0.8}\left(S+1\right)^{0.7}}{1{,}140Y^{0.5}}$$

T_c = time of concentration, h
ℓ = flow length, ft
Y = average watershed land slope, %
S = maximum potential retention, in $= \frac{1{,}000}{cn'} - 10$

l= 153 ft
Y= 1.50 % (0.0150 FT/FT)
cn'= CN= 75
S= (1000/75)-10= 3.33

$T_c = \frac{153^{0.8}(3.33+1)^{0.7}}{1140*1.50^{0.5}} = 0.112$ hr

T_c= 0.112 hr= 6.7 MIN

VELOCITY METHOD (NEH 630.1502(b))

SHEET FLOW (T_{st}):

$$T_t = \frac{0.007(n\ell)^{0.8}}{\left(P_2\right)^{0.5} S^{0.4}}$$

where:
T_t = travel time, h
n = Manning's roughness coefficient (table 15–1)
ℓ = sheet flow length, ft
P_2 = 2-year, 24-hour rainfall, in
S = slope of land surface, ft/ft

n= 0.41 (BERMUDA GRASS (SEE TABLE 15-1)
L= 30 FT (SEE NRCS NEH EQ 5-9)
P_2= 2.5 INCH
S= 0.0140 FT/FT

$T_t = \frac{0.007(0.41x30)^{0.8}}{(2.5)^{0.5}X0.0143^{0.4}}$

T_t= 0.18 HR= 10.8 MIN

SHALLOW OVERLAND FLOW (T_{sf}):

$$T_t = \frac{L}{3600V}$$

T_t = travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours.

SEGMENT T2
L= 145 FT
V= 0.85 FT/S (NEH FIG 15-4, SHORT GRASS PRAIRIE)
T2= 145/(3600 x 0.85)= 0.047 HR= 2.8 MIN

SEGMENT T3
L= 105'
V= 3.0 FT/S (NEH FIG 15-4, UPLAND GULLIES)
T3= 105/(3600 x 3.0)= 0.010 HR= 0.6 MIN

TOTAL TIME OF CONCENTRATION
TC= T1 + T2 +T3 = 10.8 MIN + 2.8 MIN + 0.6 MIN
TC= 14.2 MIN

AVERAGE OF LAG AND VELOCITY METHOD (BASIS OF DESIGN)

T_c= 10.5 MIN

NOTES:
1. LAG METHOD BASED ON NRCS NEH 630.1502(a)
2. PRE-DEVELOPMENT LAND SLOPE BASED ON ACTUAL PREDEVELOPED CONDITIONS.

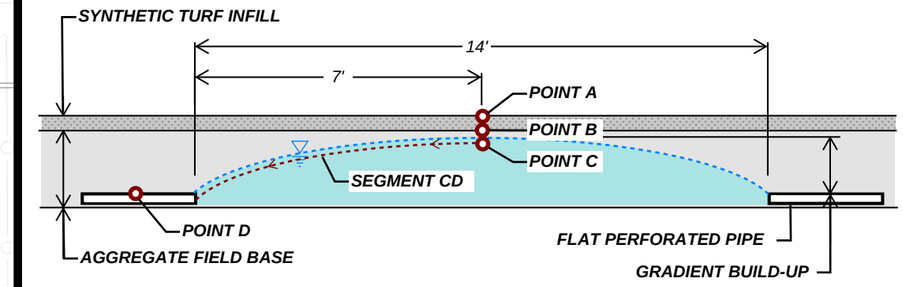
MAZZETTI

N

0' 50'

Scale: 1"= 50' 11/20/23

FIGURE T1B
TIME OF CONCENTRATION CALCULATIONS - PRE-DEVELOPMENT BASEBALL
SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS



SYNTHETIC TURF FIELD CROSS-SECTION DIAGRAM

NOTES:
1. REFER TO TABLE T2 FOR CALCULATIONS AND METHODOLOGY

POINT E

SEGMENT DE
(FLAT PERFORATED PIPE)

