# Final
# Stormwater Management Plan

Proposed Residences At Green Meadow
Senior Living Facility
San Angelo, TX

October 30, 2024

Prepared By:
SM Engineering
5507 High Meadow Circle
Manhattan, KS 66503


Samuel D. Malinowsky, P.E.
smcivilengr@gmail.com

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## INTRODUCTION

This Stormwater Management Plan has been prepared for the proposed development of a 30 unit senior living facility located at 3800 Green Meadow, San Angelo, TX. The total site area is 1.43 acres. The site location is shown in Figure 1 below.


**Figure 1: Site Location Map**

The purpose of the study is to analyze the effects the project will have on the local drainage patterns and to determine measures necessary to prevent negative impacts downstream.

## DRAINAGE ANALYSIS METHODS AND CALCULATIONS

The drainage study was prepared using Hydrology Studio software to analyze both existing and proposed site drainage characteristics. (the Hydrology Studio report pages are included in Appendix B). Hydrology Studio is a hydrology software suite created by Terry Stringer who was the original developer of Hydraflow. When Hydraflow was sold to ACAD Terry created Hydrology Studio to service engineers who worked outside the ACAD interface. The rational

method was used to determine the existing runoff with the modified rational method being used for the developed runoff per the city of San Angelo Stormwater Design Manual.

**EXISTING DRAINAGE**

The drainage area considered is 1.43 acres in size and is currently vacant ground covered in grass and dirt. On the south end of the site is Green Meadow Drive on the east is an existing commercial development and on the northwest side is an existing arroyo. The site predominantly drains northwesterly to the existing arroyo. The existing drainage map is included in Appendix A.

**PROPOSED DRAINAGE PLAN**

The development plan calls for construction of a 10,200 SF, 30 unit, senior living facility and associated parking area.

The building will be located in the north portion of the lot with parking located to the south and east. The detention system will be an above ground dry pond located in the northeast portion of the lot. A copy of the proposed drainage plan is included in Appendix A. The outlet of the pond will be an 8" pipe that will outlet into the arroyo at an elevation above the base flood elevation of 1892 ft. The 8" pipe will limit the stormwater flow from the to the predevelopment runoff for the 2 yr and 100 yr storms.

The pre and post development runoff curve numbers were calculated using runoff coefficients listed in the San Angelo Stormwater Design Manual. The existing ground is comprised of spares grass and dirt. The stormwater manual lists a 0.3 coefficient for parks & open areas. To more closely model the existing conditions a runoff coefficient of 0.4 was used. The developed runoff coefficient was calculated using 0.30 for the grass areas and 0.95 for the impervious areas. A developed runoff coefficient of 0.65 was calculated.. The calculation is summarized below.

$$(0.96 \text{ Ac} \times 0.95) / 1.43 + (0.67 \times 0.30) / 1.43 = 0.78$$

Due to the size of the site and the slope of the existing ground a predeveloped and post developed time of concentration of 5.00 minutes was used. Below is a chart comparing the developed runoff values to the predeveloped.

