



Memorandum

To: Planning Commission
From: Niall Connolly, Principal Planner
Date: October 16th, 2026
Re: Design Development Review, Parking Lot at MeMe's Cafe, 975 Zion Park Blvd

Introduction

Trista and Matt Rayner applied for Design Development Review approval for a new parking lot at his property at 975 Zion Park Blvd.



Figure 1. Aerial view of the Property

There will be 11 spaces in the proposed parking lot, including two disabled spaces. Seven of the existing parking spaces will be removed and so, post development, there will be a net of four additional parking spaces on the property as a whole. Four of the existing spaces will revert to landscape. (Note - the engineering study says that there would be twelve new spaces, but the plans show eleven. In the original

design, there were twelve standard spaces, but the design was amended to create nine standard spaces, with two ADA spaces. The overall footprint has not changed, and therefore the conclusions of the engineering study are not affected.)



Figure 2. Aerial view showing existing parking spaces that will be removed



Figure 3. Four existing parking spaces will revert to landscape, and three spaces will be removed to create the entrance to the new parking lot. One parking space will remain.

The proposal also includes converting areas behind the restaurant buildings (which are now used for storage or back of house uses) to landscape.

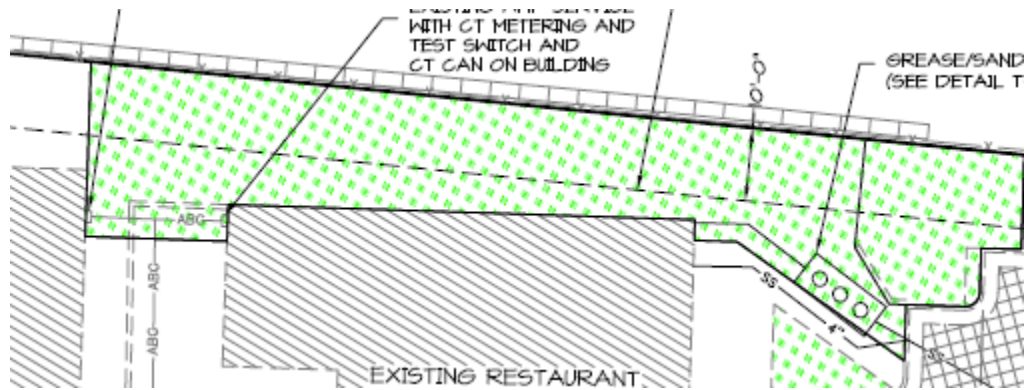


Figure 4. Storage area behind one of the restaurant buildings which will be converted into landscape.



Figure 5. Extract from zoning map showing the property (Central Commercial Zone)

Drainage

The applicant provided an engineering study to outline the proposed arrangements for the potential increase in stormwater runoff as a result of the new parking area. The applicant proposes to construct an underground storage chamber to accommodate the additional surface water runoff arising from the new parking spaces. The drainage strategy has been reviewed by the Town Engineer, Sunrise Engineering. The

Town Engineer has approved the drainage study and concurs with the conclusions and recommendations of the report.

Landscape

The applicant has demonstrated that 35% of the property will remain in landscape. To achieve this, some existing parking spaces will need to be replaced with landscape. In addition, areas behind the restaurant buildings will need to be converted to landscape. The landscape information is not as comprehensive as would now be required. However, this application was submitted in early 2023 before the current submittal requirements were introduced. Staff has requested additional information on landscape, but the applicant has indicated they would like the application to be reviewed as is. The Planning Commission could apply conditions to any approval to resolve outstanding questions about the landscape. This is discussed in more detail in the staff analysis table below.

Applicable Ordinances

The Commission may wish to refer to the following ordinances to help inform the review of this application:

- Section 10- 11A: Central Commercial Zone
- Section 10- 18: Landscaping
- Section 10-15C: Outdoor Lighting

Staff Analysis

<i>Standard</i>	<i>Requirement</i>	<i>Proposal</i>	<i>Comments</i>
<i>Setbacks</i>	Setbacks from SR-9 in the CC zone are regulated by the standards in 10-11A-6(A) and 10-23-7(K) of the Code. Based on these sections, the minimum setback from SR-9 for parking in the CC zone is 30ft. Side setbacks must be a minimum of 15ft from Juniper Lane because this is a corner lot. Setbacks from the rear property line must be a	The parking area is setback 30 ft from the SR-9 right of way and 15ft from Juniper Lane. The new parking area is setback from the rear property line by significantly more than 10 ft.	Complies.

	minimum of 10 ft.		
<i>Materials and Colors</i>	The proposed materials and colors must comply with chapters 16 and 17 of the Town Land Use Code.	The safety railing will be powder coated steel. Color not provided.	The planning commission should add a condition requiring that the safety railing must be treated to be non-reflective and the color should be on the Town's color palette.
<i>Landscaping</i>	35% of the parcel must be landscaped or natural open space (parcel is between 0.5 and 1.5 acres). Minimum 25% landscaped. Water conserving plants must constitute a minimum of 80% of the total landscape area. 1 tree and 4 shrubs required for every 1,000 sq ft area of landscape. Pedestrian pathways and courtyards can be counted as landscape, but can account for no more than 15% of the total landscape area.	38% of the parcel will remain in landscape. The applicant has provided a site plan which includes some information about landscaping. This plan does not match the actual engineered drawings exactly, in terms of the areas which are to be landscaped. It does however indicate areas which are/ will be grass. It also indicates a total of 19 trees (nine existing and ten new) and 52 shrubs. There is no information of what plant species are proposed. Based on the code requirement for one tree and four shrubs per 1,000 sq ft of landscape, 19 trees and 76 shrubs are required.	The planning commission should add a condition requiring that the applicant complies with the minimum planting requirements and that 80% of the species be drought tolerant.

<i>Outdoor Lighting</i>	The property has a lumen allowance of 61,875 lumens of outdoor lighting. This is based on the property being 1.125 acres and being allowed 55,000 lumens per acre. The color temperature of all outdoor lights must be 3,000 degrees Kelvin or less. Light fixtures must be downward facing and have a 2 inch deep shade. For properties which are not currently in compliance with the Town's outdoor lighting ordinance, immediate abatement as a condition of approval of a design development review is required by section 10-15C-12(B) of the Code.	There are six existing lighting bollards in the proximity of the future parking lot. These fixtures are compliant with the Code. The plans show that five of these will be relocated, each by about 10 ft, in order to fit with the new parking lot layout. The fixtures, lumens and color temperatures will not change. The applicant has not provided details of the existing lighting to confirm compliance with the Town's current outdoor lighting ordinance. The applicant has indicated they would like the application reviewed as is.	The Planning Commission should apply a condition to require the applicant to work with Town staff to come into compliance with today's outdoor lighting ordinance.
<i>Pedestrian Amenities</i>	Section 10-11A-14B (3) requires central commercial zone properties to have at least one exterior amenity for the convenience of pedestrians or cyclists.	The plans don't show a pedestrian amenity.	The planning commission should request a condition requiring a pedestrian amenity at the front of the property.
<i>Grading</i>	Slopes of 30% or greater must not be disturbed. Retaining walls must be no taller than 10 ft.	The site is relatively flat, but gradually slopes downwards away from SR-9. The site grading plan shows some very minor	Complies.

		re-grading, which will be necessary to create the parking lot and for drainage. There will be curbs, but no retaining walls.	
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Planning Commission Action

The Planning Commission should review the proposed Design Development Review Permit to determine if it complies with the applicable standards in the Town Ordinance. Staff recommends the Commission specifically consider the following:

- Does the proposed development meet all the requirements of the Central Commercial (CC) Zone?
- Does the proposed development meet all the requirements of the Landscaping ordinance?
- Does the proposed development meet all the requirements of the Color Palette ordinance?
- Does the proposed development meet all the requirements of the Outdoor Lighting ordinance?

As noted in staff analysis above, the application is lacking some information relating to landscaping and outdoor lighting that would usually be required. The Planning Commission could approve this application with conditions to secure this additional information.

Sample Motion Language

The Planning Commission may refer to the following sample language when making a motion on the application:

*The Planning Commission **approves/ denies** the proposed Design Development Review for a new parking lot at MeMe's Cafe, 975 Zion Park Blvd as discussed at the Commission meeting on October 21st, 2026. The motion is based on the following findings:*

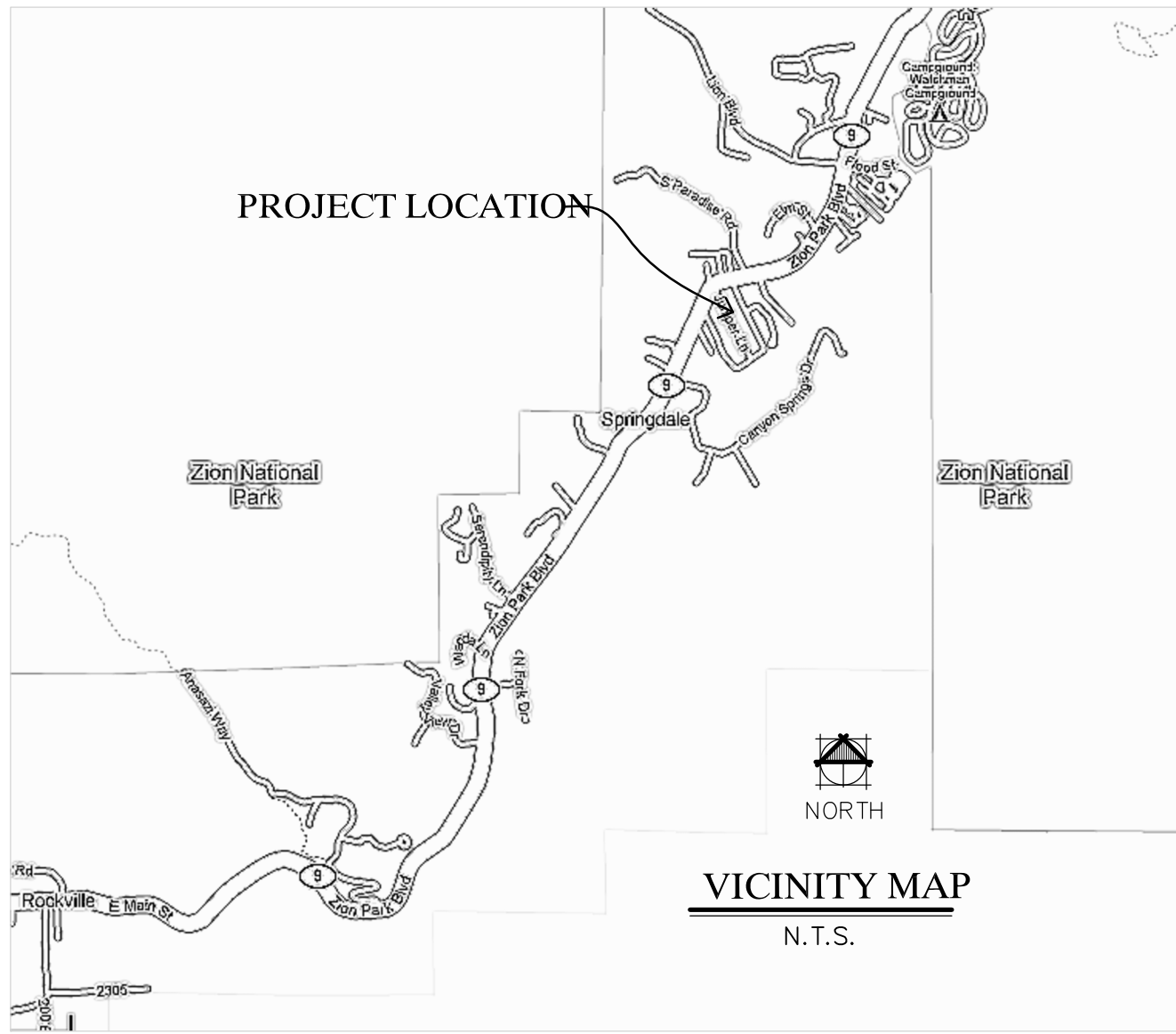
[LIST FINDINGS]

If making a motion for approval, the planning commission may wish to consider the following conditions of approval:

1. The safety railing must be treated to be non-reflective and must be a color that complies with the Town Color Palette.
2. In the absence of a consistent landscape plan, the approved area of landscape is as shown on the cover sheet (1.0) drawing prepared by Rosenberg Associates. A certificate of final inspection

will not be issued until all required areas have been converted to landscape, as shown in this drawing.

3. The applicant must comply with the minimum planting requirements of chapter 10-18 of the Town Code, which is ten trees and four shrubs per 1,000 sq ft of landscape area.
4. The applicant must notify the Town of the plant species which he intends to plant. At least 80% of the plants must be drought tolerant.
5. The applicant must provide an exterior amenity for the convenience of pedestrians or cyclists at the front of the property, as per section 10-11A-14B (3) of the Town Code.
6. The applicant must work with Town Staff to come into compliance with the current outdoor lighting ordinance.



VICINITY MAP
N.T.S.

PROJECT LOCATION

THE PROJECT IS LOCATED AT:
675 ZION PARK BOULEVARD
SPRINGDALE, UTAH

RAYNER PARKING LOT

LOCATED IN SECTION 29, TOWNSHIP 41 SOUTH, RANGE 10 WEST OF THE SALT LAKE
BASE AND MERIDIAN IN THE CITY OF ST. GEORGE, WASHINGTON COUNTY, UTAH.

POWER

ROCKY MOUNTAIN POWER
P.O. BOX 400
PORTLAND, OREGON 97207
(800) 464-3481

WATER/SEWER

TOWN OF SPRINGDALE
118 LION BOULEVARD
SPRINGDALE, UTAH 84767
(435) 712-3434

CATV SERVICE

TDS BROADBAND
111 WEST 700 SOUTH
ST. GEORGE, UTAH 84770
(866) 622-8848

TELEPHONE

CENTURYLINK
546 N. 1400 E. (TRAILER)
ST. GEORGE, UTAH 84710
(435) 673-4634

OWNER/DEVELOPER/CONTACT

THE DEVELOPER FOR THIS PROJECT IS
MATT RAYNER
84 EAST 1125 NORTH
HURRICANE, UTAH 84737
(435) 668-6143

PROJECT ENGINEER

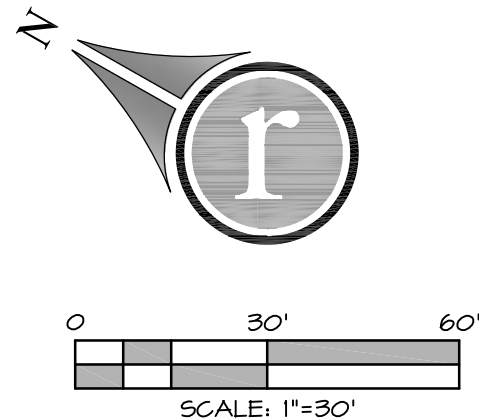
THE ENGINEER FOR THIS PROJECT IS:
ROSENBERG ASSOCIATES
CONTACT: CHARLIE GONZALEZ
352 EAST RIVERSIDE DRIVE, SUITE A2
ST. GEORGE, UTAH 84740 (435) 673-8397

GEOTECHNICAL ENGINEER

THE ENGINEER FOR THIS PROJECT IS:
LANDMARK TESTING & ENGINEERING
745 EAST FACTORY DRIVE
ST. GEORGE, UTAH 84740 (435) 486-0566

NOTE:

ALL TRAFFIC CONTROL SIGNS AND STRIPING
SHALL CONFORM TO TOWN OF SPRINGDALE STANDARDS AS WELL AS
THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).



SITE DATA

CURRENT ZONE:
CENTRAL
COMMERCIAL
(CC)

TOTAL AREA:
5,793 SQ. FT.
0.13 ACRES

PROJECT LAND USE:
COMMERCIAL

PARKING PROVIDED:
12 STANDARD
12 TOTAL

SHEET LAYOUT

SHEET NUMBER	SHEET DESCRIPTION
1.0	COVER SHEET
3.0	SITE/GRADING PLAN & DETAIL SHEET
3.1	GRADING DETAIL SHEET
4.0	UTILITY PLAN

ENGINEER'S ACKNOWLEDGMENT:

I, RAYMOND M. ALLTON, ST. GEORGE, UTAH DO HEREBY
CERTIFY THAT I AM A REGISTERED PROFESSIONAL
ENGINEER AS PRESCRIBED BY THE LAWS OF THE STATE OF
UTAH AND THAT I HOLD CERTIFICATE OF REGISTRATION
(LICENSE) NUMBER 179031. I FURTHER CERTIFY THAT THE
DESIGN OF THESE IMPROVEMENT PLANS WAS MADE UNDER
MY DIRECTION AND SUPERVISION AND IS ACCURATELY
REPRESENTED ON THESE PLANS.

Date: March 19, 2025

Raymond Allton

Raymond M. Allton, P.E.

Certificate No. 179031

DATE: 3/19/2025

JOB NO.: 5775-22-003

DRAWN BY: CRG

DESIGNED BY: RMA

SCALE: AS NOTED

DWG: New Parking Lot

DATE:

REVISIONS:

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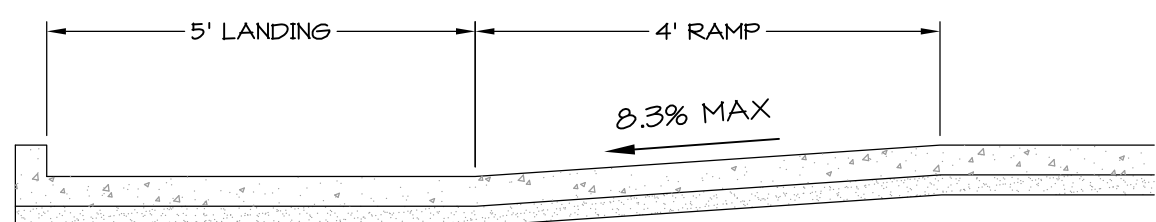
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DATE:

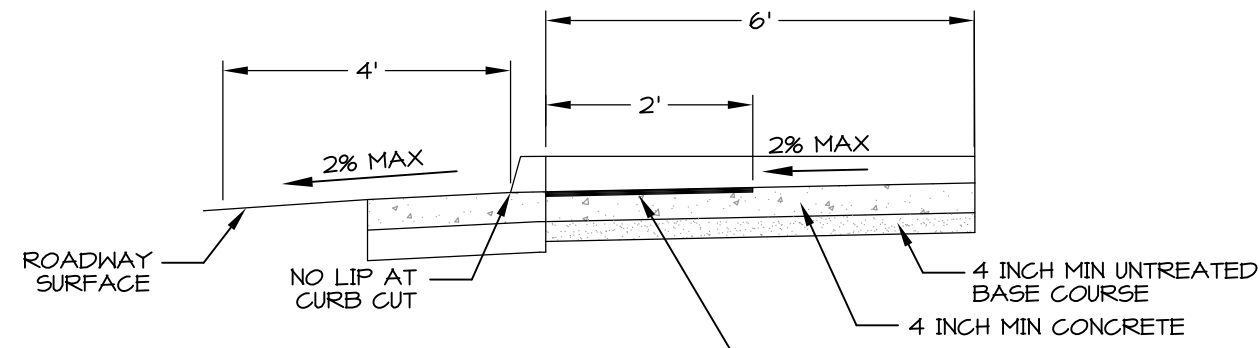
REVISIONS:

ACCESSIBLE NOTES:

1. ALL LANDINGS AT DOORWAYS AND STAIRWAYS TO COMPLY WITH IBC 1003.3.1.4 - 1003.3.3.5.1.
2. ACCESSIBLE CURB RAMP AT SIDEWALKS WITH 4" CURB = 4' WIDE SIDEWALK FOR RAMP TO COMPLY WITH 1:12 SLOPE.
3. ACCESSIBLE ROUTES (EXCLUDING RAMPS) SHALL HAVE RUNNING SLOPES (I.E., IN THE DIRECTION OF TRAVEL) NO GREATER THAN 5.0% (1:20), AND CROSS SLOPES NO GREATER THAN 2.08% (1:48).
4. ALL SIDEWALKS SHALL HAVE A 2% CROSS SLOPE.