POINT A, B, C

POINT D

SEGMENT EF
(PERFORATED COLLECTOR PIPE)
TC IS RAPID / IGNORED

DETENTION SYSTEM

POINT F

OUTFALL TO EXISTING OPEN CHANNEL

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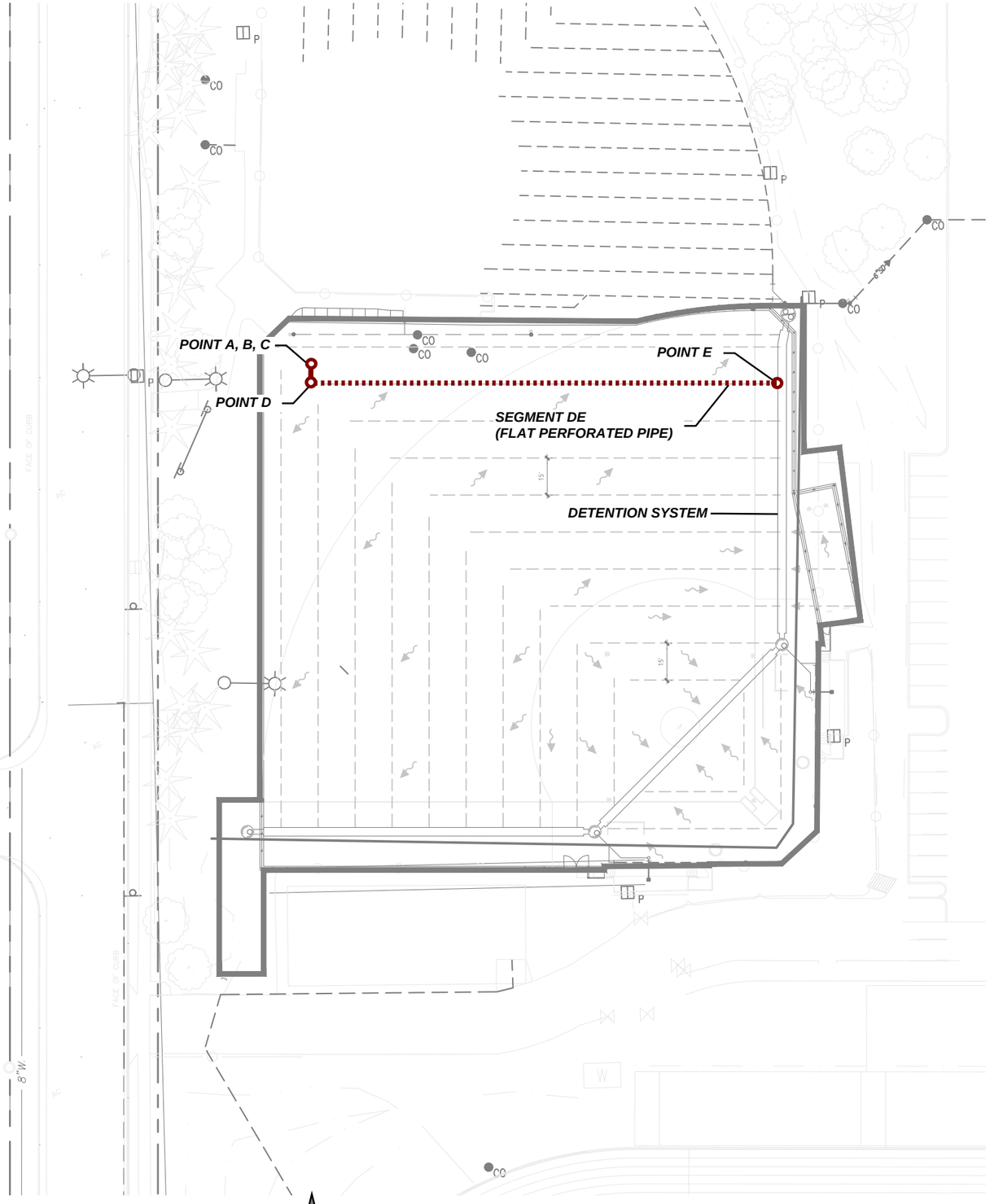
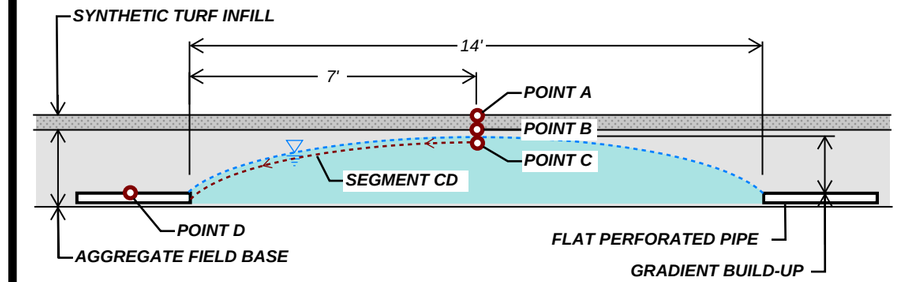
N

0' 50'

Scale: 1"= 50' 11/20/23

FIGURE T2B
TIME OF CONCENTRATION CALCULATIONS - POST-DEVELOPMENT BASEBALL
SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS





SYNTHETIC TURF FIELD CROSS-SECTION DIAGRAM

NOTES:
1. REFER TO TABLE T2 FOR CALCULATIONS AND METHODOLOGY

MAZZETTI

N

0' 50'

Scale: 1"= 50' 11/20/23

FIGURE T2S
TIME OF CONCENTRATION CALCULATIONS - POST-DEVELOPMENT SOFTBALL
SOUTHRIDGE HIGH SCHOOL ATHLETIC FIELDS

Table T2B - Time of Concentration Calculations: Baseball Field

There will be no surface runoff from the synthetic field. All drainage from these areas overlaying the permeable aggregate will be collected by the subsurface drainage system. The time concentraction for these areas is comprised of the following segments:

Flow Segments

AB	Vertical percolation through the synthetic turf.
BC	Vertical percolation through the permeable aggregate.
CD	Lateral percolation on a gradient through the permeable aggregate to the subsurface drainage trench.
DE/EF	Pipe flow through the subsurface drainage system to the onsite storm system.

Travel Time Calculations

Segment	Reach Type	Surface Description	Hydraulic Conductivity "k" (ft/min)	Length (ft)	Upper Elev (ft)	Lower Elev (ft)	Gradient (ft/ft)	Velocity (ft/min)	Tc (min)
AB	Percolation	Turf	0.097	0.125	470.93	470.805	1.00	0.097	1.3
BC	Percolation	Aggregate	1.389	0.500	470.805	470.31	1.00	1.389	0.4
	Gradient Buildup - Assume earlier storm (no time)								
CD	Percolation	Aggregate	1.389	7.5	470.72	470.31	0.0553	0.0769	97.6

	Reach Type	Pipe Type	Manning's "n" Value	Length (ft)	Upper Elev (ft)	Lower Elev (ft)	Pipe Slope (ft/ft)	Velocity (ft/s)	Tc (min)
DE/EF	Pipe	Flat HDPE	0.013	236	470.31	469.125	0.0050	1	3.9

Total Tc (min)= 103.2

Synthetic Turf System Permeability

Testing on other synthetic fields suggest a drainage rate of approximately 70 inches per hour.
This corresponds to a percolation of 0.097 feet per minute.

Aggregate Permeability

The permeability of the aggregate is estimated with the 10th percentile particle size. Based on sieve testing on synthetic field and track installations, the 10th percentile particle size typically ranges around the #20 sieve.
The permeability rate is calculated as follows:
K=100(DxD) where D = 10th percentile particle size in cm and K= permeability in cm/sec.

D=	0.084	cm
K=	0.7056	cm/s
K=	1.389	ft/min

Gradient Build Up

For the purposes of this calculation, a 5 inch gradient is assumed to be already in place between each of the subsurface drainage pipes. This would be the case with successive storm events, and represents the maximum water surface at 1" below the sythetic turf infill. If the gradient build-up is not n place, the time of concentration would be significantly longer due to the flatter gradient.