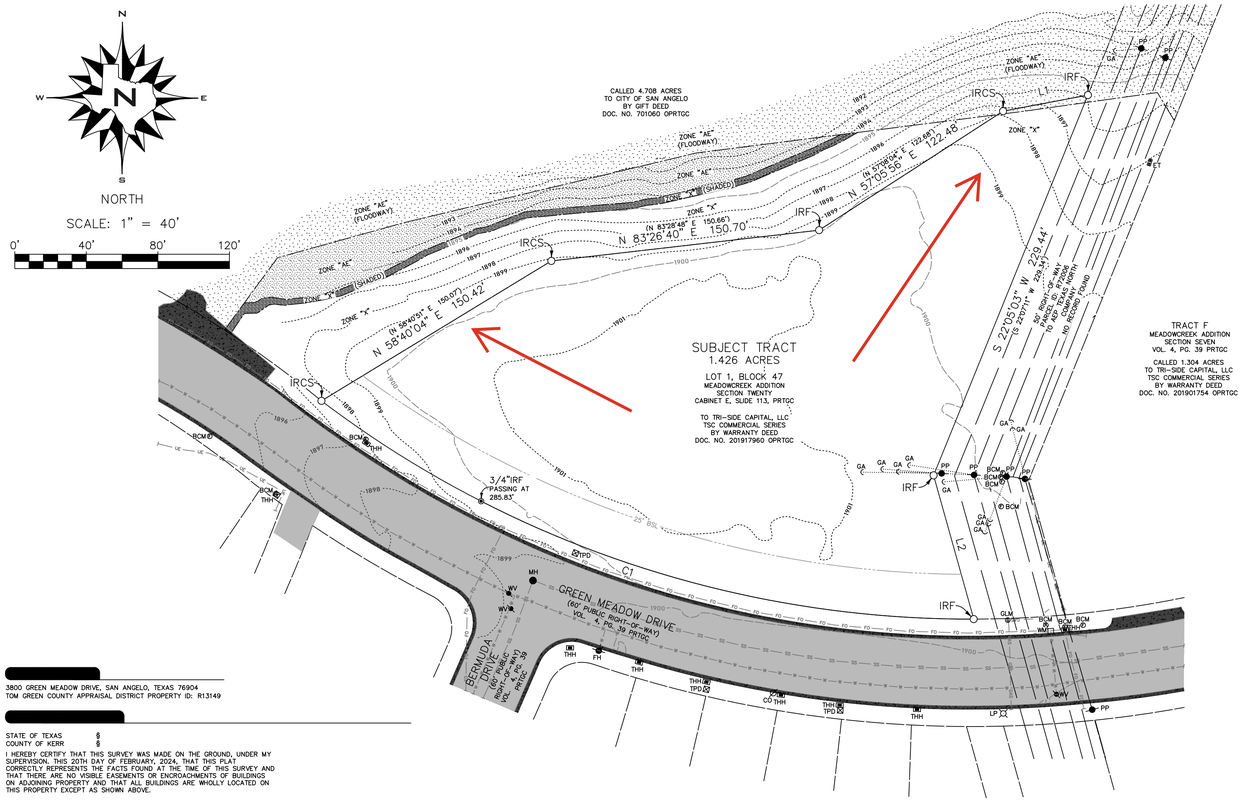
| | 2 Yr. Runoff (cfs) | 100 Yr. Runoff (cfs) |
|---|---|---|
| Pre-Developed | 2.89 | 5.65 |
| Developed | 3.21 | 6.00 |
| Outlet from Pond | 2.43 | 3.85 |
| Difference from Predeveloped | -0.46 | -1.80 |

**CONCLUSION**

The proposed senior living development will increase the stormwater runoff from the site thus requiring stormwater quantity to be addressed per the San Angelo Stormwater Design Manual. Based on the above discussion, if constructed as proposed, the overall stormwater runoff from the site will be decreased.

# Appendix A

- Existing Drainage Plan
- Proposed Drainage Plan




( ) RECORD BEARING & DISTANCE
BCM BURIED CABLE MARKER
BSL BUILDING SETBACK LINE
CO CLEANOUT
DOC DOCUMENT
DRTGC DEED RECORDS OF TOM GREEN COUNTY
ET ELECTRICAL TRANSFORMER
FH FIRE HYDRANT
GA GUY ANCHOR
GLM GAS LINE MARKER
IPF IRON PIPE FOUND
IRCF IRON ROD WITH "SKC-ENG" CAP FOUND
IRCS 1/2" IRON ROD WITH "MDS" CAP SET
IRF 5/8" IRON ROD FOUND (UNLESS OTHERWISE NOTED)
LP LIGHT POLE
MH MANHOLE
NO NUMBER
OPRTGC OFFICIAL PUBLIC RECORDS OF TOM GREEN COUNTY
PG PAGE
PKNF PK NAIL FOUND
PP POWER POLE
PRTGC PLAT RECORDS OF TOM GREEN COUNTY
THH TELEPHONE HANDHOLE
TPD TELEPHONE PEDESTAL
VOL VOLUME
WM WATER METER
WV WATER VALVE

3800 GREEN MEADOW DRIVE, SAN ANGELO, TEXAS 76904
TOM GREEN COUNTY APPRAISAL DISTRICT PROPERTY ID: R13149

STATE OF TEXAS §
COUNTY OF KERR §

I HEREBY CERTIFY THAT THIS SURVEY WAS MADE ON THE GROUND, UNDER MY SUPERVISION, THIS 20TH DAY OF FEBRUARY, 2024, THAT THIS PLAT CORRECTLY REPRESENTS THE FACTS FOUND AT THE TIME OF THIS SURVEY AND THAT THERE ARE NO VISIBLE EASEMENTS OR ENCROACHMENTS OF BUILDINGS ON ADJOINING PROPERTY AND THAT ALL BUILDINGS ARE WHOLLY LOCATED ON THIS PROPERTY EXCEPT AS SHOWN ABOVE.