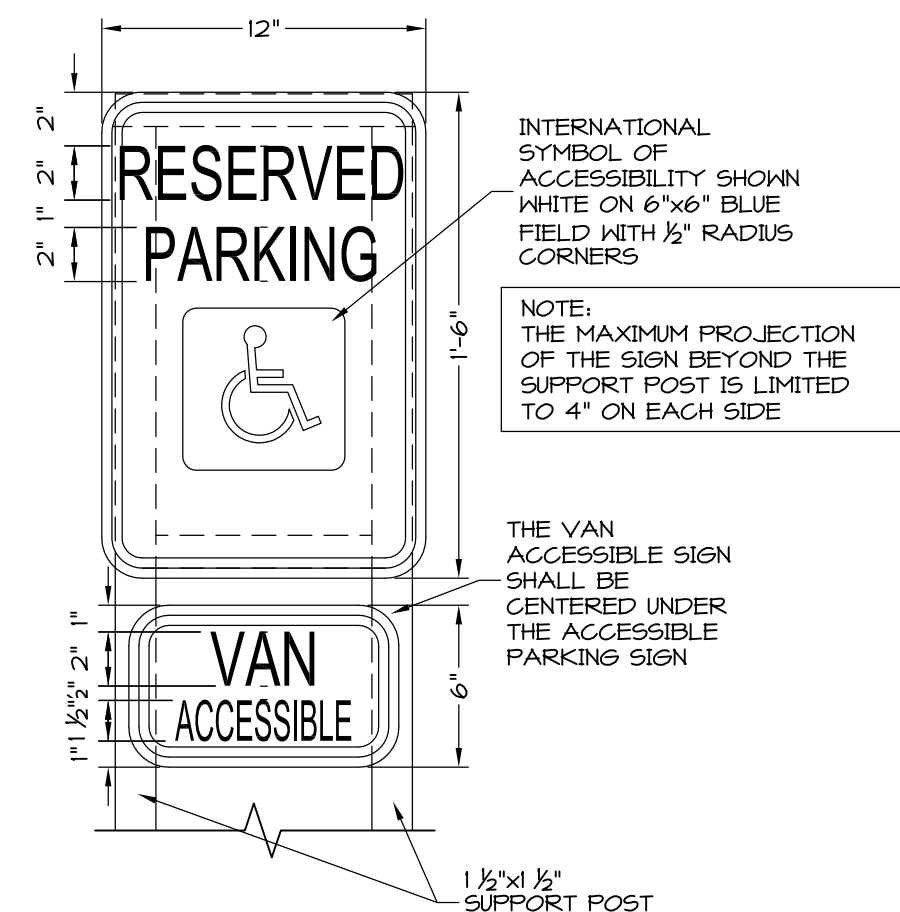


SECTION B-B



SECTION A-A

ADA RAMP DETAIL



SIGN NOTES:

1. THE BOTTOM OF THE SIGN SHALL BE 60" ABOVE FINISH GRADE.
2. SIGNS SHALL BE PROPERLY CENTERED WITHIN THE PARKING SPACE.
3. THE SIGN FACE SHOULD BE LOCATED NO FARTHER THAN 6 FEET FROM EACH OF THE PARKING SPACES.



ADA PARKING DETAIL

SCALE: N.T.S.

SITE LANDSCAPE:

SITE AREA = 49,021 SQ.FT.
LANDSCAPED AREA = 18,481 SQ.FT.
18,481 / 51,318 = 36%

GRADING NOTES:

1. ALL EXCAVATIONS AND GRADING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF SPRINGDALE SPECIFICALLY APPENDIX 33 OF THE 'UNIFORM BUILDING CODE' 1994 EDITION FOR TREE SCHEDULES, APPENDIX K OF THE 'UTAH UNIFORM BUILDING STANDARD ACT RULES' FOR GRADING, EXCAVATION AND EARTHWORK CONSTRUCTION AND THE SPECIFICATIONS AND REQUIREMENTS INCLUDED IN THE GEOTECHNICAL STUDY PREPARED BY LANDMARK TESTING & ENGINEERING, 525 N. 3050 E., #3, ST. GEORGE, UTAH 84140.
2. THE CONTRACTOR SHALL PROVIDE SUITABLE EQUIPMENT TO CONTROL DUST AND AIR POLLUTION CAUSED BY CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL ALSO PROVIDE SUITABLE MUD AND DIRT CONTAINMENT TO MAINTAIN THE WORK SITE, ACCESS ROADWAYS AND ADJACENT PROPERTIES IN A CLEAN CONDITION.
3. ALL IMPORTED STRUCTURAL FILL SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO DELIVERY TO THE SITE. ALL STRUCTURAL FILL SHALL BE PLACED IN 8 INCH LOOSE HORIZONTAL LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF MAXIMUM DRY DENSITY (ASTM D-1557).
4. ALL EXCAVATIONS, GRADING AND FILL OPERATIONS WITHIN THE BUILDING AREA SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER TO VERIFY SUB-SOIL CONDITIONS AND DETERMINE ADEQUACY OF SITE PREPARATION, SUITABILITY OF FILL MATERIALS AND COMPLIANCE WITH COMPACTION REQUIREMENTS.
5. THE DEVELOPER FOR THIS PROJECT IS: MATT RAYNER AND ROGER COLEMAN. FOR QUESTIONS REGARDING THIS PROJECT CONTACT PETER STEMPLE, AIA, P.O. BOX 790206, VIRGIN, UT, 84114, (435) 635-3718.

SIGN SUMMARY:

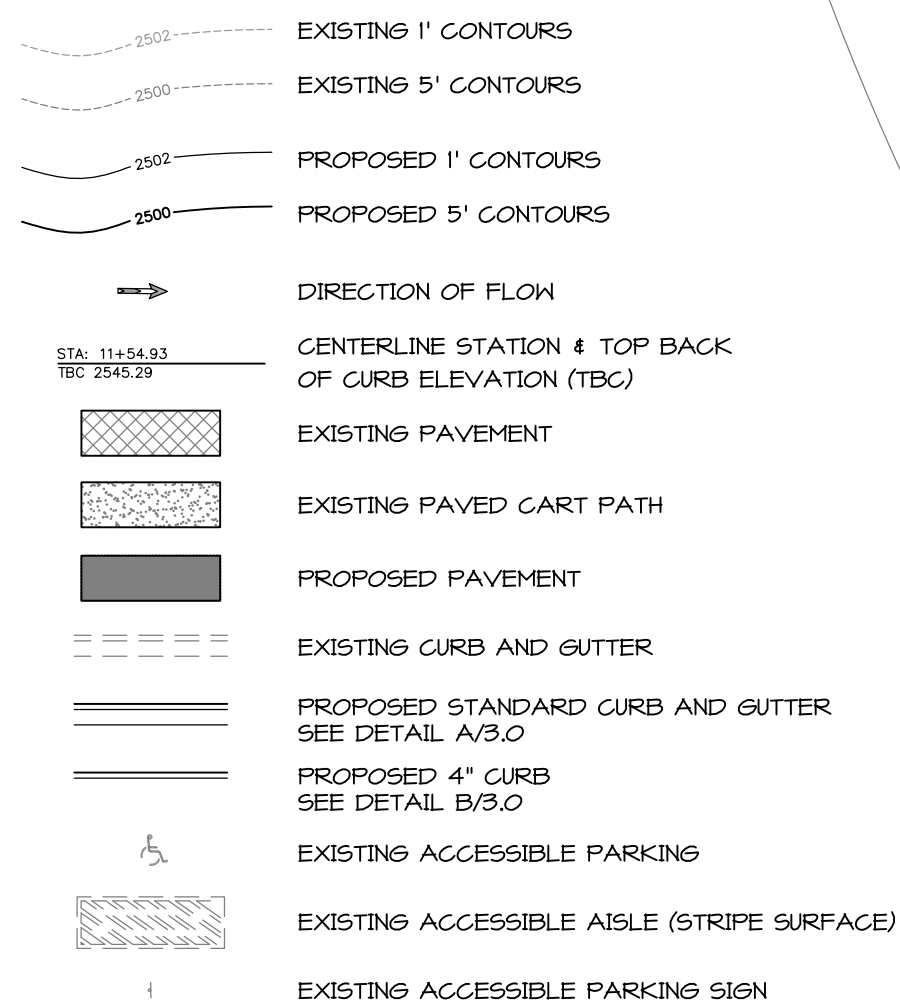
NOTE:

ALL STRIPING SHALL CONFORM TO TOWN OF SPRINGDALE STANDARDS AS WELL AS THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

S-55

Call
before you
Dig
1-800-662-4111
BLUE STAKES LOCATION CENTER (TYP)

GRADING LEGEND:



ESTIMATED EARTHWORK VOLUMES:

44	(C) CU. YD. CUT
16	(F) CU. YD. FILL
28	(F) CU. YD. NET

CUT AND FILL VOLUMES SHOWN ARE BASED ON DIGITAL TERRAIN MODELING COMPUTATIONS. VOLUMES SHOWN ARE COMPACTED IN PLACE VOLUMES AND DO NOT REFLECT EXPANSION AND SHRINKAGE CONDITIONS EXPERIENCED DURING CONSTRUCTION. THESE VOLUMES ARE SHOWN AS REFERENCE ONLY.

- THE CONTRACTOR SHALL BE RESPONSIBLE TO EVALUATE THE ONSITE SOILS, REVIEW THE GEOTECHNICAL INVESTIGATION AND DETERMINE THE ANTICIPATED EARTHWORK FOR THIS PROJECT.

ACCESSIBILITY NOTES:

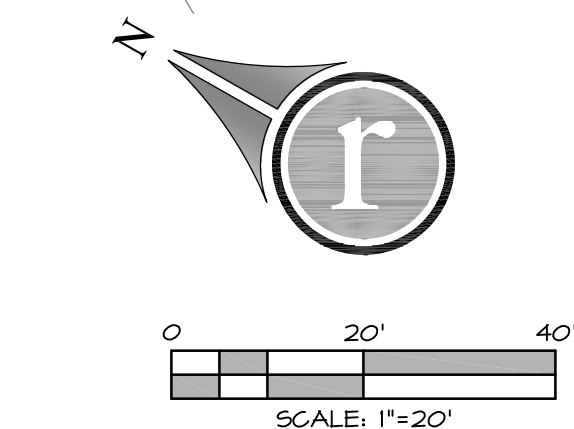
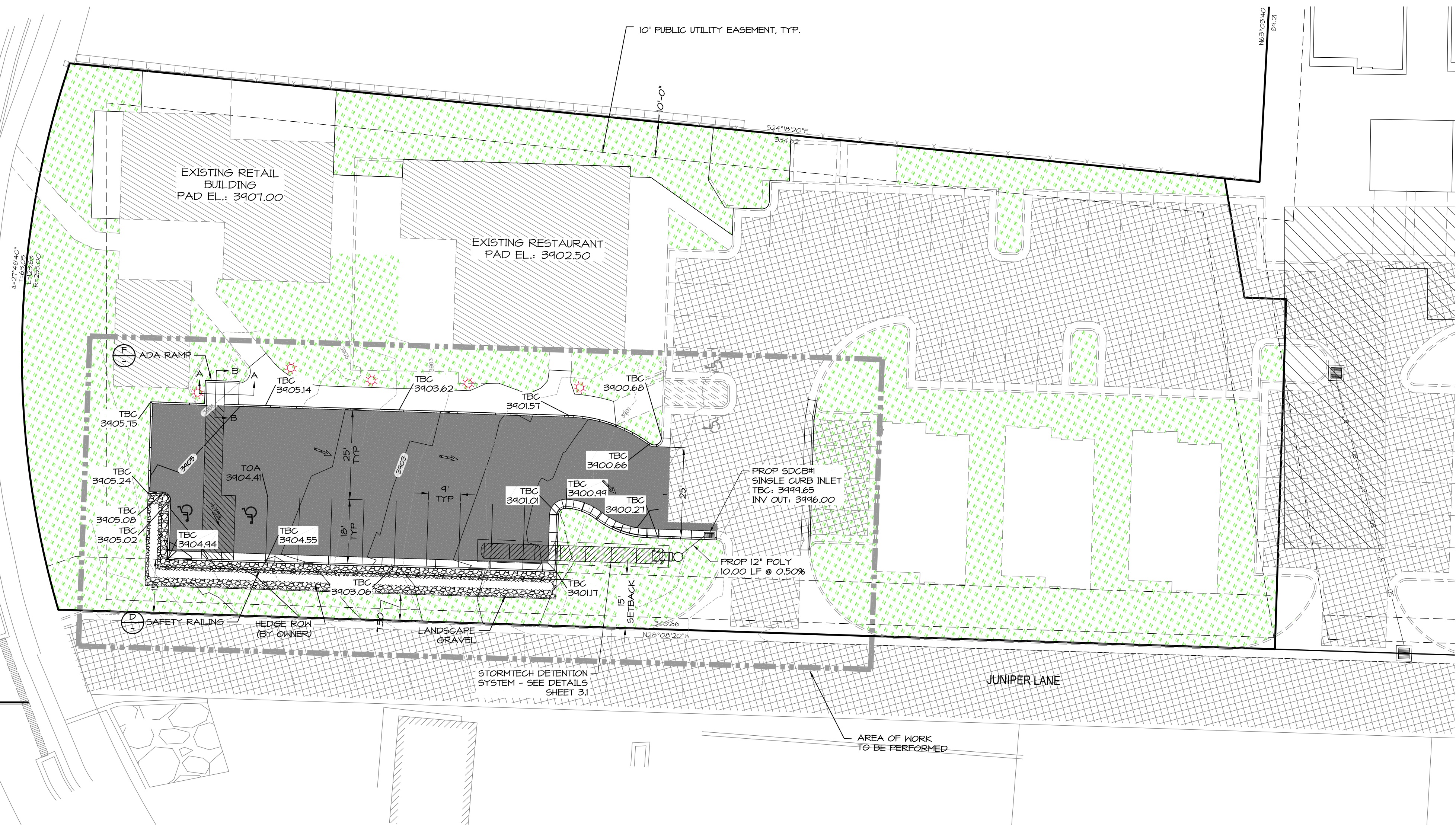
ALL ACCESSIBLE RAMPS, AISLES & ACCESS ROUTES SHALL COMPLY TO ADA STANDARDS, INCLUDING BUT NOT LIMITED TO, THE FOLLOWING:

1. MAX. SLOPE OF 1:20; MAX. CROSS SLOPE OF 1:48.
2. PROVIDE LEVEL LANDINGS AT ALL EXTERIOR DOORS WITH MAX. GRADE OF 2%.

DRAINAGE NOTES:

SITE DRAINAGE SHALL COMPLY WITH THE DRAINAGE REPORT PROVIDED BY ROSENBERG ASSOCIATES, DATED AUGUST 21, 2007, IN ADDITION:

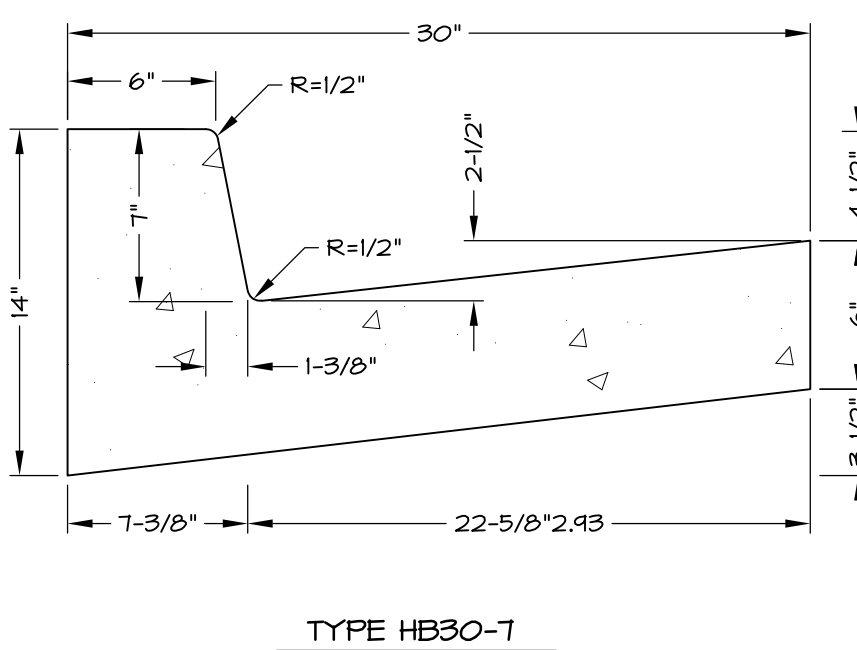
1. IN LANDSCAPED AREAS, PROVIDE 3% MIN SLOPE FOR A DISTANCE OF 10' AWAY FROM ALL BUILDINGS, IN PAVEMENT OR SLAB AREAS, PROVIDE 2% MIN SLOPE. IN AREAS WHERE ALTERNATIVE METHODS ARE REQUIRED, REFERENCE GEOTECHNICAL REPORT SECTION 8.0 MOISTURE CONTROL (1-4).
2. THIS SITE LIES OUTSIDE OF THE VIRGIN RIVER FLOODPLAIN.