Lateral Percolation

This is calculated with Darcy's Law where the flow velocity is the product of the permeability rate and the gradient.

Pipe Flows

The calculation estimates travel times assuming the pipes are flowing full. The actual flows through the subsurface drainage system lateral piping will be significantly less than full capacity and will therefore have slower flow velocities and longer travel times than those shown in the calculation.

Table T2S - Time of Concentration Calculations: Softball Field

There will be no surface runoff from the synthetic field. All drainage from these areas overlaying the permeable aggregate will be collected by the subsurface drainage system. The time concentraction for these areas is comprised of the following segments:

Flow Segments

AB	Vertical percolation through the synthetic turf.
BC	Vertical percolation through the permeable aggregate.
CD	Lateral percolation on a gradient through the permeable aggregate to the subsurface drainage trench.
DE/EF	Pipe flow through the subsurface drainage system to the onsite storm system.

Travel Time Calculations

Segment	Reach Type	Surface Description	Hydraulic Conductivity "k" (ft/min)	Length (ft)	Upper Elev (ft)	Lower Elev (ft)	Gradient (ft/ft)	Velocity (ft/min)	Tc (min)
AB	Percolation	Turf	0.097	0.125	470.93	470.805	1.00	0.097	1.3
BC	Percolation	Aggregate	1.389	0.500	470.805	470.31	1.00	1.389	0.4
	Gradient Buildup - Assume earlier storm (no time)								
CD	Percolation	Aggregate	1.389	7.5	470.72	470.31	0.0553	0.0769	97.6

	Reach Type	Pipe Type	Manning's "n" Value	Length (ft)	Upper Elev (ft)	Lower Elev (ft)	Pipe Slope (ft/ft)	Velocity (ft/s)	Tc (min)
DE/EF	Pipe	Flat HDPE	0.013	190	470.31	469.355	0.0050	1	3.2

Total Tc (min)= 102.4

Synthetic Turf System Permeability

Testing on other synthetic fields suggest a drainage rate of approximately 70 inches per hour.
This corresponds to a percolation of 0.097 feet per minute.

Aggregate Permeability

The permeability of the aggregate is estimated with the 10th percentile particle size. Based on sieve testing on synthetic field and track installations, the 10th percentile particle size typically ranges around the #20 sieve.
The permeability rate is calculated as follows:
K=100(DxD) where D = 10th percentile particle size in cm and K= permeability in cm/sec.

D=	0.084	cm
K=	0.7056	cm/s
K=	1.389	ft/min

Gradient Build Up

For the purposes of this calculation, a 5 inch gradient is assumed to be already in place between each of the subsurface drainage pipes. This would be the case with successive storm events, and represents the maximum water surface at 1" below the sythetic turf infill. If the gradient build-up is not n place, the time of concentration would be significantly longer due to the flatter gradient.

Lateral Percolation

This is calculated with Darcy's Law where the flow velocity is the product of the permeability rate and the gradient.

Pipe Flows

The calculation estimates travel times assuming the pipes are flowing full. The actual flows through the subsurface drainage system lateral piping will be significantly less than full capacity and will therefore have slower flow velocities and longer travel times than those shown in the calculation.

Appendix D1:
Geotechnical Report

Download Here:
https://files.mazzetti.com/dl/mBY0YVucEn

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Appendix D2:
NRCS Soil Data

Soil Map
Hydrologic Soil Group
Water Features

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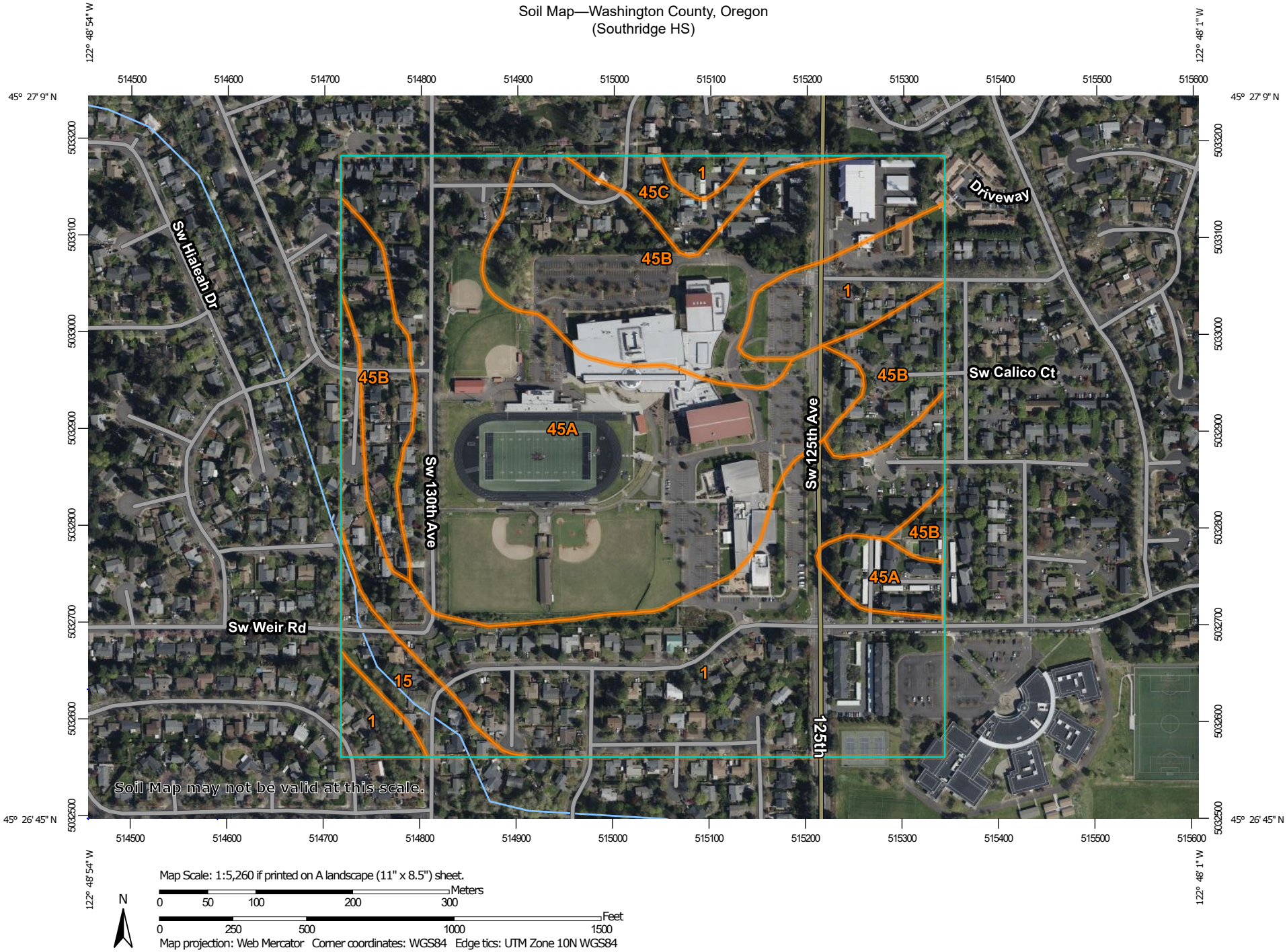
T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Soil Map—Washington County, Oregon
(Southridge HS)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 22, Sep 14, 2022