JEFF BOERNER RPLS # 4939

| | OBSERVED | | RECORD | |
|---|---|---|---|---|
| | BEARING | DISTANCE | BEARING | DISTANCE |
| L1 | N 79°51'16" E | 48.26' | N 79°17'24" E | 48.26' |
| L2 | S 15°37'57" E | 83.45' | S 15°35'49" E | 83.46' |

| | OBSERVED | | | | RECORD | | | |
|---|---|---|---|---|---|---|---|---|
| | RADIUS | ARC LENGTH | CHORD LENGTH | CHORD BEARING | DELTA ANGLE | RADIUS | ARC LENGTH | CHORD LENGTH | CHORD BEARING | DELTA ANGLE |
| C1 | 600.00' | 391.45' | 384.54' | N 71°30'00" W | 37°22'49" | 600.00' | 391.28' | 384.38' | N 71°27'53" W | 37°21'51" |

BEING A 1.426 ACRE TRACT OF LAND, MORE OR LESS, SITUATED IN THE ALVIN E. WHITE SURVEY NO. 1, ABSTRACT NO. 3944, KENDALL COUNTY, TEXAS, SAID 1.426 ACRE TRACT BEING ALL OF LOT 1, BLOCK 47, MEADOWCREEK ADDITION, SECTION 20, A SUBDIVISION OF LAND RECORDED IN CABINET "E", SLIDE 113, OF THE PLAT RECORDS OF TOM GREEN COUNTY, TEXAS, SAID LOT CONVEYED TO TRI-SIDE CAPITAL, LLC – TSC COMMERCIAL SERIES BY WARRANTY DEED RECORDED IN DOCUMENT NO. 201917960, OF THE OFFICIAL PUBLIC RECORDS OF TOM GREEN COUNTY, TEXAS.

REFERENCE COMMITMENT FOR TITLE INSURANCE ISSUED BY TITLE RESOURCES GUARANTY COMPANY, COUNTERSIGNED BY TITLE RESOURCES GUARANTY COMPANY, GF NO. 2400160-COM, HAVING AN EFFECTIVE DATE OF JANUARY 12, 2024 AND AN ISSUE DATE OF JANUARY 10, 2024. NO FURTHER RESEARCH FOR EASEMENTS OR ENCUMBRANCES WAS PERFORMED BY MDS LAND SURVEYING COMPANY, INC.

10.1 DOES AFFECT, SHOWN HEREON (CABINET "E", SLIDE 113, PRTGC)
10.2 DOES NOT AFFECT (VOL. 780, PG. 383, DRTGC)
10.3 SEE GENERAL NOTE # 5
10.4 SEE GENERAL NOTE # 5
10.5 SEE GENERAL NOTE # 7