NOTE:
ALL APPLICABLE DETAILS SHALL COMPLY WITH TOWN OF SPRINGDALE STANDARDS.

GENERAL NOTES:

1. CONTOUR INTERVAL IS 1 FT.
2. OWNER RESPONSIBLE FOR ALL DRAINAGE ON-SITE.
3. PARKING LOT AREA PAVEMENT DESIGN IS THE SAME AS STREET DESIGN: 2 1/2" ASPHALTIC CONCRETE OVER 6" OF TYPE II BASE OVER 12" OF COMPACTED SUBGRADE.



TYPE HB30-7

NOTES:

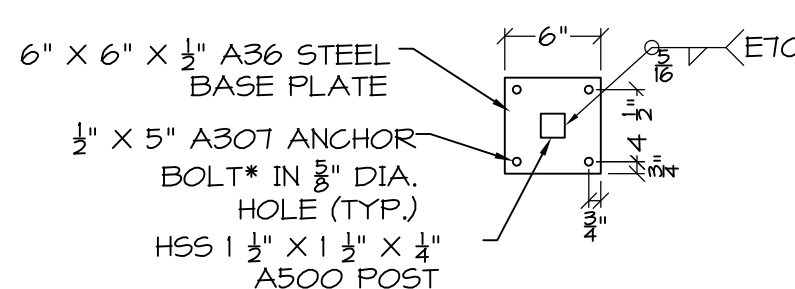
1. ALL CONCRETE SHALL BE CLASS "A" CONCRETE.



STANDARD CURB & GUTTER

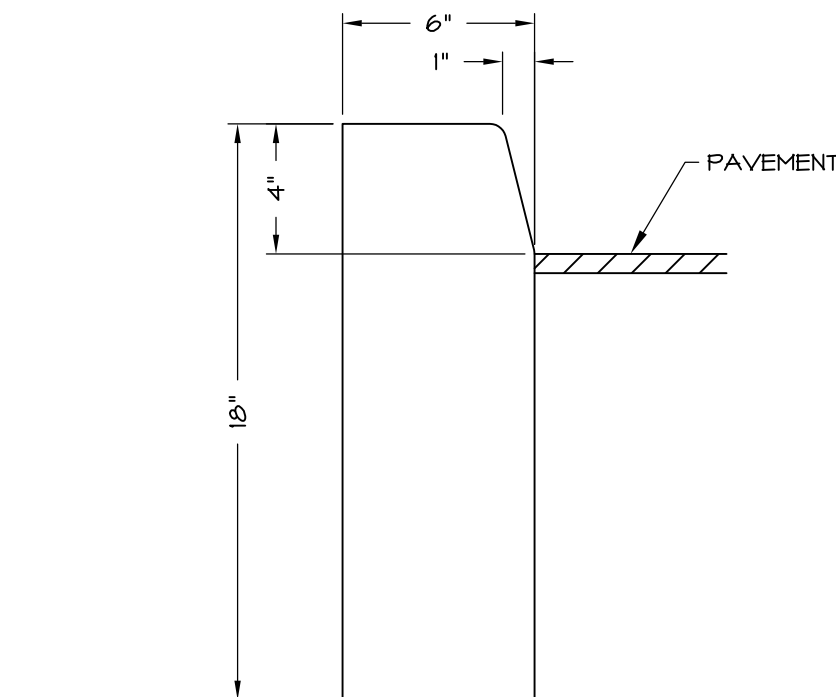
SCALE: N.T.S.

- NOTES:
- PROVIDE POWDER COAT FINISH ON ALL GUARD RAIL
 - ANCHOR BOLTS TO BE INSTALLED WITH SIMPSON SET-EX EPOXY
 - USE 1/8" THICK MOLDED BEARING PAD



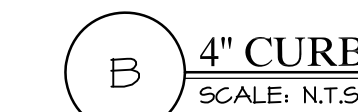
SAFETY RAILING BASE

SCALE: N.T.S.



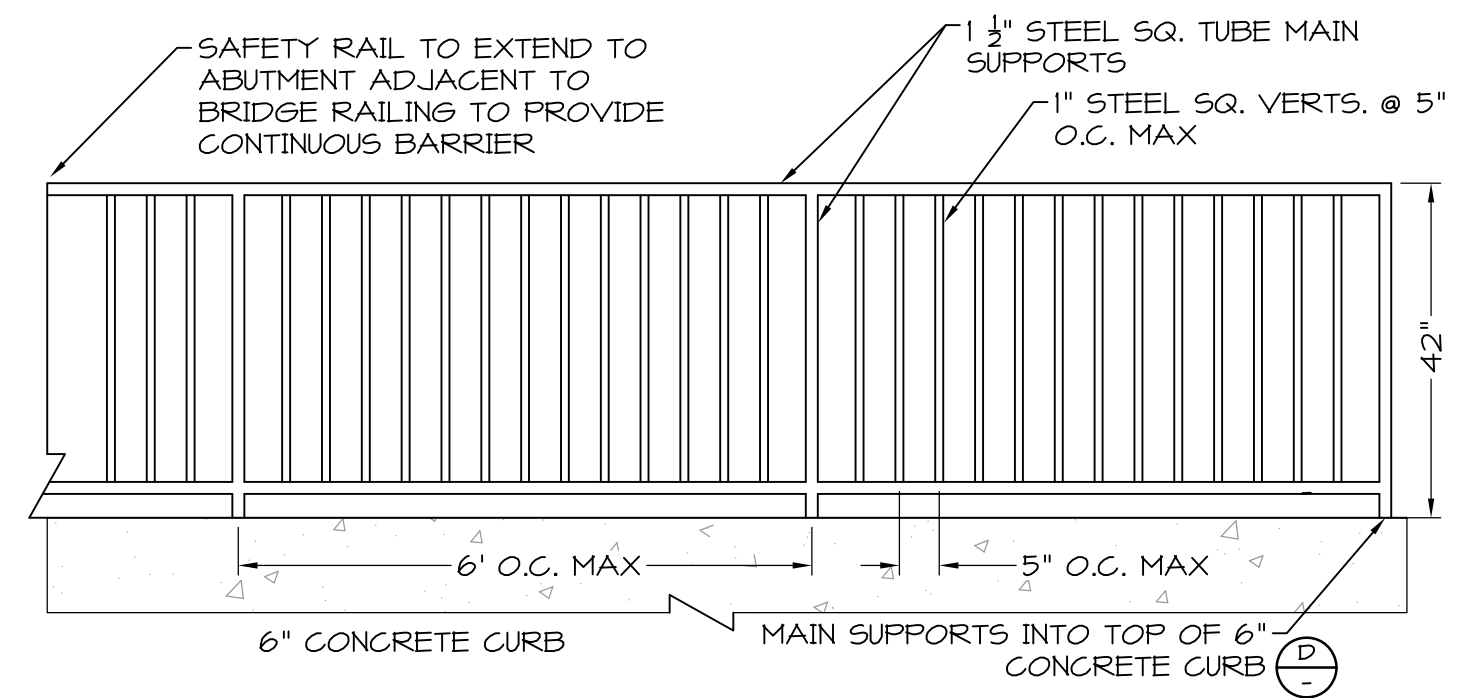
NOTES:

1. ALL CONCRETE SHALL BE CLASS "A" CONCRETE.



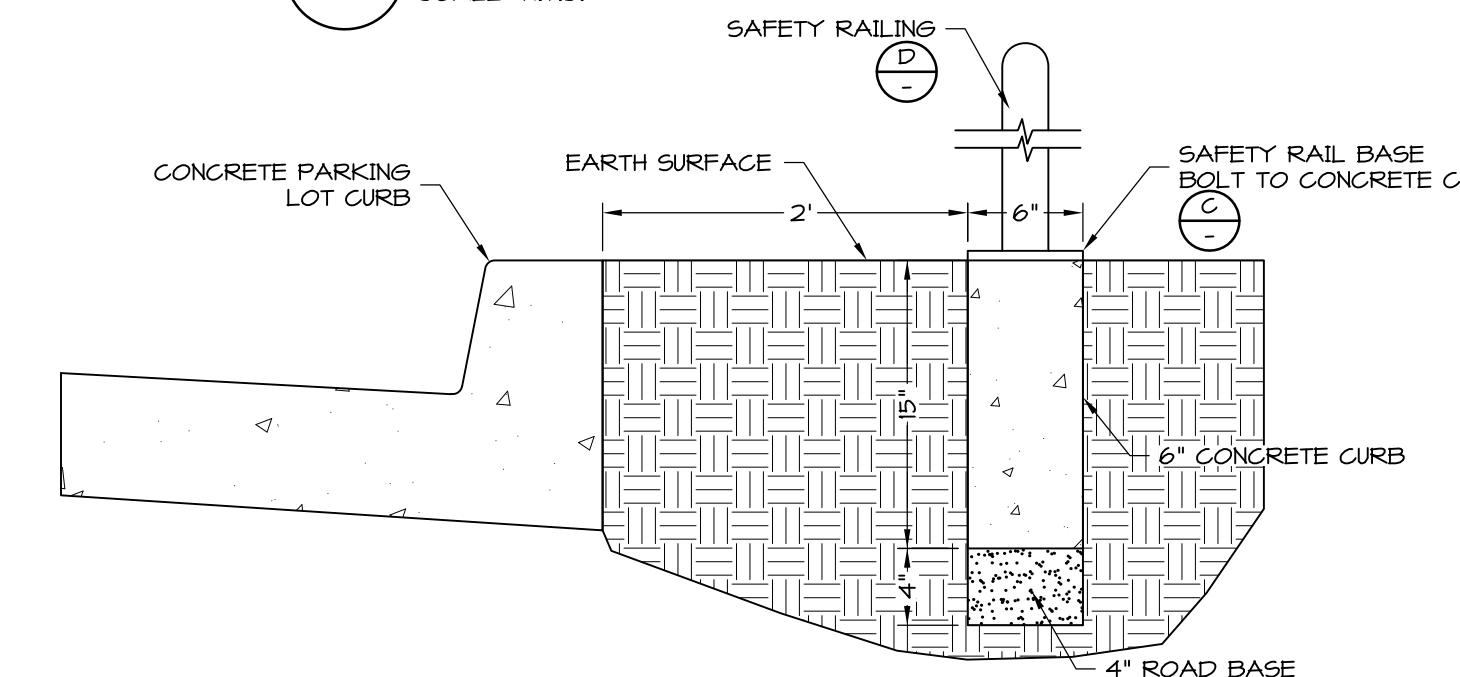
4" CURB

SCALE: N.T.S.



SAFETY RAILING

SCALE: N.T.S.



6" CONCRETE CURB

SCALE: N.T.S.

DATE: 3/19/2025
JOB NO.: 5775-22-003
DRAWN BY: CRG
DESIGNED BY: RMA
SCALE: AS NOTED
DWG: New Parking Lot

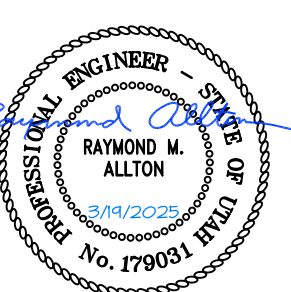
DATE	REVISIONS

ROSENBERG
A S S O C I A T E S
CIVIL ENGINEERS • LAND SURVEYORS



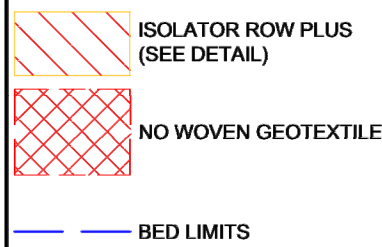
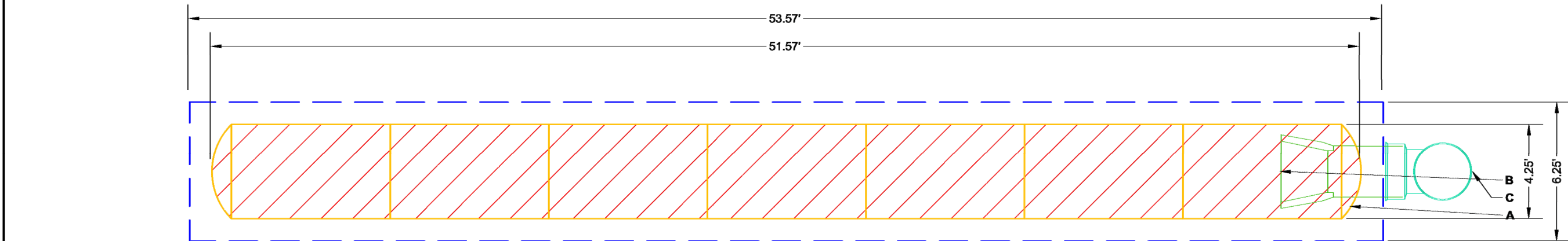
352 East Riverside Drive, Suite A-2
St. George, Utah 84790
Ph (435) 672-8586 Fl (435) 673-8397
www.rosenbergassociates.net

SITE/GRADING PLAN & DETAIL SHEET
FOR
RAYNER PARKING LOT
MATT RAYNER
SPRINGDALE, UTAH 84767

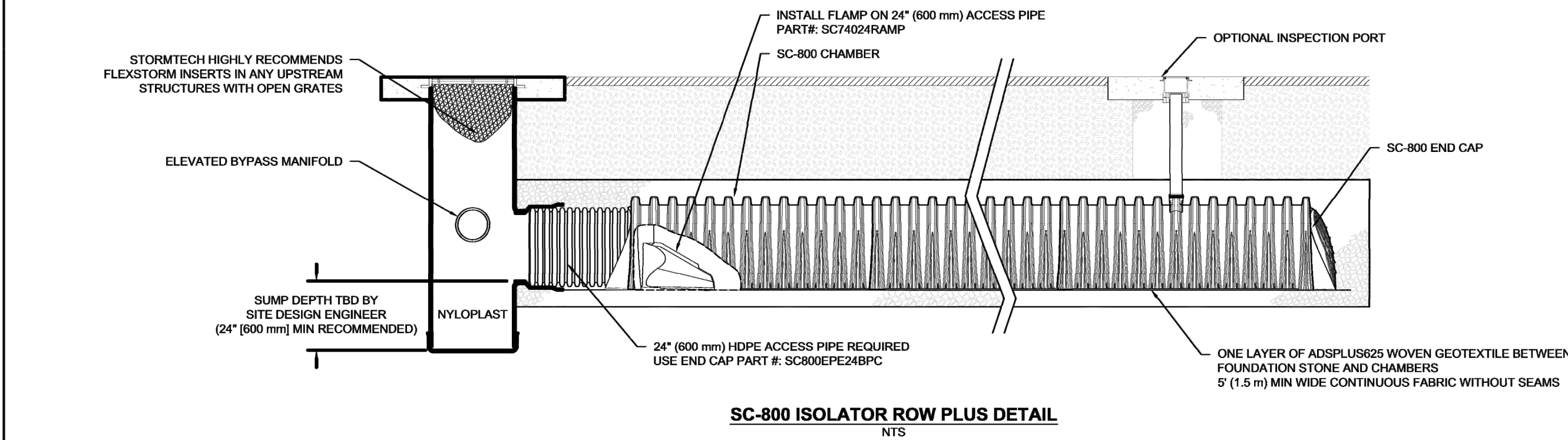


SHEET
3.0
2 OF 4 SHEETS

PROPOSED LAYOUT		PROPOSED ELEVATIONS:		PART TYPE		ITEM ON LAYOUT	DESCRIPTION	INVERT	MAX FLOW
7	STORMTECH SC-800 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	4006.25						
2	STORMTECH SC-800 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	4000.00						
6	STONE ABOVE (d)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	3999.50						
6	STONE BELOW (d)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	3999.50						
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	3999.50						
	INSTALLED SYSTEM VOLUME (CF)	TOP OF STONE:	3998.75						
719	(PERIMETER STONE INCLUDED)	TOP OF SC-800 CHAMBER:	3998.25						
	(COVER STONE INCLUDED)	24" ISOLATOR ROW PLUS INVERT:	3997.68						
	(BASE STONE INCLUDED)	BOTTOM OF SC-800 CHAMBER:	3995.50						
135	SYSTEM AREA (SF)	BOTTOM OF STONE:	3995.00						
119.6	SYSTEM PERIMETER (ft)								



NOTES
THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
NOT FOR CONSTRUCTION: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.