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

Date(s) aerial images were photographed: Apr 16, 2021—Apr 18, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Aloha silt loam	33.7	34.9%
15	Dayton silt loam	2.8	2.9%
45A	Woodburn silt loam, 0 to 3 percent slopes	34.5	35.8%
45B	Woodburn silt loam, 3 to 7 percent slopes	23.0	23.9%
45C	Woodburn silt loam, 7 to 12 percent slopes	2.4	2.5%
Totals for Area of Interest		**96.5**	**100.0%**

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Washington County, Oregon			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
1—Aloha silt loam			
Aloha	90	—	C/D

Hydrologic Soil Group and Surface Runoff–Washington County, Oregon			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
15—Dayton silt loam			
Dayton	90	—	D
45A—Woodburn silt loam, 0 to 3 percent slopes			
Woodburn	85	—	C
45B—Woodburn silt loam, 3 to 7 percent slopes			
Woodburn	85	—	C
45C—Woodburn silt loam, 7 to 12 percent slopes			
Woodburn	85	—	C

Data Source Information

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 22, Sep 14, 2022

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table. The kind of water table, apparent or perched, is given if a seasonal high water table exists in the soil. A water table is perched if free water is restricted from moving downward in the soil by a restrictive feature, in most cases a hardpan; there is a dry layer of soil underneath a wet layer. A water table is apparent if free water is present in all horizons from its upper boundary to below 2 meters or to the depth of observation. The water table kind listed is for the first major component in the map unit.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Report—Water Features

Map unit symbol and soil name	Hydrologic group	Surface runoff	Most likely months	Water table			Ponding			Flooding	
				Upper limit	Lower limit	Kind	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*		*Ft*				
1—Aloha silt loam											
Aloha	C/D		Jan-Apr	1.5-2.0	1.7-3.3	Apparent	—	—	None	—	None
			May-Nov	—	—	—	—	—	None	—	None
			Dec	1.5-2.0	1.7-3.3	Apparent	—	—	None	—	None
15—Dayton silt loam											
Dayton	D		Jan-May	0.0-2.0	6.0	Apparent	0.0-0.5	Long (7 to 30 days)	Frequent	—	None
			Jun-Oct	—	—	—	—	—	None	—	None
			Nov-Dec	0.0-2.0	6.0	Apparent	0.0-0.5	Long (7 to 30 days)	Frequent	—	None
45A—Woodburn silt loam, 0 to 3 percent slopes											
Woodburn	C		Jan-Mar	2.1-2.7	6.0	Apparent	—	—	None	—	None
			Apr	2.7-3.2	6.0	Apparent	—	—	None	—	None
			May	4.5-5.7	6.0	Apparent	—	—	None	—	None
			Jun-Nov	—	—	—	—	—	None	—	None
			Dec	2.1-2.7	6.0	Apparent	—	—	None	—	None
45B—Woodburn silt loam, 3 to 7 percent slopes											
Woodburn	C		Jan-Mar	2.1-2.7	6.0	Apparent	—	—	None	—	None
			Apr	2.7-3.2	6.0	Apparent	—	—	None	—	None
			May	4.5-5.7	6.0	Apparent	—	—	None	—	None
			Jun-Nov	—	—	—	—	—	None	—	None
			Dec	2.1-2.7	6.0	Apparent	—	—	None	—	None

Map unit symbol and soil name	Hydrologic group	Surface runoff	Most likely months	Water table			Ponding			Flooding	
				Upper limit	Lower limit	Kind	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*		*Ft*				
45C—Woodburn silt loam, 7 to 12 percent slopes											
Woodburn	C		Jan-Mar	2.1-2.7	6.0	Apparent	—	—	None	—	None
			Apr	2.7-3.2	6.0	Apparent	—	—	None	—	None
			May	4.5-5.7	6.0	Apparent	—	—	None	—	None
			Jun-Nov	—	—	—	—	—	None	—	None
			Dec	2.1-2.7	6.0	Apparent	—	—	None	—	None

Data Source Information

Soil Survey Area: Washington County, Oregon
Survey Area Data: Version 22, Sep 14, 2022

Appendix E:
Operations and Maintenance Information

Draft CWS Private Stormwater Facilities Agreement
Draft Operation and Maintenance Guidelines
Draft Operation and Maintenance Logs

V

MAZZETTI
T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204
T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

After Recording Return to:
Clean Water Services
2550 SW Hillsboro Hwy.
Hillsboro, OR 97123

PRIVATE STORMWATER FACILITIES AGREEMENT

This Agreement is made and entered into this _____ day of _____ 20___, by and between Clean Water Services (District) and _____ (Owner) whose address is _____.