1. ALL BEARINGS, DISTANCES AND COORDINATES ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJUSTMENT), U.S. SURVEY FEET.
2. DISTANCES SHOWN HEREON ARE GRID VALUES (US SURVEY FEET).
3. FIELD SURVEY COMPLETED 2-9-2024.
4. VISIBLE IMPROVEMENTS/UTILITIES WERE LOCATED WITH THIS SURVEY; NO SUBSURFACE PROBING, EXCAVATION OR EXPLORATION WAS PERFORMED FOR THIS SURVEY. THE SURVEYOR HAS NOT BEEN PROVIDED WITH CONSTRUCTION PLANS SHOWING THE LOCATION OF UNDERGROUND UTILITIES. UNDERGROUND UTILITIES MAY EXIST WHICH ARE NOT SHOWN HEREON.
5. DETERMINATION OF THE OWNERSHIP, LOCATION, OR DEVELOPMENT OF MINERALS RELATED TO THE SUBJECT TRACT FALL OUTSIDE THE SCOPE OF THIS SURVEY, SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT OR PROSPECTIVE PURCHASER TO AN EXPERT CONSULTANT.
6. ACCORDING TO MAP NO. 48451C0490E OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD INSURANCE RATE MAPS FOR TOM GREEN COUNTY, DATED JUNE 18, 2012, THE SUBJECT TRACT IS SITUATED WITHIN: UNSHADED ZONE 'X' DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 500-YEAR FLOOD PLAIN; AND ZONE 'AE' DEFINED AS SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD WITH BASE ELEVATIONS DETERMINED.THIS FLOOD STATEMENT DOES NOT IMPLY THAT THE PROPERTY OR STRUCTURES THEREON WILL BE FREE FROM FLOODING OR FLOOD DAMAGE. ON RARE OCCASIONS FLOODS CAN AND WILL OCCUR AND FLOOD HEIGHTS MAY BE INCREASED BY MAN-MADE OR NATURAL CAUSES. THIS FLOOD STATEMENT SHALL NOT CREATE LIABILITY ON THE PART OF THE SURVEYOR.
7. THIS SURVEY HAS BEEN PREPARED FOR THE SOLE PURPOSE OF THE TRANSACTION DESCRIBED HEREON REFERENCED TITLE COMMITMENT AND THE PARTIES LISTED THEREON. THIS SURVEY IS NOT TO BE USED FOR ANY SUBSEQUENT TRANSACTIONS.NO FURTHER RESEARCH FOR EASEMENTS OR ENCUMBRANCES WAS PERFORMED BY MDS LAND SURVEYING COMPANY, INC.
8. BUILDING SETBACK LINES SHOWN HEREON ARE IN ACCORDANCE WITH THE SETBACK LINE REQUIREMENTS AS SHOWN ON THE SUBDIVISION PLAT RECORDED IN CABINET "E", SLIDE 113, PLAT RECORDS OF TOM GREEN COUNTY, TEXAS. NO FURTHER RESEARCH OF SAID BUILDING SETBACK LINES WAS PERFORMED BY MDS LAND SURVEYING.
9. THE MATHEMATICAL CLOSURE FOR THE SUBJECT TRACT BOUNDARY SHOWN HEREON IS IN ACCORDANCE WITH THE MINIMUM STANDARDS SET FORTH BY THE TEXAS BOARD OF PROFESSIONAL ENGINEERS AND SURVEYORS (TBPLES). CLOSURE = 0.000'
10. A ONE CALL UTILITY LOCATION SERVICE WAS PERFORMED FOR THIS SURVEY TO LOCATE AND MARK UNDERGROUND UTILITIES. UNDERGROUND UTILITIES MARKED IN CONJUNCTION TO ONE CALL TICKET # 245330870, SUBMITTED ON 2-2-2024, ARE SHOWN HEREON AND WERE LOCATED IN CONJUNCTION TO PIN FLAG AND PAINT STRIPE MARKERS PRESENT IN THE FIELD AT THE TIME OF THE SURVEY. UNDERGROUND UTILITIES AND FACILITIES OWNED AND OR OPERATED BY FRONTIER COMMUNICATIONS (PHONE), SUDDENLINK COMMUNICATIONS (CABLE / FIBER), VEXUS (FIBER), CITY OF SAN ANGELO (WATER AND SANITARY SEWER) TICKET RESPONSE SHOWS SAID UTILITIES WERE MARKED ON 2-12-2024, AND WERE NOT PRESENT PRIOR TO THE COMPLETION OF THE ON THE GROUND SURVEY AND ARE NOT SHOWN HEREON; DUE TO TIME CONSTRAINTS AND LIMITATIONS THE SURVEYOR WAS NOT ABLE TO LOCATE SAID UTILITIES PRIOR TO THE COMPLETION OF THIS SURVEY. THE UNDERGROUND WATER, SANITARY SEWER AND FIBER OPTIC LINES SHOWN HEREON DO NOT REPRESENT AN ON THE GROUND SURVEY, SAID UTILITIES ARE GRAPHIC ONLY AND ARE BASED ON LIMITED INFORMATION MADE AVAILIBLE TO THE SURVEYOR DURING THE PROCESS OF CONDUCTING THIS SURVEY. THE SURVEYOR HAS NOT BEEN PROVIDED WITH CONSTRUCTION PLANS SHOWING THE LOCATION OF UNDERGROUND UTILITIES. UNDERGROUND UTILITIES MAY EXIST WHICH ARE NOT SHOWN HEREON. THIS STATEMENT SHALL NOT CREATE LIABILITY ON PART OF THE SURVEYOR AND MDS LAND SURVEYING COMPANY INC ASSUMES NO LIABILITY AS TO THE ACCURACY AND OR COMPLETENESS OF THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN HEREON. SUPPLEMENTAL UNDERGROUND UTILITY INFORMATION REGARDING THE UNDERGROUND WATER AND SANITARY SEWER LINES WAS OBTAINED FROM: HTTPS://COSA1.MAPS.ARCGIS.COM/APPS/WEBAPPVIEWER/INDEX.HTML?ID=A2EBBB161BF442739042 7ED0C5075 30, ACCESSED 2-19-2024.
11. ELEVATIONS SHOWN HEREON REFERENCE NAVD 88 VERTICAL DATUM AS DETERMINED BY GPS OBSERVATIONS.
12. CONTOUR LINES SHOWN HEREON ARE IN CONJUNCTION WITH GPS OBSERVATIONS TAKEN AT THE TIME OF THIS SURVEY. (CONTOUR INTERVALS = 1 FOOT)
13. THE PROPERTY SHOWN HEREON IS IN THE "PD" ZONING DISTRICT, LOW-RISE, MULTIFAMILY RESIDENTIAL ZONING DISTRICT OF THE CITY OF SAN ANGELO, TEXAS.