SC-800 ISOLATOR ROW PLUS DETAIL
NTS

3 SC-800 ISOLATOR ROW PLUS DETAIL

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
- A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
- A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
- A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
- A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
- A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
- B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
- B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
- i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
- ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
- B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

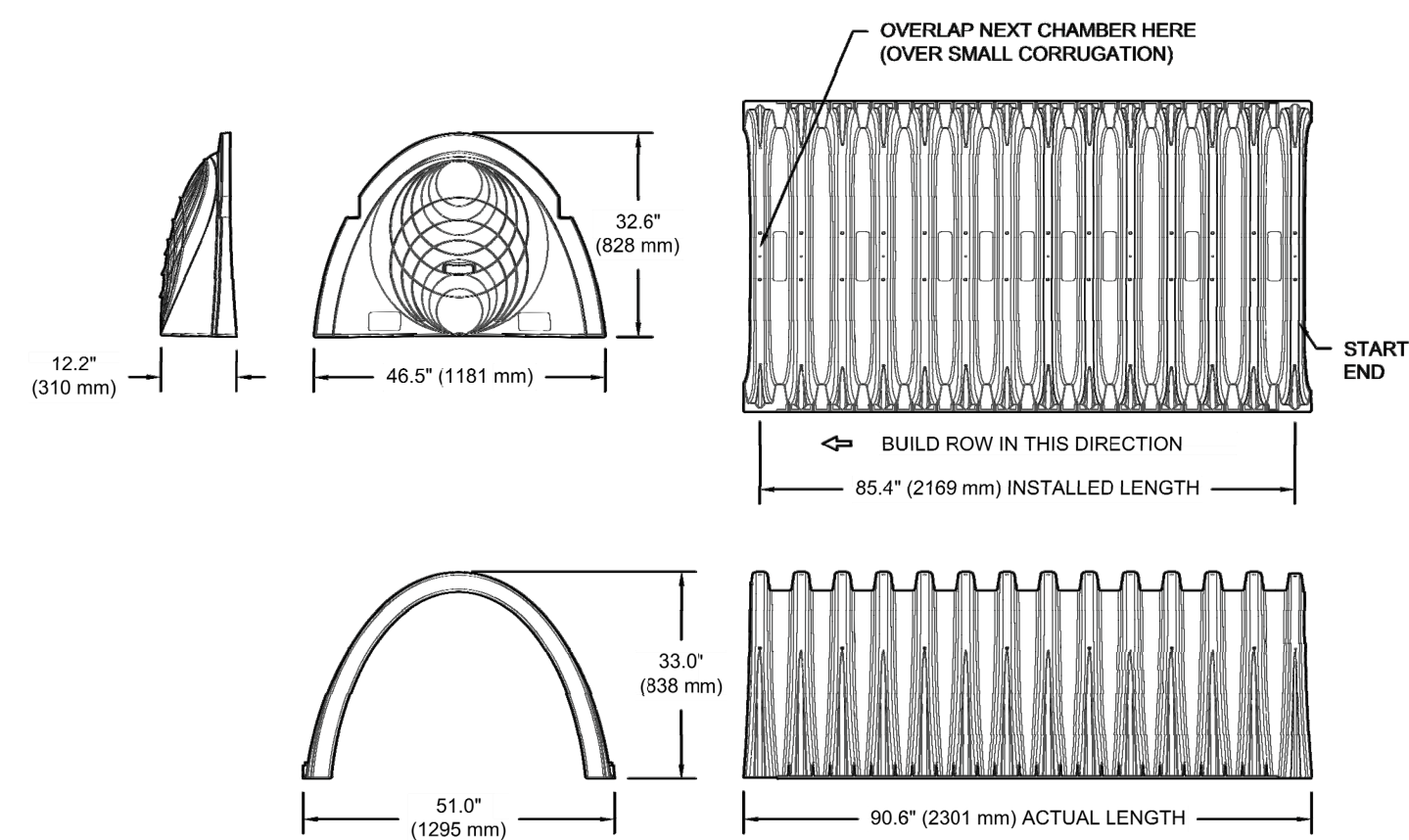
- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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SC-800 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 33.0" X 85.4"	(1295 mm X 838 mm X 2169 mm)
CHAMBER STORAGE	50.6 CUBIC FEET	(1.43 m³)
MINIMUM INSTALLED STORAGE*	81.0 CUBIC FEET	(2.29 m³)
WEIGHT	81.8 lbs.	(37.1 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	46.5" X 32.6" X 10.5"	(1181 mm X 828 mm X 267 mm)
END CAP STORAGE	3.4 CUBIC FEET	(0.09 m³)
MINIMUM INSTALLED STORAGE**	15.4 CUBIC FEET	(0.43 m³)
WEIGHT	15.7 lbs.	(7.1 kg)

* ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS
** ASSUMES 6" (152 mm) STONE ABOVE AND BELOW END CAPS, 6" (152 mm) BETWEEN ROWS, 12" (305 mm) BEYOND END CAPS

PRE-CORED HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "BPC"
PRE-CORED HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "TPC"

PART #	STUB	B	C
SC800PE08TPC	6" (150 mm)	21.4" (544 mm)	0.9" (23 mm)
SC800PE08BPC	19.2" (488 mm)	—	—
SC800PE08TPC	6" (200 mm)	—	1.0" (25 mm)
SC800PE10TPC	10" (250 mm)	17.0" (432 mm)	—
SC800PE10BPC	—	14.4" (366 mm)	1.2" (30 mm)
SC800PE12TPC	12" (300 mm)	—	1.6" (41 mm)
SC800PE12BPC	—	11.3" (287 mm)	—
SC800PE15TPC	15" (375 mm)	—	1.7" (43 mm)
SC800PE15BPC	—	8.0" (203 mm)	2.0" (51 mm)
SC800PE18TPC	18" (450 mm)	—	2.3" (58 mm)
SC800PE18BPC	—	—	—
SC800PE24BPC	24" (600 mm)	—	—
SC800PE	NONE	—	SOLID END CAP

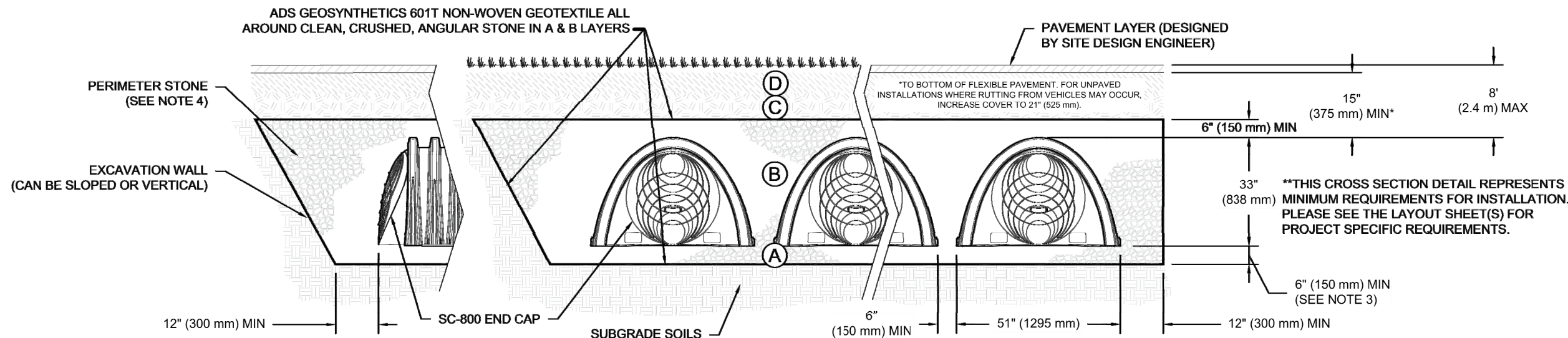
NOTE: ALL DIMENSIONS ARE NOMINAL

2 SC-800 TECHNICAL SPECIFICATION

ACCEPTABLE FILL MATERIALS: STORMTECH SC-800 CHAMBER SYSTEMS

MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 15" (375 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 88, 9, 10
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ²	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ²	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
 - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
 - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
 - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
 - WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



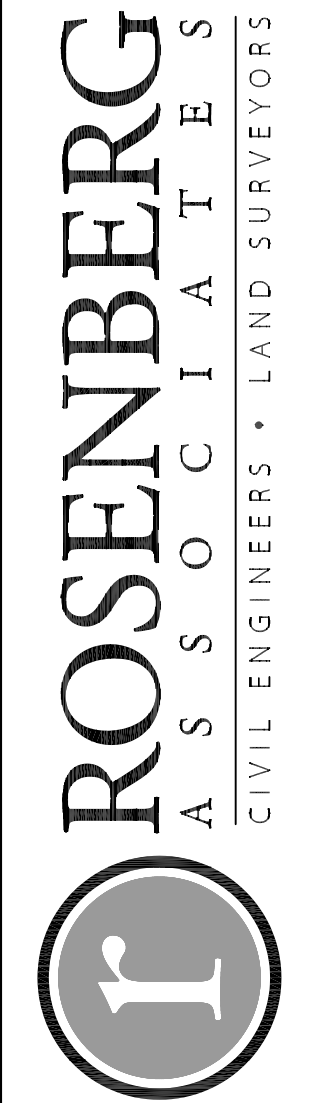
NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-800 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT², AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-800 CROSS SECTION DETAIL

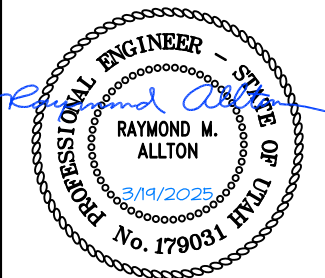
DATE:	3/14/2025
JOB NO.:	5175-22-003
DRAWN BY:	CRG
DESIGNED BY:	RMA
SCALE:	AS NOTED
DWG.:	Parking Lot

REVISIONS	
DATE:	

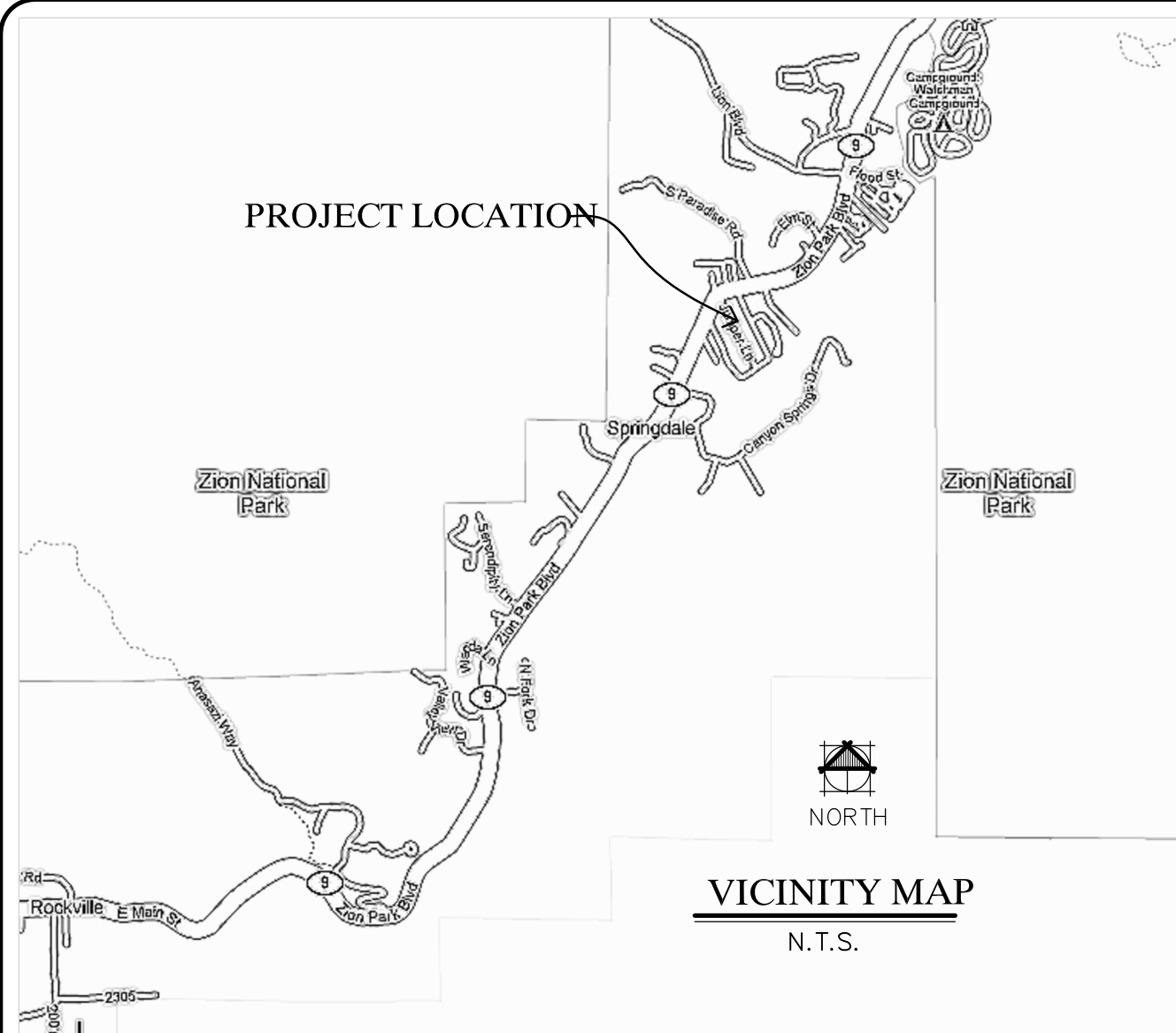


352 East Riverside Drive, Suite A-2
St. George, Utah 84790
Ph (435) 672-8586 Fl (435) 673-8397
www.rosenbergassociates.net

GRADING DETAIL SHEET
FOR
RAYNER PARKING LOT
MATT RAYNER
SPRINGDALE, UTAH 84767



SHEET
3.1
3 OF 4 SHEETS



SITE DATA

CURRENT ZONE:
CENTRAL
COMMERCIAL
(CC)

TOTAL AREA:
5,193 SQ. FT.
0.13 ACRES

PROJECT LAND USE:
COMMERCIAL

PROJECT LOCATION

THE PROJECT IS LOCATED AT:
615 ZION PARK BOULEVARD
SPRINGDALE, UTAH

OWNER/DEVELOPER/CONTACT

THE DEVELOPER FOR THIS PROJECT IS
MATT RAYNER
84 EAST 1125 NORTH
HURRICANE, UTAH 84751
(435) 668-6143

PROJECT ENGINEER

THE ENGINEER FOR THIS PROJECT IS:
ROSENBERG ASSOCIATES
CONTACT: CHARLIE GONZALEZ
352 EAST RIVERSIDE DRIVE, SUITE A2
ST. GEORGE, UTAH 84790 (435) 673-8586

GEOTECHNICAL ENGINEER

THE ENGINEER FOR THIS PROJECT IS:
LANDMARK TESTING & ENGINEERING
745 EAST FACTORY DRIVE
ST. GEORGE, UTAH 84710 (435) 486-0566

POWER

ROCKY MOUNTAIN POWER
P.O. BOX 400
PORTLAND, OREGON 97201
(800) 464-3481

WATER/SEWER

TOWN OF SPRINGDALE
115 LION BOULEVARD
SPRINGDALE, UTAH 84761
(435) 712-3434

CATV SERVICE

TDS BROADBAND
111 WEST 700 SOUTH
ST. GEORGE, UTAH 84710
(666) 622-8848

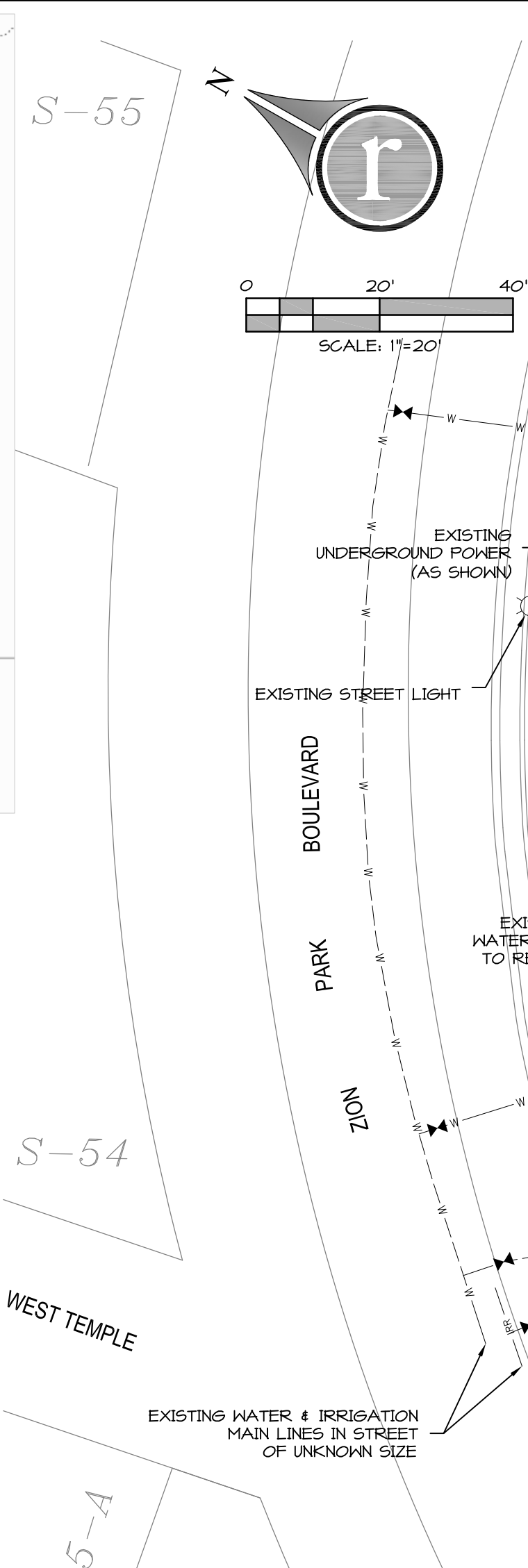
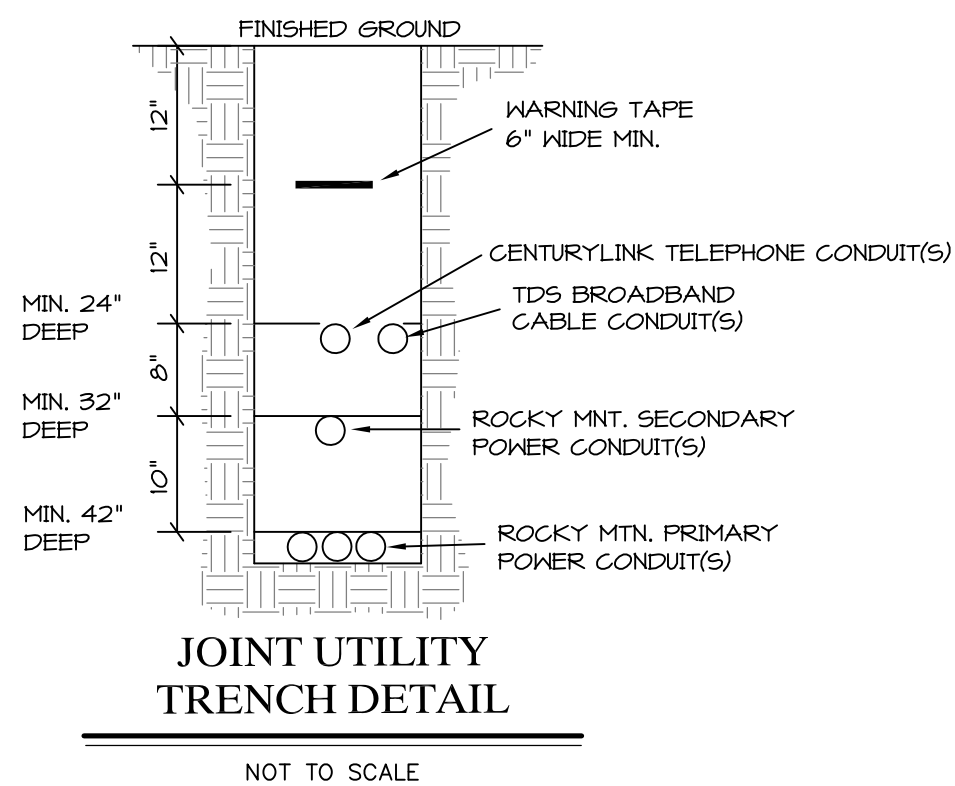
TELEPHONE

CENTURYLINK
546 N. 1400 E. (TRAILER)
ST. GEORGE, UTAH 84710
(435) 673-4634

AVOID CUTTING UNDERGROUND
UTILITY LINES. IT'S COSTLY

**Call
before you
Dig**

1-800-662-4111
BLUE STAKES LOCATION CENTER (UTAH)



- LEGEND:**
- SS 8" EXISTING SEWER MAIN - 8" DIA. (UNLESS OTHERWISE NOTED)
 - W 8" EXISTING WATER MAIN - 8" DIA. (UNLESS OTHERWISE NOTED)
 - IRR 4" EXISTING IRRIGATION LINE - 4" DIA. (UNLESS OTHERWISE NOTED)
 - OP EXISTING OVERHEAD POWER
 - 500-MCM EXISTING 3 PHASE PRIMARY POWER
 - ABC-ABC EXISTING PHASE ABC
 - TRANS EXISTING TRANSFORMER
 - HYD 6" EXISTING 6" HYDRANT W/VALVE
 - WV EXISTING WATER VALVE
 - SM 48" AND 60" EXISTING SEWER MANHOLE - 48" AND 60" AS NOTED
 - WM 1" EXISTING WATER METER - 1"
 - SL EXISTING SEWER LATERAL
 - REL RELOCATED PEDESTRIAN LIGHTING

- CENTURYLINK TELEPHONE NOTES:**
- DEVELOPER TO PROVIDE ALL TRENCH AND PLACE CENTURYLINK PROVIDED CONDUIT. CALL (435) 632-6553 1 DAYS PRIOR TO REQUIRING CONDUIT TO SCHEDULE DELIVERY.
 - DEVELOPER TO PLACE PULL STRING IN ALL CONDUIT.
 - ANY BREAKS IN CONDUIT ARE DEVELOPER RESPONSIBILITY TO REPAIR AND MAY RESULT IN DELAY OF SERVICE.
 - IT IS DEVELOPERS RESPONSIBILITY TO PROVIDE RECORDED PLAT WITH ADDRESSES PRIOR TO WIRE BEING RUN.
 - CONTACT CENTURYLINK ENGINEER AT (435) 673-4634 WITH ANY QUESTIONS OR CHANGES TO JUC PLANS.
 - ANY CENTURYLINK FACILITY RELOCATIONS ASSOCIATED WITH PROJECT WILL BE BILLABLE 100% TO OWNER/DEVELOPER AND MUST BE SCHEDULED A MINIMUM OF 4 WEEKS IN ADVANCE.