RECITALS

A. Owner has developed or will develop the Facilities listed below. (List the type of private stormwater facilities on site and the quantity of each type).

Facility type (list each) _____ Quantity_____

B. The Facilities enable development of property while mitigating the impacts of additional surface water and pollutants associated with stormwater runoff prior to discharge from the property to the public stormwater system. The consideration for this Agreement is connection to the public stormwater system.

C. The property benefited by the Facilities and subject to the obligation of this Agreement is described below or in Exhibit A (Property) attached hereto and incorporated by reference.

D. The Facilities are designed by a registered professional engineer to accommodate the anticipated volume of runoff and to detain and treat runoff in accordance with District's Design and Construction Standards.

E. Failure to inspect and maintain the Facilities can result in an unacceptable impact to the public stormwater system.

NOW, THEREFORE, it is agreed by and between the parties as follows:

1. OWNER INSPECTIONS District shall provide Owner an Operations and Maintenance Plan (O&M Plan) for each Facility. Owner agrees to operate, inspect and maintain each Facility in accordance with the current O&M Plan and any subsequent modifications to the Plan. Owner shall maintain a log of inspection activities. The log shall be available to District upon request or during District inspections.

2. DEFICIENCIES All aspects in which the Facilities fail to satisfy the O&M Plan shall be noted as "Deficiencies".

3. OWNER CORRECTIONS All Deficiencies shall be corrected at Owner's expense within thirty (30) days after completion of the inspection. If more than 30 days is reasonably needed to correct a Deficiency, Owner shall have a reasonable period to correct the Deficiency so long as the correction is commenced within the 30-day period and is diligently prosecuted to completion.

4. DISTRICT INSPECTIONS Owner grants District the right to inspect the Facilities. District will endeavor to give ten (10) days prior written notice to Owner, except that no notice shall be required in case of an emergency. District shall determine whether Deficiencies need to be corrected. Owner (at the address provided in this Agreement, or such other address as Owner may designate in writing to District) will be notified in writing through the US Mail of the Deficiencies and shall make corrections within 30 days of the date of the notice.

5. DISTRICT CORRECTIONS If correction of all Owner or District identified Deficiencies is not completed within thirty (30) days after Owner's inspection or District notice, District shall have the right to have any Deficiencies corrected. District (i) shall have access to the Facilities for the purpose of correcting such Deficiencies and (ii) shall bill Owner for all costs reasonably incurred by District for work performed to correct the Deficiencies (District Correction Costs) following Owner's failure to correct any Deficiencies in the Facilities. Owner shall pay District the District Correction Costs within thirty (30) days of the date of the invoice. Owner understands and agrees that upon non-payment, District Correction Costs shall be secured by a lien on the Property for the District Correction Cost amount plus interest and penalties.

6. EMERGENCY MEASURES If at any time District reasonably determines that the Facilities create any imminent threat to public health, safety or welfare, District may immediately and without prior notice to Owner take measures reasonably designed to remedy the threat. District shall provide notice of the threat and the measures taken to Owner as soon as reasonably practicable, and charge Owner for the cost of these corrective measures.

7. FORCE AND EFFECT This Agreement has the same force and effect as any deed covenant running with the land and shall benefit and bind all owners of the Property present and future, and their heirs, successors and assigns.

8. AMENDMENTS The terms of this Agreement may be amended only by mutual agreement of the parties. Any amendments shall be in writing, shall refer specifically to this Agreement, and shall be valid only when executed by the owners of the Property, District and recorded in the Official Records of the county where the Property is located.

9. PREVAILING PARTY In any action brought by either party to enforce the terms of this Agreement, the prevailing party shall be entitled to recover all costs, including reasonable attorney's fees as may be determined by the court having jurisdiction, including any appeal.

10. SEVERABILITY The invalidity of any section, clause, sentence, or provision of this Agreement shall not affect the validity of any other part of this Agreement, which can be given effect without such invalid part or parts.

IN WITNESS WHEREOF, Owner and District have signed this Agreement.

NOTARIZE DOCUMENT BELOW

INDIVIDUAL OWNERS SIGN BELOW

_____
Owner (Individual)

_____
Owner (Individual)

CORPORATE, LLC, PARTNERSHIP, TRUST OR OTHER LEGAL ENTITY SIGN BELOW

_____
(Entity name)

By: _____
(Sign here for entity)

Title: _____

CLEAN WATER SERVICES

By: _____
General Manager or Designee

APPROVED AS TO FORM

_____
District Counsel

[Use this notary block if OWNER is an individual.]

STATE OF _____)
)
County of _____)

This instrument was acknowledged before me this _____day of _____, 20____,
by _____.

_____
Notary Public

[Use this notary block if OWNER is an entity.]

STATE OF _____)
)
County of _____)

This instrument was acknowledged before me on _____(date)
by_____(name of person) as
_____ (title) of _____(name of entity).

_____
Notary Public

MAINTENANCE GUIDELINES FOR CLOSED-PIPE DETENTION SYSTEMS

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the diameter of the storage area for 1/2 length of storage vault or any point depth exceeds 15% of diameter. (Example: 72-inch storage tank would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of tank.)	All sediment and debris removed from storage area.
	Joints Between Tank/Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability).	All joint between tank/pipe sections are sealed.
	Tank Pipe Bent Out of Shape	Any part of tank/pipe is bent out of shape more than 10% of its design shape. (Review required by engineer to determine structural stability).	Tank/pipe repaired or replaced to design.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch and any evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determines that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or any evidence of soil particles entering the vault through the walls.	Vault replaced or repaired to design specifications and is structurally sound. No cracks more than 1/4-inch wide at the joint of the inlet/outlet pipe.
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design standards. Allows maintenance person safe access.