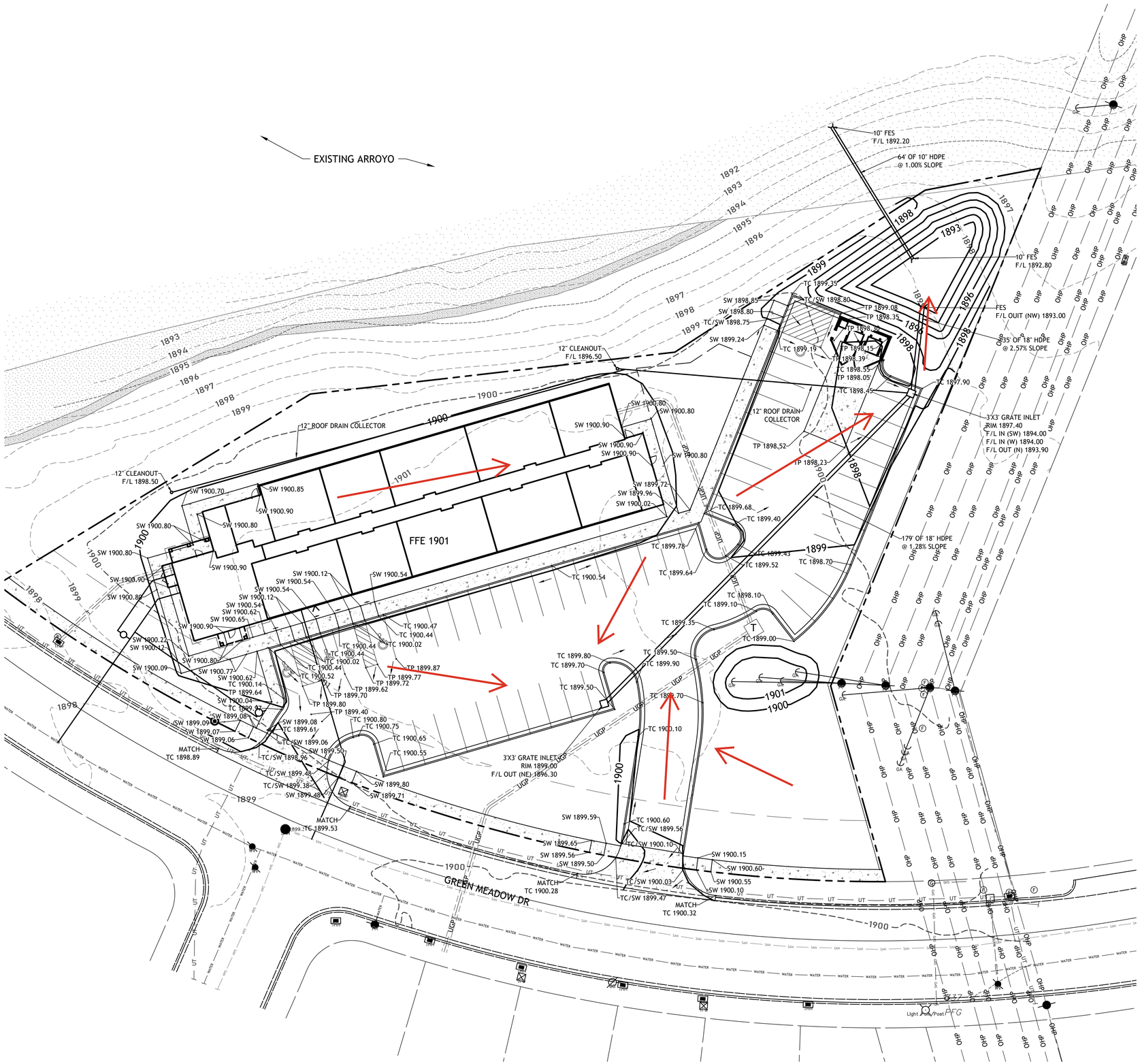
# LAND TITLE SURVEY
OF
# LOT 1, BLOCK 47
# MEADOWCREEK ADDITION
# SECTION 20
BEING
1.426 ACRES
SITUATED IN THE
A. E. WHITE SURVEY, A-3944
TOM GREEN COUNTY, TEXAS
FEBRUARY 2024