- NOTES:**
- SEE DETAIL SHEET (3.0) FOR STANDARD DETAILS PERTAINING TO THIS PROJECT.
 - TELEPHONE & CATV TO FOLLOW IN SAME TRENCH AS ELECTRICAL POWER.
 - COORDINATE WITH ARCHITECTURAL PLANS FOR LOCATION AND STYLE OF EXTERIOR LIGHTING & UTILITY CONNECTIONS TO BUILDINGS, TYP.

- SEWER NOTES:**
- NO BASEMENTS WHERE SEWER IS LESS THAN 9' FEET.
 - ANY SEWERS NOT IN PUBLIC STREETS SHALL SHOW RECORDED EASEMENTS.
 - BUILDINGS MAY REQUIRE INTERCEPTORS AT LATER DATE.

- GAS NOTES:**
- NO NATURAL GAS IS CURRENTLY AVAILABLE. GAS NEEDS MUST BE MET WITH INDIVIDUAL PROPANE TANKS, NOT PART OF THIS PROJECT.

- ROCKY MOUNTAIN POWER NOTES**
- PRIMARY POWER FROM SWITCH TO SWITCH SHALL BE 4/0 WIRE IN 2" CONDUIT.
 - PRIMARY POWER FROM SWITCH TO TRANSFORMER SHALL BE 1/0 IN 2" CONDUIT UNLESS OTHERWISE NOTED.
 - SECONDARY POWER FROM TRANSFORMER TO METER SHALL BE:
100-150 AMPS 1/0 IN 2" CONDUIT
200 AMPS 4/0 IN 2" CONDUIT
400 AMPS 350 MCM IN 3" CONDUIT
600 AMPS 500 MCM IN 3" CONDUIT
800 AMPS 4 UP PARALLEL CONDUCTORS

- UTILITY SEPARATION:**
- Water to phone lines/cable TV - 5 ft.
 - Gas to water or wastewater - 5 ft.
 - Water to power - 10 ft.
 - Water to irrigation - 5 ft.
 - Water to wastewater - 10 ft. horizontal and 18 inches vertical.
 - Gas to power - 10 ft.

- TDS BROADBAND CABLE NOTES:**
- THE DEVELOPER WILL PROVIDE ALL REQUIRED TRENCH WITHIN THE PROJECT. ANY MODIFICATIONS ALONG THE PERIPHERY TO FEED THIS PROJECT WILL BE BILLABLE TO THE DEVELOPER.
 - TDS WILL PROVIDE CONDUITS. PLEASE CONTACT MATT AT (435)-811-0180 AT LEAST 3 WEEKS PRIOR TO OPENING TRENCH TO SCHEDULE WORK.
 - ANY QUESTIONS REGARDING CONSTRUCTION OF SERVICE SHOULD BE DIRECTED TO MATT BRANN WITH TDS AT (435)-811-0180.
 - RELOCATION OF NEW OR EXISTING TDS FACILITIES WILL BE BILLABLE TO THE DEVELOPER/CONTRACTOR.
 - ANY MODIFICATIONS AFTER CONDUIT/CABLE PLACEMENT WILL BE BILLABLE TO THE DEVELOPER/CONTRACTOR. AS WILL DAMAGES CAUSED BY OTHER CONTRACTORS WORKING FOR THE DEVELOPER ON THIS PROJECT.

- GENERAL NOTES:**
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UNDERGROUND UTILITIES DURING CONSTRUCTION.
 - THE CONTRACTOR IS REQUIRED TO CALL THE CITY FOR INSPECTION OF ALL IMPROVEMENTS RELATED TO THIS PROJECT.
 - THE CONTRACTOR IS REQUIRED TO OBTAIN AN ENCROACHMENT PERMIT FOR ANY WORK DONE IN A PUBLIC RIGHT-OF-WAY.
 - ANY NECESSARY MODIFICATIONS SHALL BE APPROVED BY THE DESIGN ENGINEER PRIOR TO CONSTRUCTION.
 - SEE GRADING AND DRAINAGE SHEETS FOR STORM DRAIN DATA.
 - ADJUST EXISTING MANHOLE AND VALVE BOX COVERS TO MATCH NEW ROAD GRADES. INSTALL NEW CONCRETE COLLARS AROUND ADJUSTED COVERS IN ACCORDANCE WITH STANDARD DRAWING NO. 171
 - UTILITIES ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR AND ARE SHOWN FROM THE BEST AVAILABLE SOURCES. ENGINEER DOES NOT GUARANTEE THE LOCATION OF UTILITIES.

- WATER NOTES:**
- ALL WATERLINE WORKS MUST BE INSTALLED BY A CONTRACTOR THAT HAS BEEN PRE-QUALIFIED BY THE TOWN OF SPRINGDALE WATER DEPARTMENT.
 - ALL CONSTRUCTION SHALL CONFORM TO THE "TOWN OF SPRINGDALE STANDARD SPECIFICATIONS FOR DESIGN AND CONSTRUCTION", "THE UNIFORM BUILDING CODE", AND THE "UNIFORM FIRE CODE" LATEST EDITION AS ADMINISTERED BY THE CITY OF ST. GEORGE.
 - CONTRACTOR SHALL POTHOLE ALL PIPELINES AND VERIFY LOCATION AND DEPTH PRIOR TO PROCEEDING WITH ANY BUILDING OR PIPELINE CONSTRUCTION.
 - THE POTABLE WATER SUPPLY TO LAWN IRRIGATION SYSTEMS SHALL BE PROTECTED AGAINST BACKFLOW PER THE INTERNATIONAL PLUMBING CODE (IPC) SECTION 608.16.5 AND FOR FIRE SPRINKLER SYSTEMS PER (IPC) 608.16.4.
 - ALL BACKFLOW ASSEMBLY INSTALLATION AND TEST REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE TOWN OF SPRINGDALE BACKFLOW ORDINANCE.
 - 14 GAUGE WIRE SHALL BE TAPED TO ALL WATER LINES FOR LOCATING PURPOSES. THE WIRE SHALL ALSO BE BROUGHT UP AT EACH VALVE BOX AND HYDRANT.
 - THRUST RESTRAINT ON THE NEW PIPELINE WILL BE AS SHOWN ON THE DETAILS. USE MEGA-LUG ON THE FITTINGS AND FIELD LOCK GASKETS ON THE REQUIRED LENGTH OF RESTRAINED PIPE.
 - ASPHALT REPLACED OVER THE PIPE TRENCHING IS TO MATCH EXISTING PAVEMENT DEPTHS WITH A 6" OVER CUT FROM EDGE OF THE TRENCH LINE ON EACH SIDE OF THE TRENCH.
 - CONTRACTORS SHALL CUT OFF AND CAP (BACK AT THE WATER MAIN), ALL EXISTING SERVICE LINES OR UN-USED SUB LINES THAT WILL BE ABANDONED.
 - ANY CHANGES MADE IN THE FIELD MUST BE FIRST APPROVED AND DOCUMENTED BY THE TOWN OF SPRINGDALE WATER SERVICES ENGINEER.

DATE: 3/14/2025
JOB NO.: 5775-22-003
DRAWN BY: CRG
DESIGNED BY: RMA
SCALE: AS NOTED
DWG: New Parking Lot

REVISIONS

ROSENBERG
ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS

352 East Riverside Drive, Suite A-2
St. George, Utah 84790
Ph (435) 673-8586 Fl (435) 673-8397
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UTILITY PLAN - POWER, WATER & SEWER
FOR
MATT RAYNER
SPRINGDALE, UTAH 84767

RAYNER PARKING LOT

RAYMOND M. ALTON
REGISTERED PROFESSIONAL ENGINEER
No. 170903 (P) (U) 00

SHEET
4.0
4 OF 4 SHEETS

POWER, WATER, SEWER, TELEPHONE & CATV
SUBJECT PROPERTY LAYS WITHIN SEC. 24, T. 41 S., R. 10 W. OF THE SLB & M.

S-14-B-1



SITE PLAN

SCALE 3/4" = 1'-0"

DATE: 2-29-2024

DRAWN BY:
REVISIONS:

3-13-2024

FLOOR
PLAN

SITE PLAN

975 ZION PARK BLVD 3-4
SPRINGDALE, UTAH

101 A



June 23, 2023

Canyon Vista Development, LLC
Matt Rayner
560 North 1380 West
Hurricane, UT 84737

Subject: Geotechnical Investigation Report Review
Rayner/Coleman Addition
975 Zion Park Blvd.
Springdale, Utah
Landmark Project No.: 230373

Reference: Geotechnical Investigation Report, Springdale Motel, Landmark Project No.
06549, Dated July 17, 2006

Matt,

As requested, we have reviewed the above referenced Geotechnical Investigation Report which was prepared for the subject property prior to its current development. We understand that currently an addition is planned for the restaurant located at the west end of the parcel, along with improvements to the parking lot and driveways.

Report Review

Our original investigation encountered low to moderate plasticity clayey sands in the area of the proposed addition, Test Pit 1 of the referenced report. One-dimension consolidation tests were not conducted, however, based on the sand fraction reported for the soils, we do not expect these soils to be expansive.

Recommendations

We recommend that once construction starts, one of our engineers or geologists visit the site, and observed the excavation of test pits to collect several, relatively undisturbed samples for consolidation testing to confirm that the clays sands are not expansive.

Seismicity

Seismicity at the site was determined using the Seismic Maps Tool from seismicmaps.org website. The following values are presented to assist with seismic design:

- Latitude = 37.18836° North, Longitude = 113.00020 West
- Site Class = D – Stiff Soil, based on ASCE 7 as referenced in 2021 IBC

Period (sec)	Sa (g)	Site Class
0.2	S _s = 0.484	B/C
1.0	S ₁ = 0.159	B/C

Period (sec)	Sa (g)	Site Class
0.2	$S_{DS} = 0.456$	D
1.0	$S_{D1} = 0.242$	D

As per Section 20.1 of ASCE 7-16, “The soil shall be classified in accordance with Table 20.3-1 and Section 20.3 based on the upper 100 feet of the site profile.” However, Section 20.1 continues, “Where site specific data are not available to a depth of 100 feet, appropriate soil properties are permitted to be estimated by the registered design professional preparing the soil investigation report based on known geologic conditions.” Based on our engineering experience in the area, mapped geology, it is the opinion of Landmark Testing and Engineering that the soils on site classify as Site Class D.

Asphalt Pavement

Design of the pavement sections are based on the procedures outlined in the 1993 Guidelines for Design of Pavement Structures by the American Association of State Highway and Transportation Officials (AASHTO). A Traffic Index of 5.0 was used for design of the parking areas and a TI of 7 was used for the driveway/truck path planned for the development. A CBR value of 4 was used based on the soil encountered in our investigation.

For pavement design, the following design parameters have been assumed:

<u>Pavement Design Life</u>	20 years
<u>Subgrade CBR</u>	4
<u>Structural Layer Coefficients</u>	Asphalt = 0.42 Road Base = 0.12

Based on design parameters, the following pavement sections are provided.

Location	Asphalt Thickness (inches)	Base Course (inches)	Scarified and Compacted Subgrade (inches)
Parking (T.I = 5.0)	2.5	6.0	8.0
Truck/Driveway (T.I. = 7.0)	3.0	8.0	8.0

Recompacted on-site soils should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D-1557 and base course soils should be compacted to a minimum of 95 percent of the maximum dry density (ASTM D-1557). Asphalt should be compacted to at least 96 percent of the Marshall maximum density. Asphaltic concrete and base should be tested prior to site delivery and during placement for conformance with project specifications.

Concrete Dumpster Pad

We anticipate that a concrete pad may be installed by the dumpster or other areas with heavy truck traffic. Procedures outlined in the Portland Cement Association's guide "Thickness Design for Concrete Highway and Street Pavements" were utilized for concrete pavement design.

The following design parameters were used:

Average daily truck traffic = 0.5 (Axle -load category 1)

Subgrade-subbase support = low (based on site soils)

Concrete modulus of rupture = 600 psi

Based on input parameters, a minimum of 5.5 inches of concrete and 6 inches of base over a properly prepared subgrade will be adequate. The design recommendations are based on the following assumptions:

Subgrade soils should be compacted to a minimum of 95 percent of the maximum dry density (ASTM D-1557). Concrete and base coarse materials and construction should meet the Town of Springdale standard specifications.

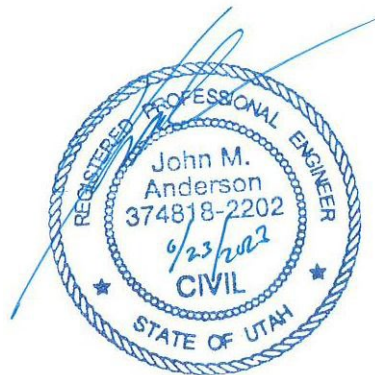
As a rough guide, the joint spacing in feet for plain concrete pavement should not generally exceed twice the slab thickness in inches. Thus, for a 5.5-inch-thick slab, joint spacing would be on the order of 11.0 feet as a maximum. Also, as a general guideline, the ratio of slab width to length should not exceed 1.25.

Joint depth should be 1/4 of the slab thickness and continuous across the slab. If sawn joints are used, the joints should be sawn as soon as possible following concrete set.

Thank you for allowing us to assist you with this project. Please feel free to contact our office if you have any questions.

LANDMARK TESTING & ENGINEERING

John M. Anderson, P.E.
Project Engineer



DRAINAGE CONTROL REPORT UPDATE

RAYNER COMMERCIAL PARKING LOT EXPANSION Springdale, Utah

Prepared For:

MATT RAYNER
1162 North Sunset Ridge Drive
Hurricane, Utah 84737

ROSENBERG ASSOCIATES
Project No: 05775-22-003

Updated February 3, 2025



This report for the drainage design of the Rayner Commercial Parking Lot Expansion was prepared by me (or under my direct supervision) following recommendations found in the Washington County Flood Control Authority Storm Drainage Systems Design and Management Manual. It is understood that the Town of Springdale does not assume liability for drainage facilities design.

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APPENDIX

Figure 1 – *Project Site Drainage Map*

Watershed Hydrology Model Input Spreadsheets

NOAA Precipitation Frequency Table

HEC-HMS Model Schematic

HEC-HMS Model Output Model Results Tables

HEC-HMS Model Output Detention Tables

1.0 PROJECT BACKGROUND

The proposed parking lot expansion project is located at 975 Zion Park Boulevard, Zion Park Boulevard and Juniper Lane in Springdale, Utah. The original property encompasses approximately 2.2-acres; however, the property has since been developed and subdivided for commercial and residential uses. For purposes of this drainage study update only the proposed parking lot is being evaluated, since previous drainage improvements have been installed for existing site improvements.

The proposed project is to construct additional parking spaces adjacent to the MeMe's Café and Barbeque restaurant. The proposed parking lot will provide 12 new spaces and eliminate 4 existing spaces, with a net gain of 8 total parking spaces.

Refer to the project civil construction plans for project site location. Refer to Figure 1 – *Project Site Drainage Map*, for an illustration of the drainage area in relation to the proposed improvements and the existing site layout.

Since the overall project has been constructed in phases, this update study report is supplemental to the following drainage study reports prepared for previous project phases:

- Storm Runoff Calculations for Rayner Coleman Hotel, prepared by Pratt Precision Engineering, dated June 2006.
- Rayner-Coleman Hotel Drainage Control Plan and Report, prepared by Rosenberg Associates, dated August 21, 2007.
- Drainage Control Plan and Report Addendum No. 1 summary letter, prepared by Rosenberg Associates, dated February 6, 2008.
- Rayner-Coleman Hotel Drainage Control Plan and Report, prepared by Rosenberg Associates, updated January 10, 2012.

2.0 EXISTING DRAINAGE CONDITIONS

2.1 EXISTING ON-SITE DRAINAGE

This evaluation is limited to storm water accumulating within the proposed new parking lot area. The existing landscaped area generally flows in a southerly direction being collected by the existing curb, gutter, and parking lot improvements. For purposes of this evaluation, the site hydrologic model assumed a “pre-developed” land use condition of open space with greater than 75% grass cover in “good” condition on Type B soils – NRCS Curve Number of 61.0.

2.2 EXISTING OFF-SITE DRAINAGE

Offsite drainage was not analyzed with this update study since no changes to the drainage outside of the parking lot area is being proposed. Refer to earlier drainage study reports for additional information.

3.0 PROPOSED DRAINAGE CONDITIONS

The proposed project changes includes the replacement of approximately 5,570 square feet of landscape area with the new parking lot, and the replacement of approximately 720 square feet of parking lot area with new landscape, with a total net impervious increase of 4,850 square feet. The site hydrologic model assumed an impervious “post-developed” NRCS Curve Number of 98.