MAINTENANCE GUIDELINES FOR FLOW CONTROL STRUCTURES

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.
	Structural Damage	Structure is not securely attached to manhole wall. Structure is not in upright position (allow up to 10% from plumb). Connections to outlet pipe are not watertight and show signs of rust. Any holes - other than designed holes - in the structure.	Structure securely attached to wall and outlet pipe. Structure in correct position. Connections to outlet pipe are water tight; structure repaired or replaced and works as designed. Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing. Gate cannot be moved up and down by one maintenance person. Chain/rod leading to gate is missing or damaged. Gate is rusted over 50% of its surface area.	Gate is watertight and works as designed. Gate moves up and down easily and is watertight. Chain is in place and works as designed. Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)	See Table V-A.3: Maintenance Standards - Closed Detention Systems (Tanks/Vaults)

Note:

Maintenance guidelines shown hereon are taken from the Washington Department of Ecology Stormwater Management Manual for Western Washington

Clean Water Services

Private Water Quality
Inspection Log

Attention:

This inspection log is to remain on site and must be made available upon request by District or City employees.

Property description:
Site address:
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____
Inspection Date: _____ Inspected by: _____ Comments: _____ _____ _____

2550 SW Hillsboro Highway Hillsboro, Oregon 97123
Phone: (503) 681-3600 Fax: (503) 681-3603 www.CleanWaterServices.org

Clean Water Services

Appendix F:
Clean Water Services Service Provider Letter

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Clean Water Services

SENSITIVE AREA PRE-SCREENING SITE ASSESSMENT

Clean Water Services File Number 23-001111

1. **Jurisdiction:** Washington County

2. **Property Information** (example: 1S234AB01400)
   Tax lot ID(s): 1S128DD 300

   ***OR* Site Address:** 9625 SW 125th Ave
   City, State, Zip: Beaverton,OR,97008
   Nearest cross street:

3. **Owner Information**
   Name: Chris Hansen
   Company: Beaverton School District
   Address: 16550 SW Merlo Road
   City, State, Zip: Beaverton,OR,97003
   Phone/fax: 503-356-4321
   Email: christopher_hansen@beaverton.k12.or.us

4. **Development Activity** (check **all** that apply)
   - ☐ Addition to single family residence (rooms, deck, garage)
   - ☐ Lot line adjustment
   - ☐ Minor land partition
   - ☐ Residential condominium
   - ☐ Commercial condominium
   - ☐ Residential subdivision
   - ☐ Commercial subdivision
   - ☐ Single lot commercial
   - ☐ Multi lot commercial

   Other: Two existing natural turf fields to synthetic turf

4. **Applicant Information**
   Name: Cameron Lamont
   Company: Mazzetti
   Address: 121 SW Salmon St., Suite 1000
   City, State, Zip: Portland,OR,97204
   Phone/fax: 503-601-5959
   Email: clamont@mazzetti.com

6. **Will the project involve any off-site work?** ☐ Yes ☒ No ☐ Unknown
   Location and description of off-site work:

7. **Additional comments or information that may be needed to understand your project:**

This application does NOT replace Grading and Erosion Control Permits, Connection Permits, Building Permits, Site Development Permits, DEQ 1200-C Permit or other permits as issued by the Department of Environmental Quality, Department of State Lands and/or Department of the Army COE. All required permits and approvals must be obtained and completed under applicable local, state, and federal law.

By signing this form, the Owner or Owner's authorized agent or representative, acknowledges and agrees that employees of Clean Water Services have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related to the project site. I certify that I am familiar with the information contained in this document, and to the best of my knowledge and belief, this information is true, complete, and accurate.

Print/type name Cameron Lamont Print/type title Civil Designer

Signature ONLINE SUBMITTAL Date 4/10/2023

FOR DISTRICT USE ONLY

- ☐ Sensitive areas potentially exist on site or within 200' of the site. **THE APPLICANT MUST PERFORM A SITE ASSESSMENT PRIOR TO ISSUANCE OF A SERVICE PROVIDER LETTER.** If Sensitive Areas exist on the site or within 200 feet on adjacent properties, a Natural Resources Assessment Report may also be required.
- ☐ Based on review of the submitted materials and best available information sensitive areas do not appear to exist on site or within 200' of the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider Letter as required by Resolution and Order 19-5, Section 3.02.1, as amended by Resolution and Order 19-22. All required permits and approvals must be obtained and completed under applicable local, State and federal law.
- ■ Based on review of the submitted materials and best available information the above referenced project will not significantly impact the existing or potentially sensitive area(s) found near the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect additional water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider Letter as required by Resolution and Order 19-5, Section 3.02.1, as amended by Resolution and Order 19-22. All required permits and approvals must be obtained and completed under applicable local, state and federal law.
- ☐ **THIS SERVICE PROVIDER LETTER IS NOT VALID UNLESS _____ CWS APPROVED SITE PLAN(S) ARE ATTACHED.**
- ☐ The proposed activity does not meet the definition of development or the lot was platted after 9/9/95 ORS 92.040(2). **NO SITE ASSESSMENT OR SERVICE PROVIDER LETTER IS REQUIRED.**

Reviewed by Chealsey Rosebrook Date 4/11/2023

Once complete, email to: **SPLReview@cleanwaterservices.org** • Fax: **(503) 681-4439**
OR mail to: SPL Review, Clean Water Services, 2550 SW Hillsboro Highway, Hillsboro, Oregon 97123