4.0 HYDROLOGIC ANALYSIS

4.1 HYDROLOGIC CALCULATIONS

HEC-HMS¹ Version 4.12 was used to perform the updated hydrologic analysis. Curve numbers for existing and developed conditions were calculated using a custom Natural Resources Conservation Service (NRCS) Soil Report and the TR-55 Table 2-2a, which assumes directly connected impervious areas. The Farmer-Fletcher distribution is used for the 3-hour storm events and the SCS Type II distribution is used for the 6-hour and 24-hour storm events. Simulated precipitation values were determined using the Point Precipitation Frequency Estimates from the NOAA Atlas 14.² Utilizing the model input values listed in Table 1, the HEC-HMS model yielded the design storm peak flow values summarized in Table 2.

TABLE 1 – HYDRAULIC MODEL INPUT

WATERSHED SUBAREA			AREA (acre)	SCS CN	LENGTH (ft)	SLOPE (%)	LAG TIME (min)
Pre	Pre-Developed Site		0.11	61	140	4.3	9.36
Post	Post-Developed Site		0.11	98	170	4.0	0.97

TABLE 2 – HYDRAULIC MODEL OUTPUT

HYDRAULIC ELEMENT			10Y-6H (cfs)	10Y-24HR (cfs)	100Y-3HR (cfs)	100Y-6HR (cfs)	100Y-24HR (cfs)
Pre	Pre-Developed Site		0.0	0.0	0.0	0.0	0.0
Post	Post-Developed Site		0.3	0.1	0.5	0.6	0.2
<i>Runoff increase from Project Development</i>			<i>0.3</i>	<i>0.1</i>	<i>0.5</i>	<i>0.6</i>	<i>0.2</i>

4.2 COMPARISON OF PEAK FLOW VALUES

The proposed project increases storm water runoff between 0.1 cfs (cubic feet per second) and 0.6 cfs for the evaluated design storms, as shown in Table 2.

¹ U.S. Army Corps of Engineers, Hydraulic Engineering Circular Hydrologic Modeling System (HEC-HMS) software, Version 4.12.

² NOAA's National Weather Service. Precipitation Frequency Data Server.

5.0 PROPOSED DRAINAGE IMPROVEMENTS

Since the “pre-developed” storm water runoff condition is effectively 0 for all evaluated design storm conditions, it is proposed that all storm water originating in the new parking lot be collected and retained in underground storage chambers. An analysis of retention volumes for the 10-year 3-hour, 6-hour, and 24-hour design storms; and for the 100-year 3-hour, 6-hour, and 24-hour design storms. The 100-year 6-hour design storm yielded the largest storage volume requirement of 660 cubic feet. Refer to the appendix for updated detention storage volume calculations. Refer to the project civil construction plans for storm water chamber layout and construction details.

6.0 CONCLUSIONS

The proposed project increases storm water runoff between 0.1 cfs and 0.6 cfs for the evaluated design storms. It is proposed that all storm water originating in the new parking lot be collected and retained in underground storage chambers having a minimum storage volume of 660 cubic feet.

APPENDIX

Figure 1 – *Project Site Drainage Map*

Watershed Hydrology Model Input Spreadsheets

NOAA Precipitation Frequency Table

HEC-HMS Model Schematic

HEC-HMS Model Output Model Results Tables

HEC-HMS Model Output Detention Tables

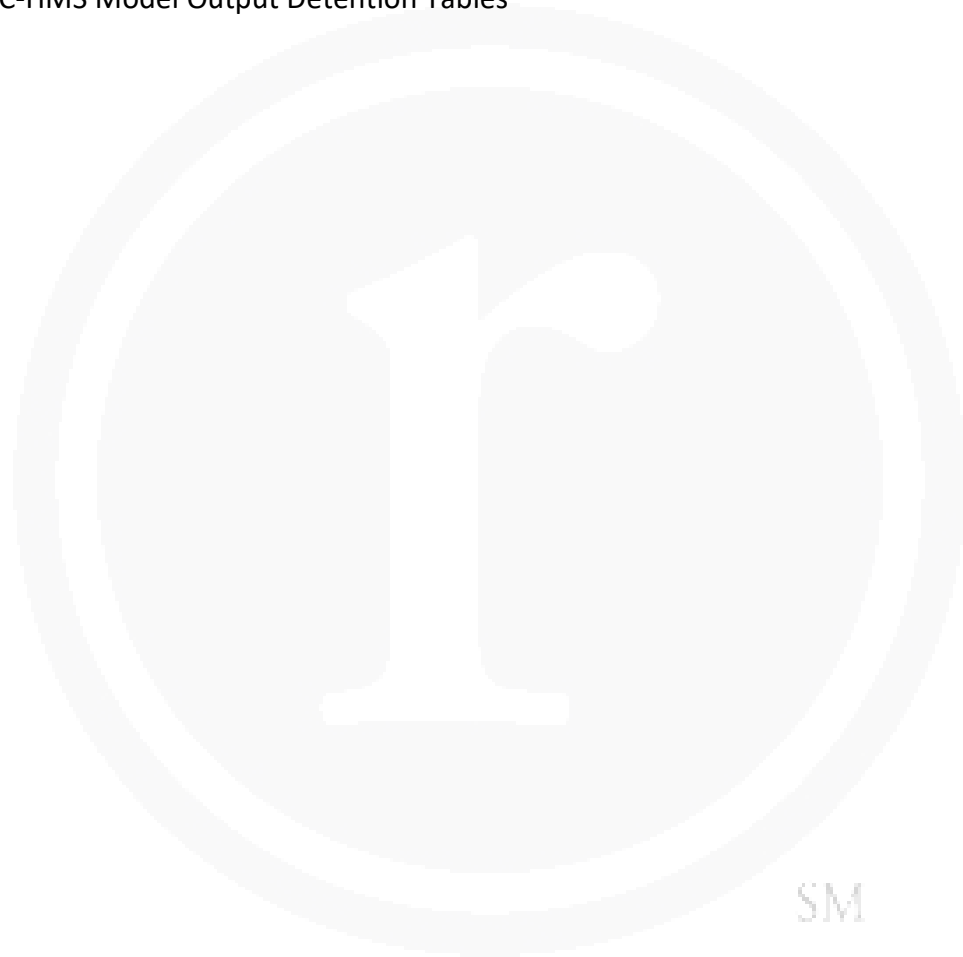


FIGURE 1 – PROJECT SITE DRAINAGE MAP





PROJECT NO. 05775-22-003

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Drainage Study Hydrology Information

CHKD: JLW

DATE: 03-Feb-25

HYDRAULIC ELEMENT		PROPERTIES		AREA		
		<i>Lo (ft)</i>	<i>S (%)</i>	<i>(sq ft)</i>	<i>(acre)</i>	<i>(sq mi)</i>
Pre	Pre-Developed Site	140	4.30	4,850	0.11	0.00017
Post	Post-Developed Site	170	4.00	4,850	0.11	0.00017

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: NRCS Curve Number

CHKD: JLW

DATE: 03-Feb-25

NRCS CURVE NUMBER (CN) CHART

LAND USE DESCRIPTION	SCS CURVE NUMBER CN VALUES									
	GROUP A		GROUP B		GROUP C		GROUP D		TOTALS	
	CN	%	CN	%	CN	%	CN	%	CN	%
<i>Cultivated Land</i>										
Cultivated Land; Without Conservation Treatment	72		81		88		91			
Cultivated Land; With Conservation Treatment	62		71		78		81			
<i>Arid and Semiarid Rangelands</i>										
Pinyon-Juniper with Grass Understory; Poor Condition	N/A		75		85		89			
Pinyon-Juniper with Grass Understory; Fair Condition	N/A		58		73		80			
Pinyon-Juniper with Grass Understory; Good Condition	N/A		41		61		71			
Sagebrush with Grass Understory; Poor Condition	N/A		67		80		85			
Sagebrush with Grass Understory; Fair Condition	N/A		51		63		70			
Sagebrush with Grass Understory; Good Condition	N/A		35		47		55			
Desert Shrub, Brush, and Cactus; Poor Condition	63		77		85		88			
Desert Shrub, Brush, and Cactus; Fair Condition	55		72		81		86			
Desert Shrub, Brush, and Cactus; Good Condition	49		68		79		84			
<i>Open Spaces (Lawns, Parks, etc.)</i>										
Open Space; Poor Condition; Grass Cover < 50%	68		79		86		89			
Open Space; Fair Condition; Grass Cover 50% to 75%	49		69		79		84			
Open Space; Good Condition; Grass Cover > 75%	39		61		74		80			
<i>Impervious Areas</i>										
Impervious Areas; Paved Parking Lots, Roofs, Driveways	98		98		98		98			
Impervious Areas; Streets and Roads; Paved; Curbs and Storm Sewers	98		98		98		98			
Impervious Areas; Streets and Roads; Paved; Open Ditches (w/ Right-of-Way)	83		89		92		93			
Impervious Areas; Streets and Roads; Gravel (w/ Right-of-Way)	76		85		89		91			
Impervious Areas; Streets and Roads; Dirt (w/ Right-of-Way)	72		82		87		89			
<i>Urban Commercial and Industrial Districts</i>										
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95			
Urban Districts; Industrial; Average 72% Impervious	81		88		91		93			
<i>Residential Districts</i>										
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92			
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87			
Residential Districts; 1/3 Acre; Average 30% Impervious	57		72		81		86			
Residential Districts; 1/2 Acre; Average 25% Impervious	54		70		80		85			
Residential Districts; 1 Acre; Average 20% Impervious	51		68		79		84			
Residential Districts; 2 Acre; Average 12% Impervious	46		65		77		82			
<i>Western Desert Urban Areas</i>										
Natural Desert Vegetation (Pervious Areas Only)	63		77		85		88			
Artificial Desert Landscaping	96		96		96		96			
<i>Developing Urban Area (No Vegetation)</i>										
Newly Graded Area (Pervious Only)	77		86		91		94			



PROJECT NO. 05775-22-003

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: NRCS Curve Number

CHKD: JLW

DATE: 03-Feb-25

NRCS WEIGHTED AVERAGE CN VALUES

LAND USE DESCRIPTION	SCS CURVE NUMBER CN VALUES									
	GROUP A		GROUP B		GROUP C		GROUP D		TOTALS	
	CN	%	CN	%	CN	%	CN	%	CN	%
<u>Pre</u>									<u>61.0</u>	<u>100</u>
Open Space; Good Condition; Grass Cover > 75%	39		61	100	74		80		61.0	100
<u>Post</u>									<u>98.0</u>	<u>100</u>
Impervious Areas; Paved Parking Lots, Roofs, Driveways	98		98	100	98		98		98.0	100



PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: TR 55 Worksheet

CHKD: JLW

DATE: 03-Feb-25

SHEET FLOW MANNINGS ROUGHNESS (n) VALUES	n
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.01
Fallow (no residue)	0.05
Cultivated soils residue cover ≤20%	0.06
Cultivated soils residue cover >20%	0.17
Grass short grass prairie	0.15
Grass dense including bluegrass, buffalo, blue grama, and native mixes	0.24
Grass bermudagrass	0.41
Grass natural range	0.13
Woods light under (cover height of 0.1 ft to obstruct sheet flow)	0.40
Woods dense under (cover height of 0.1 ft to obstruct sheet flow)	0.80

SHALLOW CONCENTRATED FLOW GROUND TYPE
P Pavement and small upland gullies
G Unpaved or grassed waterways
N Nearly bare, untilled, alluvial fans western mountain regions
C Cultivated straight row crops
S Short-grass pasture
M Minimum tillage cultivation, contour or strip-cropped, and woodlands
F Forest with heavy ground litter and hay meadows

SHALLOW CONCENTRATED FLOW ESTIMATED VELOCITIES

Table 15-3 Equations and assumptions developed from figure 15-4

Use with slope less than 0.005

Flow type	Depth (ft)	Manning's n	Velocity equation (ft/s)
Pavement and small upland gullies Paved	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways Unpaved	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$



PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

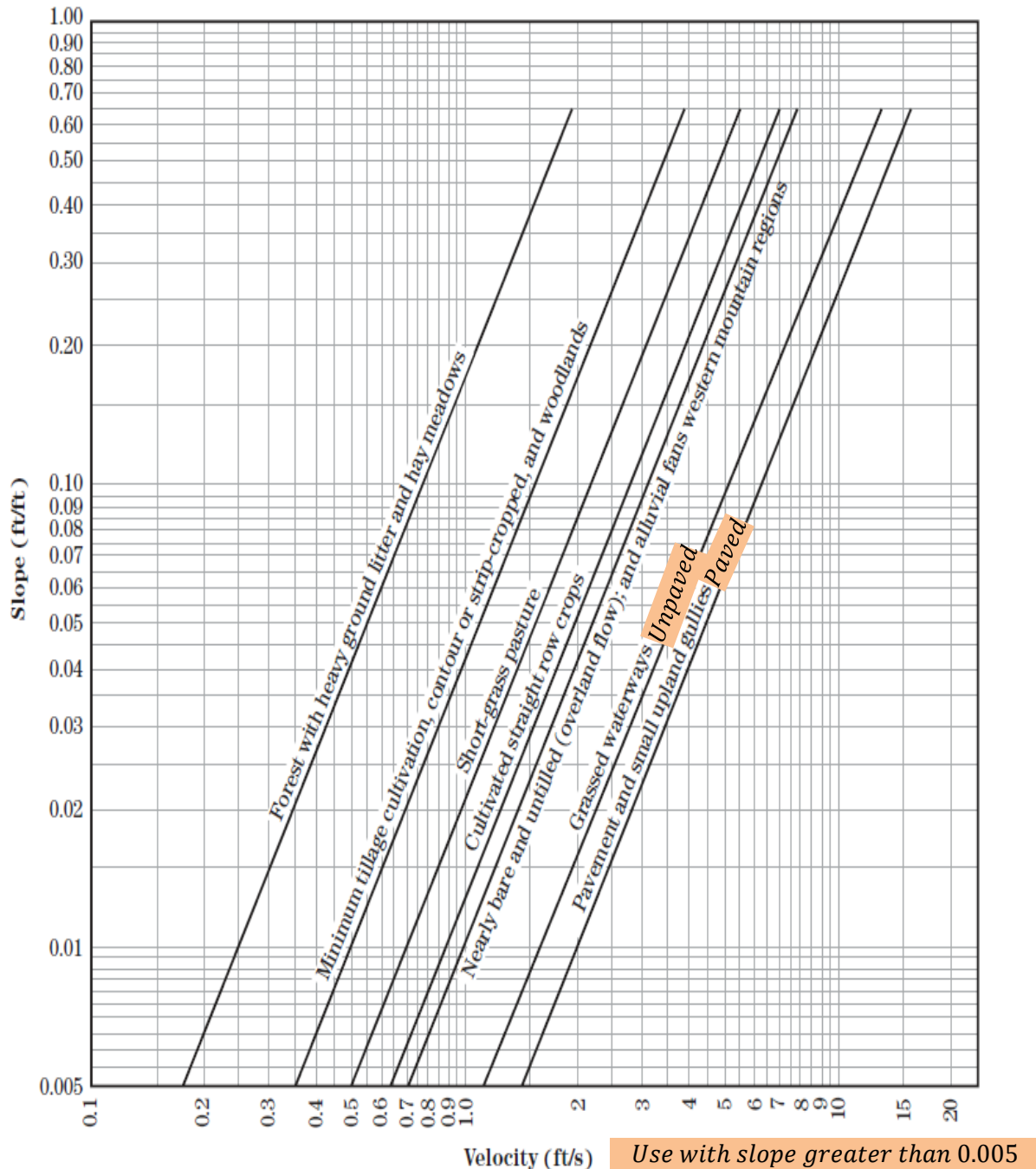
DATE: 03-Feb-25

SUBJECT: TR 55 Worksheet

CHKD: JLW

DATE: 03-Feb-25

Figure 15-4 Velocity versus slope for shallow concentrated flow





PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: TR 55 Worksheet

CHKD: JLW

DATE: 03-Feb-25

SUBAREA: Pre

SHEET FLOW

SURFACE DESCRIPTION	MANNINGS n	FLOW LENGTH L (ft) ≤100ft	2-YR 24-HR P ₂ (in)	AVE SLOPE S (ft/ft)
Grass dense including bluegrass, buffalo, blue gr	0.24	100	1.54	0.0430

Travel Time

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

$$T_t = \frac{0.25}{15.15} \text{ hr}$$

$$\text{min}$$

SHALLOW CONCENTRATED FLOW

GROUND TYPE	FLOW LENGTH L (ft)	AVE VELOCITY V(ft/s)	AVE SLOPE S (ft/ft)
S Short-grass pasture	40	1.44	0.0430

Travel Time

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

$$T_t = \frac{0.01}{0.46} \text{ hr}$$

$$\text{min}$$

CHANNEL FLOW

MANNINGS n	X-SEC FLOW AREA a (ft ²)	WETTED PERIMETER P _w	AVE SLOPE S (ft/ft)	FLOW LENGTH L (ft)

Hydraulic Radius

$$r = \frac{a}{P_w}$$

$$r = \text{ } 0 \text{ ft}$$

Average Velocity

$$V = \frac{1.49r^{2/3} S^{1/2}}{n}$$

$$V = \text{ } 0 \text{ ft/sec}$$

Travel Time

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

$$T_t = \frac{0}{0.00} \text{ hr}$$

$$\text{min}$$

TOTAL TIME OF CONCENTRATION

Time of Concentration

$$T_c = \text{Sum of Travel Times } T_t$$

$$T_c = \frac{0.26}{15.61} \text{ hr}$$

$$\text{min}$$

Lag Time

$$T_l = 0.6T_c$$

$$T_l = \frac{0.16}{9.36} \text{ hr}$$

$$\text{min}$$



PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: TR 55 Worksheet

CHKD: JLW

DATE: 03-Feb-25

SUBAREA: Post

SHEET FLOW

SURFACE DESCRIPTION	MANNINGS n	FLOW LENGTH L (ft) ≤300ft	2-YR 24-HR P ₂ (in)	AVE SLOPE S (ft/ft)
Smooth surfaces (concrete, asphalt, gravel, or b	0.01	100	1.54	0.0400

Travel Time

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

$$T_t = \frac{0.02 \text{ hr}}{1.32 \text{ min}}$$

SHALLOW CONCENTRATED FLOW

GROUND TYPE	FLOW LENGTH L (ft)	AVE VELOCITY V(ft/s)	AVE SLOPE S (ft/ft)
P Pavement and small upland gullies	70	4.07	0.0400

Travel Time

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

$$T_t = \frac{0.00 \text{ hr}}{0.29 \text{ min}}$$

CHANNEL FLOW

MANNINGS n	X-SEC FLOW AREA a (ft ²)	WETTED PERIMETER P _w	AVE SLOPE S (ft/ft)	FLOW LENGTH L (ft)
0.00	0.00	0.00	0.0400	0.00

Hydraulic Radius

$$r = \frac{a}{P_w}$$

$$r = \underline{\hspace{1cm}} 0 \text{ ft}$$

Average Velocity

$$V = \frac{1.49r^{2/3} S^{1/2}}{n}$$

$$V = \underline{\hspace{1cm}} 0 \text{ ft/sec}$$

Travel Time

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

$$T_t = \frac{0 \text{ hr}}{0.00 \text{ min}}$$

TOTAL TIME OF CONCENTRATION

Time of Concentration $T_c = \text{Sum of Travel Times } T_t$

$$T_c = \frac{0.03 \text{ hr}}{1.61 \text{ min}}$$

Lag Time

$$T_l = 0.6T_c$$

$$T_l = \frac{0.02 \text{ hr}}{0.97 \text{ min}}$$



NOAA Atlas 14, Volume 1, Version 5
Location name: Springdale, Utah, USA*
Latitude: 37.1878°, Longitude: -112.9999°
Elevation: 3898 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

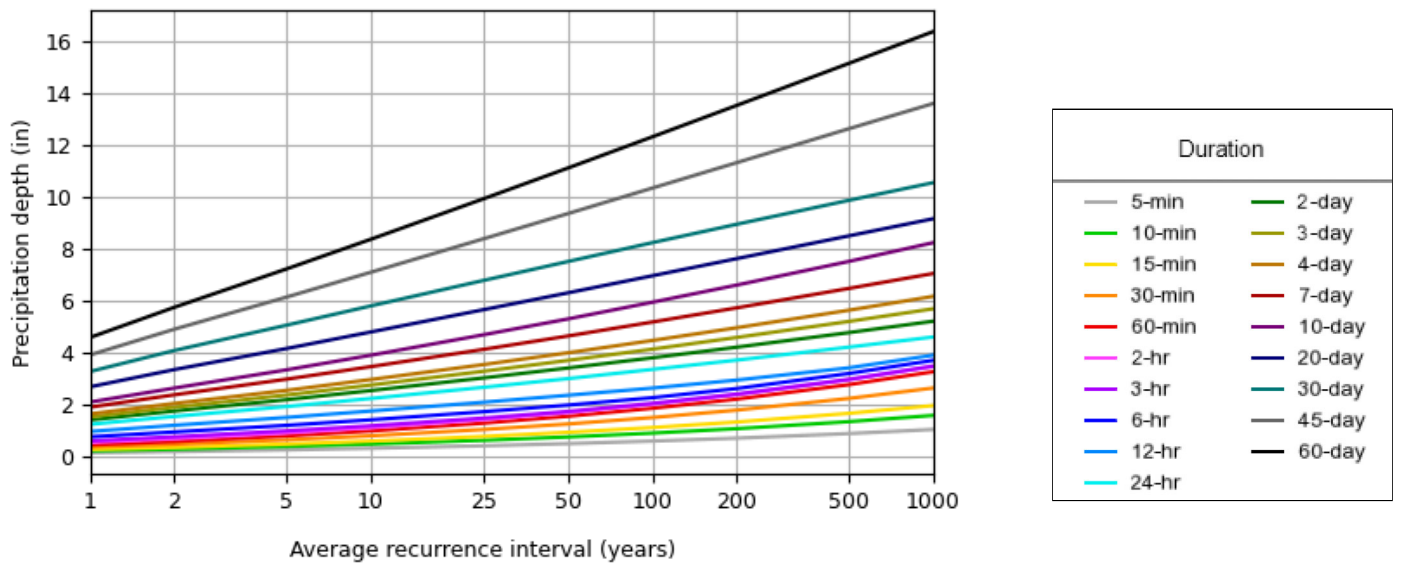
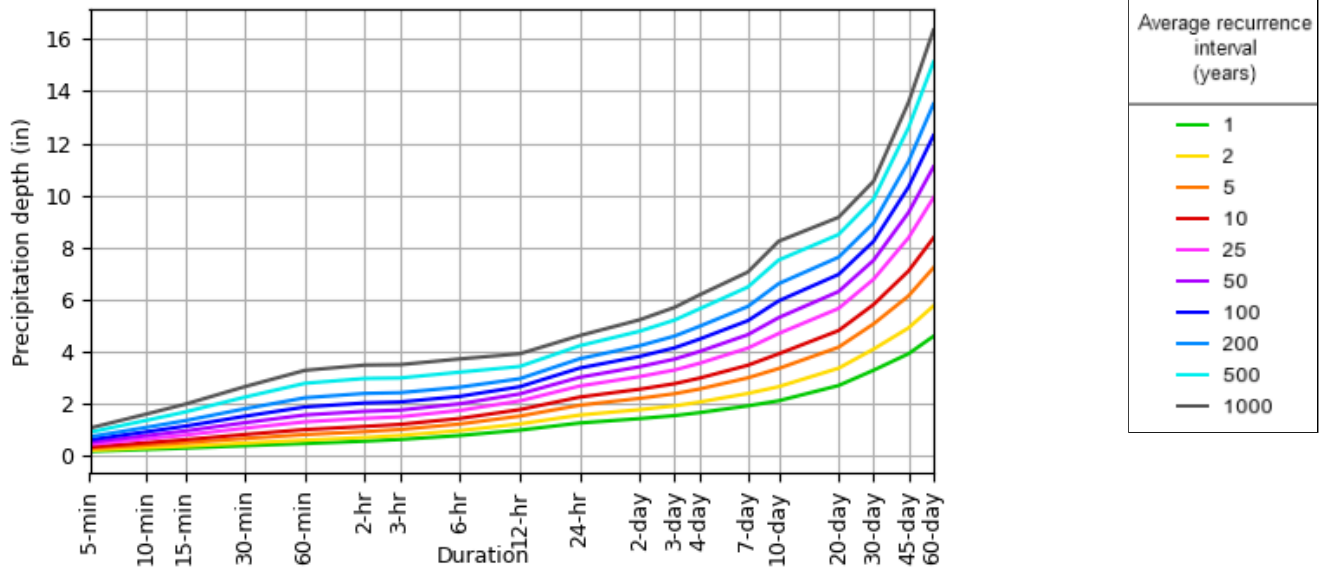
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.141 (0.121-0.167)	0.181 (0.155-0.216)	0.250 (0.213-0.297)	0.311 (0.262-0.369)	0.406 (0.336-0.482)	0.490 (0.398-0.581)	0.588 (0.466-0.702)	0.700 (0.540-0.844)	0.877 (0.650-1.07)	1.04 (0.741-1.28)
10-min	0.214 (0.183-0.254)	0.276 (0.236-0.328)	0.380 (0.324-0.452)	0.474 (0.398-0.561)	0.618 (0.511-0.734)	0.746 (0.606-0.885)	0.894 (0.710-1.07)	1.07 (0.822-1.28)	1.34 (0.989-1.63)	1.58 (1.13-1.96)
15-min	0.266 (0.227-0.315)	0.342 (0.293-0.407)	0.472 (0.401-0.560)	0.587 (0.494-0.696)	0.766 (0.633-0.910)	0.925 (0.752-1.10)	1.11 (0.880-1.32)	1.32 (1.02-1.59)	1.66 (1.23-2.03)	1.96 (1.40-2.42)
30-min	0.358 (0.306-0.424)	0.460 (0.395-0.548)	0.635 (0.541-0.754)	0.791 (0.665-0.937)	1.03 (0.853-1.22)	1.24 (1.01-1.48)	1.49 (1.18-1.78)	1.78 (1.37-2.14)	2.23 (1.65-2.73)	2.63 (1.88-3.26)
60-min	0.443 (0.379-0.524)	0.570 (0.488-0.678)	0.786 (0.669-0.933)	0.979 (0.823-1.16)	1.28 (1.06-1.52)	1.54 (1.25-1.83)	1.85 (1.47-2.21)	2.20 (1.70-2.65)	2.76 (2.04-3.38)	3.26 (2.33-4.04)
2-hr	0.534 (0.464-0.619)	0.676 (0.586-0.782)	0.899 (0.779-1.04)	1.10 (0.944-1.27)	1.41 (1.19-1.63)	1.68 (1.39-1.95)	2.00 (1.62-2.34)	2.37 (1.87-2.80)	2.95 (2.23-3.53)	3.46 (2.53-4.21)
3-hr	0.597 (0.530-0.683)	0.753 (0.666-0.864)	0.981 (0.866-1.12)	1.18 (1.03-1.35)	1.47 (1.27-1.68)	1.73 (1.47-1.99)	2.04 (1.70-2.36)	2.40 (1.96-2.81)	2.96 (2.34-3.56)	3.48 (2.67-4.25)
6-hr	0.751 (0.672-0.848)	0.940 (0.842-1.06)	1.19 (1.07-1.35)	1.41 (1.25-1.59)	1.72 (1.50-1.94)	1.97 (1.71-2.24)	2.26 (1.93-2.58)	2.61 (2.19-3.02)	3.19 (2.60-3.74)	3.70 (2.95-4.40)
12-hr	0.957 (0.860-1.07)	1.20 (1.07-1.34)	1.50 (1.34-1.68)	1.74 (1.56-1.96)	2.08 (1.84-2.34)	2.35 (2.06-2.65)	2.63 (2.28-2.98)	2.94 (2.52-3.35)	3.41 (2.86-3.93)	3.90 (3.22-4.55)
24-hr	1.23 (1.15-1.33)	1.54 (1.43-1.65)	1.92 (1.78-2.06)	2.23 (2.07-2.40)	2.66 (2.45-2.86)	2.99 (2.74-3.24)	3.35 (3.05-3.63)	3.70 (3.35-4.04)	4.20 (3.75-4.63)	4.60 (4.05-5.09)
2-day	1.40 (1.31-1.50)	1.75 (1.64-1.87)	2.18 (2.04-2.33)	2.53 (2.37-2.71)	3.02 (2.81-3.24)	3.40 (3.15-3.66)	3.79 (3.48-4.09)	4.20 (3.84-4.56)	4.76 (4.28-5.21)	5.20 (4.62-5.73)
3-day	1.52 (1.42-1.63)	1.89 (1.77-2.03)	2.36 (2.21-2.52)	2.74 (2.56-2.93)	3.27 (3.04-3.50)	3.69 (3.42-3.96)	4.12 (3.79-4.45)	4.58 (4.17-4.96)	5.19 (4.66-5.68)	5.68 (5.04-6.26)
4-day	1.63 (1.53-1.75)	2.04 (1.90-2.18)	2.54 (2.37-2.71)	2.96 (2.76-3.16)	3.53 (3.28-3.77)	3.98 (3.68-4.27)	4.46 (4.10-4.80)	4.95 (4.51-5.36)	5.62 (5.05-6.15)	6.16 (5.45-6.79)
7-day	1.89 (1.76-2.04)	2.37 (2.21-2.56)	2.97 (2.76-3.20)	3.45 (3.21-3.72)	4.11 (3.81-4.44)	4.63 (4.26-5.01)	5.17 (4.74-5.60)	5.72 (5.18-6.23)	6.46 (5.79-7.11)	7.04 (6.24-7.81)
10-day	2.09 (1.94-2.25)	2.63 (2.44-2.83)	3.33 (3.08-3.58)	3.89 (3.60-4.18)	4.68 (4.29-5.04)	5.29 (4.83-5.72)	5.93 (5.37-6.45)	6.59 (5.91-7.21)	7.50 (6.63-8.29)	8.23 (7.19-9.17)
20-day	2.67 (2.50-2.87)	3.34 (3.12-3.59)	4.15 (3.86-4.44)	4.79 (4.46-5.12)	5.64 (5.24-6.03)	6.29 (5.82-6.74)	6.95 (6.39-7.47)	7.61 (6.94-8.22)	8.48 (7.65-9.25)	9.15 (8.17-10.0)
30-day	3.26 (3.04-3.51)	4.08 (3.80-4.38)	5.05 (4.70-5.42)	5.79 (5.38-6.22)	6.76 (6.26-7.26)	7.50 (6.91-8.06)	8.22 (7.54-8.88)	8.93 (8.12-9.68)	9.85 (8.87-10.8)	10.5 (9.41-11.6)
45-day	3.90 (3.62-4.22)	4.89 (4.53-5.27)	6.13 (5.67-6.61)	7.09 (6.54-7.64)	8.37 (7.70-9.04)	9.34 (8.54-10.1)	10.3 (9.39-11.2)	11.3 (10.2-12.4)	12.6 (11.3-13.9)	13.6 (12.0-15.1)
60-day	4.57 (4.22-4.97)	5.74 (5.29-6.24)	7.21 (6.64-7.83)	8.36 (7.69-9.06)	9.90 (9.06-10.8)	11.1 (10.1-12.1)	12.3 (11.1-13.4)	13.5 (12.1-14.8)	15.1 (13.4-16.7)	16.4 (14.4-18.2)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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PF graphical

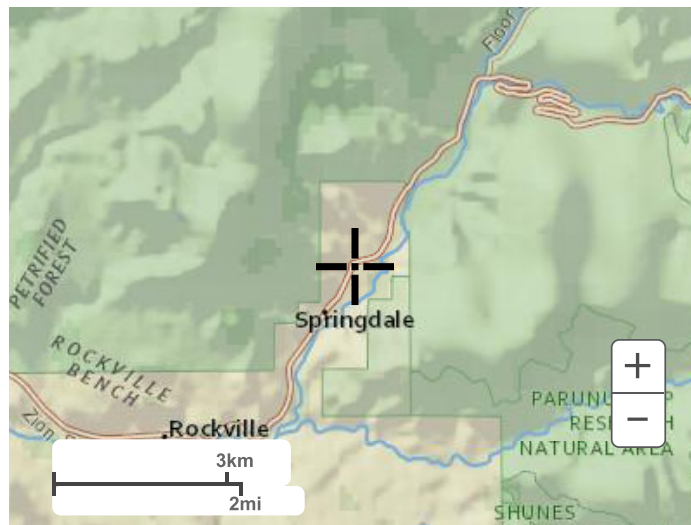
PDS-based depth-duration-frequency (DDF) curves
Latitude: 37.1878°, Longitude: -112.9999°



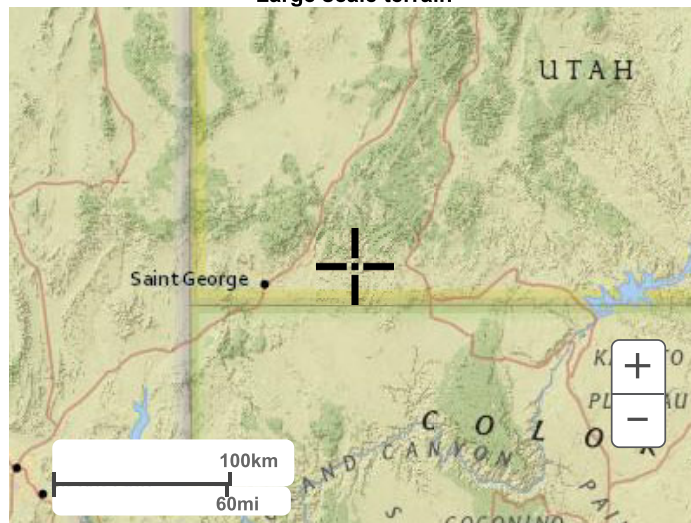
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Maps & aerials

Small scale terrain



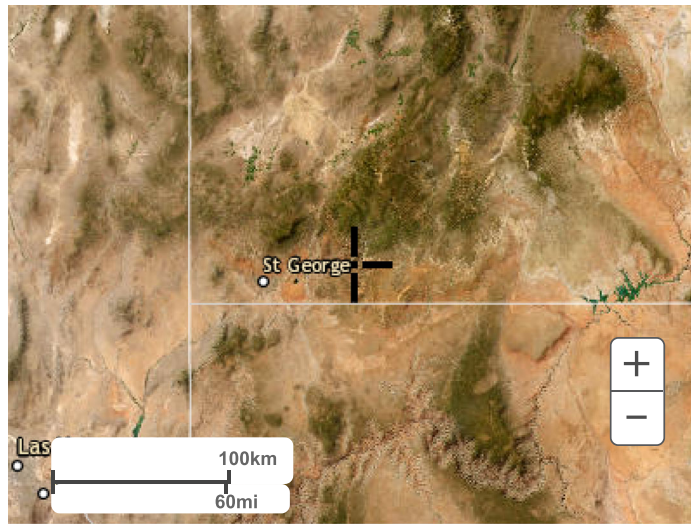
Large scale terrain



Large scale map



Large scale aerial

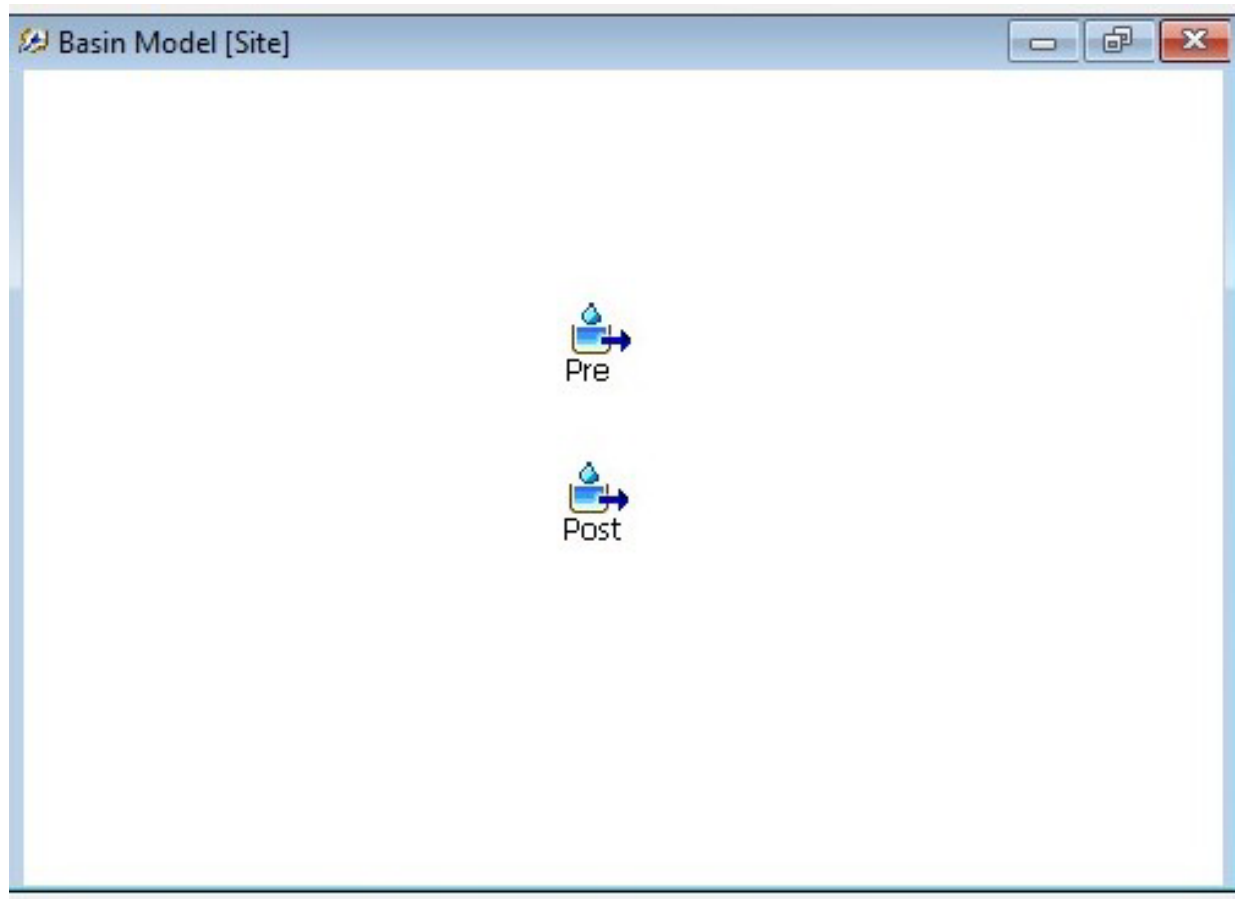


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HEC-HMS MODEL SCHEMATIC





PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Model Results

CHKD: JLW

DATE: 03-Feb-25

WATERSHED SUBAREA		AREA (acre)	SCS CN	LENGTH (ft)	SLOPE (%)	LAG TIME (min)
Pre	Pre-Developed Site	0.11	61	140	4.3	9.36
Post	Post-Developed Site	0.11	98	170	4.0	0.97