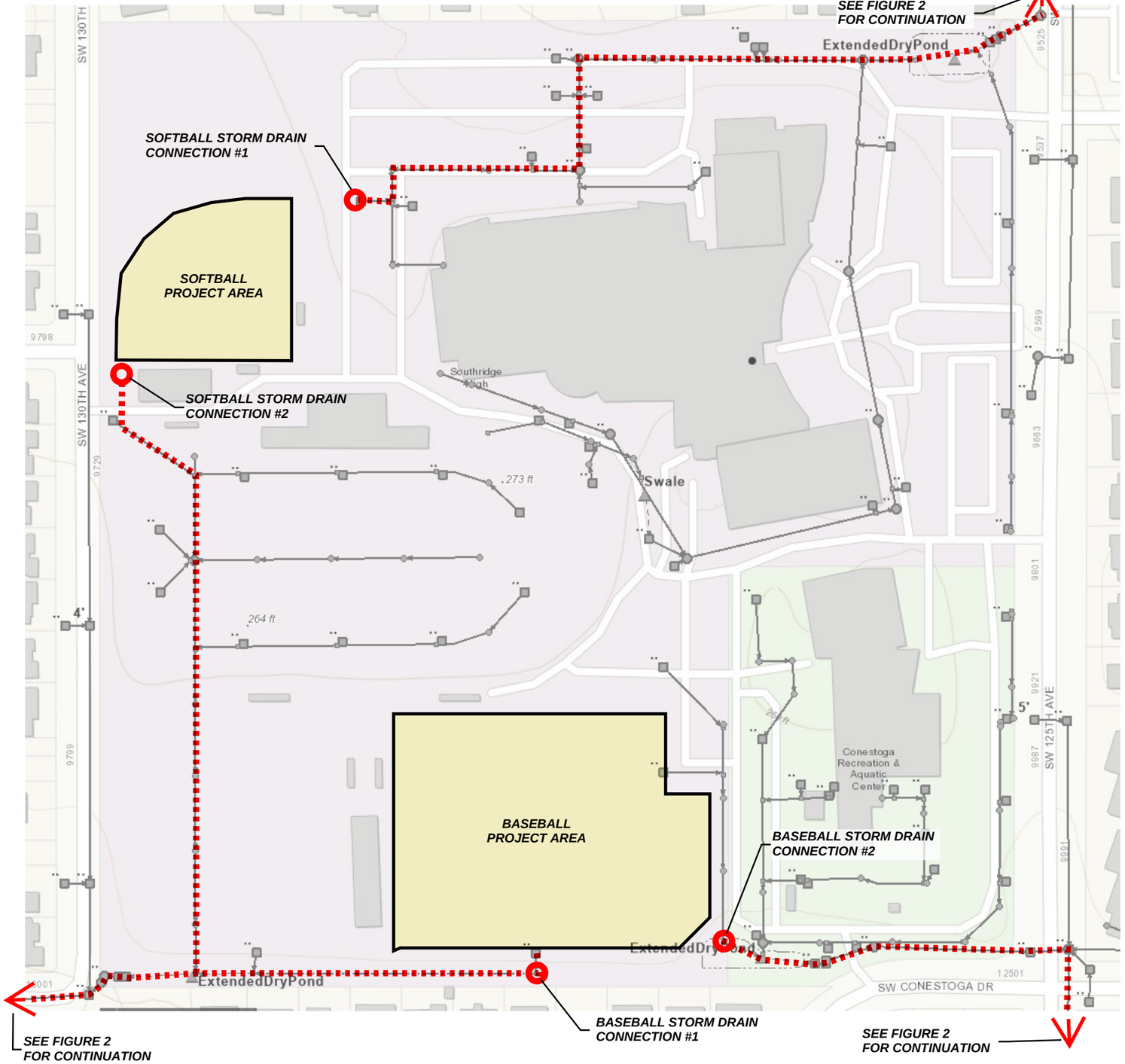
Revised 2/2020

Appendix G:
Hydromodification Risk Assessment

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401



4.03.3 - Hydromodification Assessment Methodology

Project Site: Southridge High School
9625 SW 125th Ave,
Beaverton, OR 97008

- **Risk Level**: LOW (Softball) MODERATE (Baseball) (Refer to Figure 2)
- **Development Class**: Developed Area (classified as an area added to the Urban Growth Boundary prior to 2002)
- **Project Size Category**: Large (80,000 sq ft and larger)

CONCLUSION: Project is a Category 2 Project

TABLE 4-2
HYDROMODIFICATION APPROACH PROJECT CATEGORY TABLE

Development Class/ Risk Level	Small Project 1,000 – 12,000 SF	Medium Project >12,000 – 80,000 SF	Large Project > 80,000 SF
Expansion/High	Category 1	Category 3	Category 3
Expansion/ Moderate			
Expansion/ Low		Category 2	
Developed/ High		Category 3	
Developed/ Moderate		Category 2	Category 2
Developed/ Low			

Category 2
Projects in Category 2 represent those with a moderate anticipated risk. Any of the following options may be used to address hydromodification:

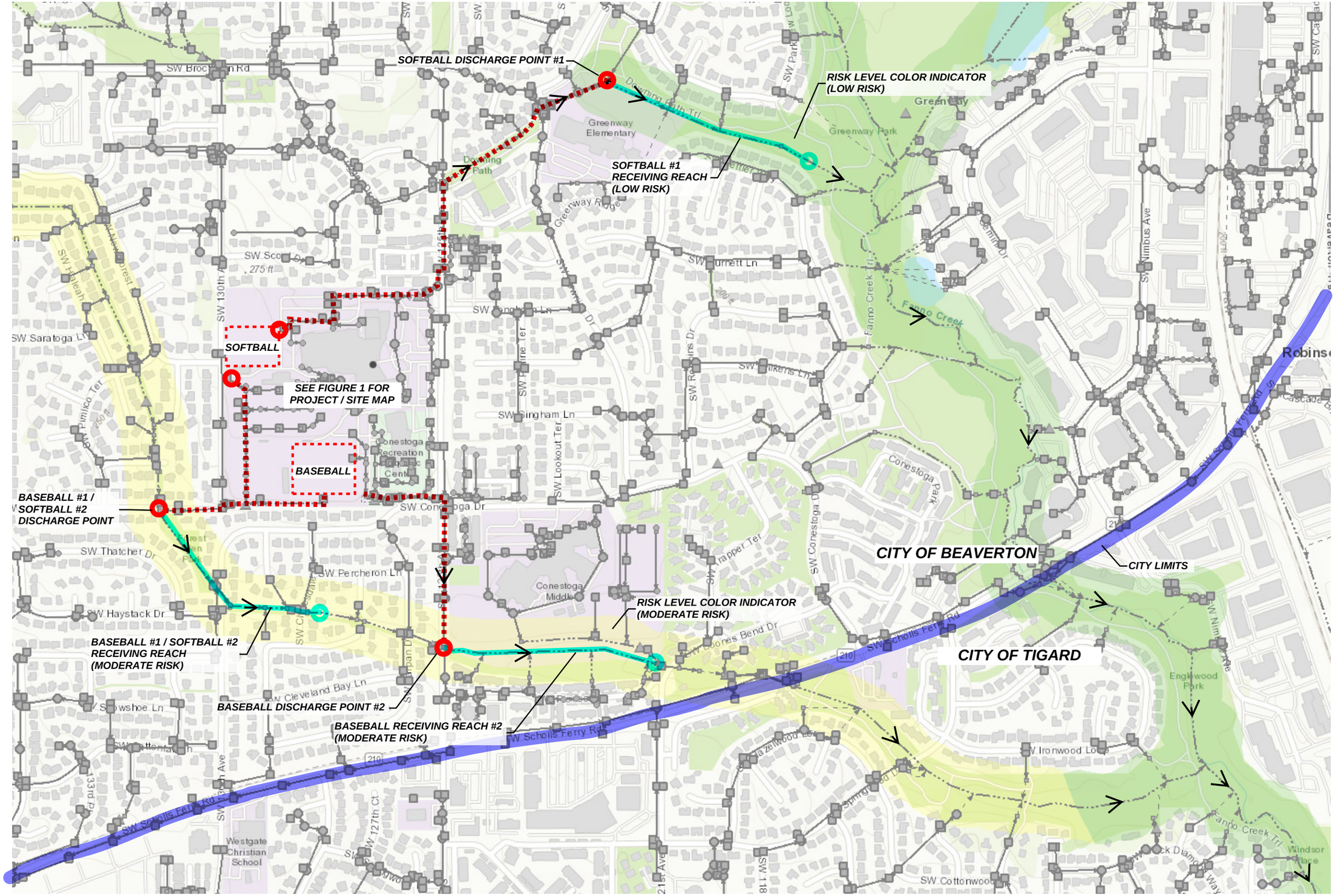
1. Infiltration facility, using the Standard Sizing, described in Section 4.08.5; or
2. Peak-Flow Matching Detention, using design criteria described in Section 4.08.6; or
3. Combination of Infiltration facility and Peak-Flow Matching Detention, using criteria described in Section 4.08.5 and 4.08.6; or
4. Any option listed in Category 3.

NOTE: Project is outside of the Cooper Mountain Community range

MAZZETTI

N 04/12/23
NOT TO SCALE

FIGURE 1
HYDROMODIFICATION ASSESSMENT - PROJECT SITE MAP / METHODOLOGY
BSD SOUTHRIDGE ATHLETIC FIELDS



MAZZETTI

N

04/12/23
NOT TO SCALE

FIGURE 2
HYDROMODIFICATION ASSESSMENT - RECEIVING REACH MAP
BSD SOUTHRIDGE ATHLETIC FIELDS

Appendix H:
2014 City of Beaverton
Evaluation of Existing Stormwater Facilities

MAZZETTI

T 503.620.3232
121 SW Salmon Street, Suite 1000
Portland, OR 97204

T 541.686.8478
940 Willamette Street, Suite 310
Eugene, OR 97401

Beaverton
OREGON

CITY OF BEAVERTON

PO 4755, Beaverton, OR 97076
www.beavertonoregon.gov

Date: 6/18/2014
503-526-2552 OFFICE

Approved: 06/18/2014
Expires: 06/18/2016
Plan Reviewer: gdorsey

Approved: Engineering

Approved: Planning

SITE DEVELOPMENT PERMIT

Permit #: SD2014-0005
Project Name: Southridge HS Community Plaza

Project Address: 9625 SW 125TH AVE
Map/Tax Lot #: 1S128DD00300

Owner: Beaverton School District
Address: 16550 SW Merlo Rd. Beaverton OR 97006
Telephone Number (503) 591-4308

Fax
Email address:
patrick o'harrow@beaverton.k12

Contractor: HOFFMAN CONSTRUCTI
Address: 805 SW BROADWAY SUITE 2100 PORTLAND
Telephone Number (503) 221-8811
CCB No: 28417
Contact Na Dave Garske

Fax
Email address:
dave-garske@hoffmancorp.com

THIS PERMIT IS NOT VALID UNLESS SIGNED BY THE OWNER OR AN OWNER'S AUTHORIZED AGENT. PERMITS ARE NOT TRANSFERABLE UNLESS SPECIFICALLY APPROVED BY THE CITY AFTER SUBMITTAL OF A REVISED PERMIT APPLICATION FROM THE RESPONSIBLE PARTIES.

Owners /Authorized Agent:

Print Name: PATRICK O'Harrow

Signature: Patrick O'Harrow Date: 6-23-14

Copy of permit and approved plans to be kept on site

kpff

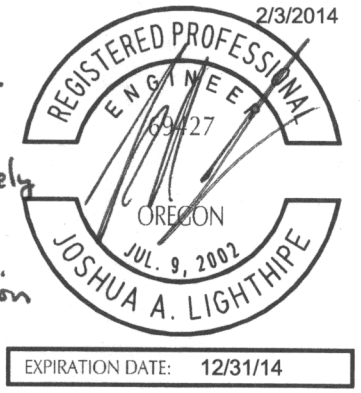
STORMWATER DRAINAGE REPORT

FOR

SOUTHRIDGE HIGH SCHOOL – SKYHAWK PLAZA

Beaverton, Oregon

For what it is worth,
Mitigation for impervious Area
Surface water runoff for this
Part of the site is adequately
addressed by the existing
Stormwater treatment and Detention
Pond located at the NorthEast
Corner of the School Site.



That is, there is no "Code reason" to Construct the
Proposed LIDA Swale.

If the applicant wants
to build one for Show
and tell purposes ... so be it.

Mark Boguslawski
2-13-2014

KPFF Consulting Engineers
111 SW Fifth Avenue, Suite 2500
Portland, Oregon 97204
Ph. 503-227-3251

Prepared by: Steve Olson, EIT
Project Engineer: Josh Lighthipe, PE

February 3, 2014

KPFF Project No. 313044