HYDRAULIC ELEMENT		10Y-6H (cfs)	10Y-24HR (cfs)	100Y-3HR (cfs)	100Y-6HR (cfs)	100Y-24HR (cfs)
Pre	Pre-Developed Site	0.0	0.0	0.0	0.0	0.0
Post	Post-Developed Site	0.3	0.1	0.5	0.6	0.2
<i>Runoff increase from Project Development</i>		<i>0.3</i>	<i>0.1</i>	<i>0.5</i>	<i>0.6</i>	<i>0.2</i>



PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

100-YEAR 24-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs

Post-Developed Peak Flow 0.2 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:00	0.0	0.0	0
12:30	0.0	0.0	0
13:00	0.0	0.0	0
13:30	0.0	0.0	0
14:00	0.0	0.0	0
14:30	0.0	0.0	0
15:00	0.0	0.0	0
15:30	0.0	0.0	0
16:00	0.0	0.0	0
16:30	0.0	0.0	0
17:00	0.0	0.0	0
17:30	0.0	0.0	0
18:00	0.0	0.0	0
18:30	0.0	0.0	0
19:00	0.0	0.0	0
19:30	0.0	0.0	0
20:00	0.0	0.0	0
20:30	0.0	0.0	0
21:00	0.0	0.0	0
21:30	0.0	0.0	0
22:00	0.0	0.0	0
22:30	0.0	0.0	0
23:00	0.0	0.0	0
23:30	0.0	0.0	0
0:00	0.0	0.2	360
0:30	0.0	0.1	180
1:00	0.0	0.0	0
1:30	0.0	0.0	0
2:00	0.0	0.0	0
2:30	0.0	0.0	0
3:00	0.0	0.0	0
3:30	0.0	0.0	0
4:00	0.0	0.0	0
4:30	0.0	0.0	0
5:00	0.0	0.0	0
5:30	0.0	0.0	0
6:00	0.0	0.0	0
6:30	0.0	0.0	0
7:00	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
7:30	0.0	0.0	0
8:00	0.0	0.0	0
8:30	0.0	0.0	0
9:00	0.0	0.0	0
9:30	0.0	0.0	0
10:00	0.0	0.0	0
10:30	0.0	0.0	0
11:00	0.0	0.0	0
11:30	0.0	0.0	0
12:00	0.0	0.0	0
12:30	0.0	0.0	0
13:00	0.0	0.0	0
13:30	0.0	0.0	0
14:00	0.0	0.0	0
14:30	0.0	0.0	0
15:00	0.0	0.0	0
15:30	0.0	0.0	0
16:00	0.0	0.0	0
16:30	0.0	0.0	0
17:00	0.0	0.0	0
17:30	0.0	0.0	0
18:00	0.0	0.0	0
18:30	0.0	0.0	0
19:00	0.0	0.0	0
19:30	0.0	0.0	0
20:00	0.0	0.0	0
20:30	0.0	0.0	0
21:00	0.0	0.0	0
TOTAL DETENTION VOLUME			540

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

100-YEAR 3-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs
Post-Developed Peak Flow 0.5 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:30	0.0	0.0	0
12:35	0.0	0.4	120
12:40	0.0	0.5	150
12:45	0.0	0.4	120
12:50	0.0	0.3	90
12:55	0.0	0.2	60
13:00	0.0	0.1	30
13:05	0.0	0.1	30
13:10	0.0	0.1	30
13:15	0.0	0.1	30
13:20	0.0	0.0	0
13:25	0.0	0.0	0
13:30	0.0	0.0	0
13:35	0.0	0.0	0
13:40	0.0	0.0	0
13:45	0.0	0.0	0
13:50	0.0	0.0	0
13:55	0.0	0.0	0
14:00	0.0	0.0	0
14:05	0.0	0.0	0
14:10	0.0	0.0	0
14:15	0.0	0.0	0
14:20	0.0	0.0	0
14:25	0.0	0.0	0
14:30	0.0	0.0	0
14:35	0.0	0.0	0
14:40	0.0	0.0	0
14:45	0.0	0.0	0
14:50	0.0	0.0	0
14:55	0.0	0.0	0
15:00	0.0	0.0	0
15:05	0.0	0.0	0
15:10	0.0	0.0	0
15:15	0.0	0.0	0
15:20	0.0	0.0	0
15:25	0.0	0.0	0
15:30	0.0	0.0	0
15:35	0.0	0.0	0
15:40	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
15:45	0.0	0.0	0
15:50	0.0	0.0	0
15:55	0.0	0.0	0
16:00	0.0	0.0	0
16:05	0.0	0.0	0
16:10	0.0	0.0	0
16:15	0.0	0.0	0
16:20	0.0	0.0	0
16:25	0.0	0.0	0
16:30	0.0	0.0	0
16:35	0.0	0.0	0
16:40	0.0	0.0	0
16:45	0.0	0.0	0
16:50	0.0	0.0	0
16:55	0.0	0.0	0
17:00	0.0	0.0	0
17:05	0.0	0.0	0
17:10	0.0	0.0	0
17:15	0.0	0.0	0
17:20	0.0	0.0	0
17:25	0.0	0.0	0
17:30	0.0	0.0	0
17:35	0.0	0.0	0
17:40	0.0	0.0	0
17:45	0.0	0.0	0
17:50	0.0	0.0	0
17:55	0.0	0.0	0
18:00	0.0	0.0	0
18:05	0.0	0.0	0
18:10	0.0	0.0	0
18:15	0.0	0.0	0
18:20	0.0	0.0	0
18:25	0.0	0.0	0
18:30	0.0	0.0	0
18:35	0.0	0.0	0
18:40	0.0	0.0	0
18:45	0.0	0.0	0
18:50	0.0	0.0	0
TOTAL DETENTION VOLUME			660

PROJECT NO. 05775-22-003

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

100-YEAR 6-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs
Post-Developed Peak Flow 0.6 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:30	0.0	0.0	0
12:35	0.0	0.0	0
12:40	0.0	0.0	0
12:45	0.0	0.0	0
12:50	0.0	0.0	0
12:55	0.0	0.0	0
13:00	0.0	0.0	0
13:05	0.0	0.0	0
13:10	0.0	0.0	0
13:15	0.0	0.0	0
13:20	0.0	0.0	0
13:25	0.0	0.0	0
13:30	0.0	0.0	0
13:35	0.0	0.0	0
13:40	0.0	0.0	0
13:45	0.0	0.0	0
13:50	0.0	0.0	0
13:55	0.0	0.0	0
14:00	0.0	0.0	0
14:05	0.0	0.0	0
14:10	0.0	0.0	0
14:15	0.0	0.0	0
14:20	0.0	0.0	0
14:25	0.0	0.0	0
14:30	0.0	0.0	0
14:35	0.0	0.0	0
14:40	0.0	0.1	30
14:45	0.0	0.1	30
14:50	0.0	0.1	30
14:55	0.0	0.6	180
15:00	0.0	0.5	150
15:05	0.0	0.2	60
15:10	0.0	0.1	30
15:15	0.0	0.1	30
15:20	0.0	0.1	30
15:25	0.0	0.0	0
15:30	0.0	0.1	30
15:35	0.0	0.0	0
15:40	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
15:45	0.0	0.0	0
15:50	0.0	0.0	0
15:55	0.0	0.0	0
16:00	0.0	0.0	0
16:05	0.0	0.0	0
16:10	0.0	0.0	0
16:15	0.0	0.0	0
16:20	0.0	0.0	0
16:25	0.0	0.0	0
16:30	0.0	0.0	0
16:35	0.0	0.0	0
16:40	0.0	0.0	0
16:45	0.0	0.0	0
16:50	0.0	0.0	0
16:55	0.0	0.0	0
17:00	0.0	0.0	0
17:05	0.0	0.0	0
17:10	0.0	0.0	0
17:15	0.0	0.0	0
17:20	0.0	0.0	0
17:25	0.0	0.0	0
17:30	0.0	0.0	0
17:35	0.0	0.0	0
17:40	0.0	0.0	0
17:45	0.0	0.0	0
17:50	0.0	0.0	0
17:55	0.0	0.0	0
18:00	0.0	0.0	0
18:05	0.0	0.0	0
18:10	0.0	0.0	0
18:15	0.0	0.0	0
18:20	0.0	0.0	0
18:25	0.0	0.0	0
18:30	0.0	0.0	0
18:35	0.0	0.0	0
18:40	0.0	0.0	0
18:45	0.0	0.0	0
18:50	0.0	0.0	0
TOTAL DETENTION VOLUME			600

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

10-YEAR 24-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs

Post-Developed Peak Flow 0.1 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:00	0.0	0.0	0
12:30	0.0	0.0	0
13:00	0.0	0.0	0
13:30	0.0	0.0	0
14:00	0.0	0.0	0
14:30	0.0	0.0	0
15:00	0.0	0.0	0
15:30	0.0	0.0	0
16:00	0.0	0.0	0
16:30	0.0	0.0	0
17:00	0.0	0.0	0
17:30	0.0	0.0	0
18:00	0.0	0.0	0
18:30	0.0	0.0	0
19:00	0.0	0.0	0
19:30	0.0	0.0	0
20:00	0.0	0.0	0
20:30	0.0	0.0	0
21:00	0.0	0.0	0
21:30	0.0	0.0	0
22:00	0.0	0.0	0
22:30	0.0	0.0	0
23:00	0.0	0.0	0
23:30	0.0	0.0	0
0:00	0.0	0.1	180
0:30	0.0	0.1	180
1:00	0.0	0.0	0
1:30	0.0	0.0	0
2:00	0.0	0.0	0
2:30	0.0	0.0	0
3:00	0.0	0.0	0
3:30	0.0	0.0	0
4:00	0.0	0.0	0
4:30	0.0	0.0	0
5:00	0.0	0.0	0
5:30	0.0	0.0	0
6:00	0.0	0.0	0
6:30	0.0	0.0	0
7:00	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
7:30	0.0	0.0	0
8:00	0.0	0.0	0
8:30	0.0	0.0	0
9:00	0.0	0.0	0
9:30	0.0	0.0	0
10:00	0.0	0.0	0
10:30	0.0	0.0	0
11:00	0.0	0.0	0
11:30	0.0	0.0	0
12:00	0.0	0.0	0
12:30	0.0	0.0	0
13:00	0.0	0.0	0
13:30	0.0	0.0	0
14:00	0.0	0.0	0
14:30	0.0	0.0	0
15:00	0.0	0.0	0
15:30	0.0	0.0	0
16:00	0.0	0.0	0
16:30	0.0	0.0	0
17:00	0.0	0.0	0
17:30	0.0	0.0	0
18:00	0.0	0.0	0
18:30	0.0	0.0	0
19:00	0.0	0.0	0
19:30	0.0	0.0	0
20:00	0.0	0.0	0
20:30	0.0	0.0	0
21:00	0.0	0.0	0
TOTAL DETENTION VOLUME			360

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

10-YEAR 3-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs
Post-Developed Peak Flow 0.3 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:30	0.0	0.0	0
12:35	0.0	0.2	60
12:40	0.0	0.3	90
12:45	0.0	0.2	60
12:50	0.0	0.2	60
12:55	0.0	0.1	30
13:00	0.0	0.1	30
13:05	0.0	0.1	30
13:10	0.0	0.0	0
13:15	0.0	0.0	0
13:20	0.0	0.0	0
13:25	0.0	0.0	0
13:30	0.0	0.0	0
13:35	0.0	0.0	0
13:40	0.0	0.0	0
13:45	0.0	0.0	0
13:50	0.0	0.0	0
13:55	0.0	0.0	0
14:00	0.0	0.0	0
14:05	0.0	0.0	0
14:10	0.0	0.0	0
14:15	0.0	0.0	0
14:20	0.0	0.0	0
14:25	0.0	0.0	0
14:30	0.0	0.0	0
14:35	0.0	0.0	0
14:40	0.0	0.0	0
14:45	0.0	0.0	0
14:50	0.0	0.0	0
14:55	0.0	0.0	0
15:00	0.0	0.0	0
15:05	0.0	0.0	0
15:10	0.0	0.0	0
15:15	0.0	0.0	0
15:20	0.0	0.0	0
15:25	0.0	0.0	0
15:30	0.0	0.0	0
15:35	0.0	0.0	0
15:40	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
15:45	0.0	0.0	0
15:50	0.0	0.0	0
15:55	0.0	0.0	0
16:00	0.0	0.0	0
16:05	0.0	0.0	0
16:10	0.0	0.0	0
16:15	0.0	0.0	0
16:20	0.0	0.0	0
16:25	0.0	0.0	0
16:30	0.0	0.0	0
16:35	0.0	0.0	0
16:40	0.0	0.0	0
16:45	0.0	0.0	0
16:50	0.0	0.0	0
16:55	0.0	0.0	0
17:00	0.0	0.0	0
17:05	0.0	0.0	0
17:10	0.0	0.0	0
17:15	0.0	0.0	0
17:20	0.0	0.0	0
17:25	0.0	0.0	0
17:30	0.0	0.0	0
17:35	0.0	0.0	0
17:40	0.0	0.0	0
17:45	0.0	0.0	0
17:50	0.0	0.0	0
17:55	0.0	0.0	0
18:00	0.0	0.0	0
18:05	0.0	0.0	0
18:10	0.0	0.0	0
18:15	0.0	0.0	0
18:20	0.0	0.0	0
18:25	0.0	0.0	0
18:30	0.0	0.0	0
18:35	0.0	0.0	0
18:40	0.0	0.0	0
18:45	0.0	0.0	0
18:50	0.0	0.0	0
TOTAL DETENTION VOLUME			360

PROJECT NO. 05775-22-003

PROJECT: Rayner Restaurant Parking Lot Addition

BY: RMA

DATE: 03-Feb-25

SUBJECT: Detention Calculations

CHKD: JLW

DATE: 03-Feb-25

10-YEAR 6-HOUR STORM HYDROGRAPH

Pre-Developed Peak Flow 0.0 cfs
Post-Developed Peak Flow 0.3 cfs

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
12:30	0.0	0.0	0
12:35	0.0	0.0	0
12:40	0.0	0.0	0
12:45	0.0	0.0	0
12:50	0.0	0.0	0
12:55	0.0	0.0	0
13:00	0.0	0.0	0
13:05	0.0	0.0	0
13:10	0.0	0.0	0
13:15	0.0	0.0	0
13:20	0.0	0.0	0
13:25	0.0	0.0	0
13:30	0.0	0.0	0
13:35	0.0	0.0	0
13:40	0.0	0.0	0
13:45	0.0	0.0	0
13:50	0.0	0.0	0
13:55	0.0	0.3	90
14:00	0.0	0.3	90
14:05	0.0	0.1	30
14:10	0.0	0.1	30
14:15	0.0	0.1	30
14:20	0.0	0.0	0
14:25	0.0	0.0	0
14:30	0.0	0.0	0
14:35	0.0	0.0	0
14:40	0.0	0.0	0
14:45	0.0	0.0	0
14:50	0.0	0.0	0
14:55	0.0	0.0	0
15:00	0.0	0.0	0
15:05	0.0	0.0	0
15:10	0.0	0.0	0
15:15	0.0	0.0	0
15:20	0.0	0.0	0
15:25	0.0	0.0	0
15:30	0.0	0.0	0
15:35	0.0	0.0	0
15:40	0.0	0.0	0

TIME (hour)	RAYNER PARKING LOT		
	PRE (cfs)	POST (cfs)	VOLUME (cf)
15:45	0.0	0.0	0
15:50	0.0	0.0	0
15:55	0.0	0.0	0
16:00	0.0	0.0	0
16:05	0.0	0.0	0
16:10	0.0	0.0	0
16:15	0.0	0.0	0
16:20	0.0	0.0	0
16:25	0.0	0.0	0
16:30	0.0	0.0	0
16:35	0.0	0.0	0
16:40	0.0	0.0	0
16:45	0.0	0.0	0
16:50	0.0	0.0	0
16:55	0.0	0.0	0
17:00	0.0	0.0	0
17:05	0.0	0.0	0
17:10	0.0	0.0	0
17:15	0.0	0.0	0
17:20	0.0	0.0	0
17:25	0.0	0.0	0
17:30	0.0	0.0	0
17:35	0.0	0.0	0
17:40	0.0	0.0	0
17:45	0.0	0.0	0
17:50	0.0	0.0	0
17:55	0.0	0.0	0
18:00	0.0	0.0	0
18:05	0.0	0.0	0
18:10	0.0	0.0	0
18:15	0.0	0.0	0
18:20	0.0	0.0	0
18:25	0.0	0.0	0
18:30	0.0	0.0	0
18:35	0.0	0.0	0
18:40	0.0	0.0	0
18:45	0.0	0.0	0
18:50	0.0	0.0	0
TOTAL DETENTION VOLUME			270