MDS LAND SURVEYING COMPANY, INC.
ALTA | BOUNDARY | CONSTRUCTION | OIL & GAS TOPOGRAPHIC
TEXAS BOARD OF PROFESSIONAL LAND SURVEYING FIRM REGISTRATION No. 10019600
874 HARPER RD, SUITE 104 • KERRVILLE, TX 78028 • 830-816-1818

JOB No. 24-026-00 | SURVEYORS: JB/DB | SHEET 1 OF 1

C:\DESIGN\Sam Malinowsky\Residence at Green Meadow\Outside Files\twdgreenmeadow\24-026-00 3800 Green Meadow Dr San Angelo – LTS.dwg Oct 03,2024 – 9:52am garre

Existing Drainage




## GRADING NOTES:

1. EARTHWORK UNDER THE BUILDING SHALL COMPLY WITH THE PROJECT ARCHITECTURAL PLANS. OTHER FILL MATERIAL SHALL BE MADE IN LIFTS NOT TO EXCEED EIGHT INCHES DEPTH COMPACTED TO 95% STANDARD PROCTOR DENSITY. FILL MATERIAL MAY INCLUDE ROCK FROM ON-SITE EXCAVATION IF CAREFULLY PLACED SO THAT LARGE STONES ARE WELL DISTRIBUTED AND VOIDS ARE COMPLETELY FILLED WITH SMALLER STONES, EARTH, SAND OR GRAVEL TO FURNISH A SOLID EMBANKMENT. NO ROCK LARGER THAN THREE INCHES IN ANY DIMENSION NOR ANY SHALE SHALL BE PLACED IN THE TOP 12 INCHES OF EMBANKMENT.

2. AREAS THAT ARE TO BE CUT TO SUBGRADE LEVELS SHALL BE PROOF ROLLED WITH A MODERATELY HEAVY LOADED DUMP TRUCK OR SIMILAR APPROVED CONSTRUCTION EQUIPMENT TO DETECT UNSUITABLE SOIL CONDITIONS.

3. IN ALL AREAS OF EXCAVATION, IF UNSUITABLE SOIL CONDITIONS ARE ENCOUNTERED. A QUALIFIED GEOTECHNICAL ENGINEER SHALL RECOMMEND TO THE OWNER THE METHODS OF UNDERCUTTING AND REPLACEMENT OF PROPERLY COMPACTED, APPROVED FILL MATERIAL. ALL PROOF ROLLING AND UNDERCUTTING SHOULD BE PERFORMED DURING A PERIOD OF DRY WEATHER.

4. CONTRACTOR SHALL USE SILT FENCE OR OTHER MEANS OF CONTROLLING EROSION ALONG THE EDGE OF THE PROPERTY OR OTHER BOTTOM OF SLOPE LOCATIONS.

5. CONTRACTOR IS TO REMOVE AND DISPOSE OF ALL DEBRIS, RUBBISH AND OTHER MATERIALS RESULTING FROM PREVIOUS AND CURRENT DEMOLITION OPERATIONS.

6. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO AVOID PROPERTY DAMAGE TO ADJACENT PROPERTIES DURING THE CONSTRUCTION PHASES OF THIS PROJECT. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGES TO THE ADJACENT PROPERTIES OCCURRING DURING THE CONSTRUCTION PHASES OF THIS PROJECT.

7. IT IS NOT THE DUTY OF THE ENGINEER OR THE OWNER TO REVIEW THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES, IN, ON OR NEAR THE CONSTRUCTION SITE AT ANY TIME DURING CONSTRUCTION.

8. THE SITEWORK FOR THIS PROJECT SHALL MEET OR EXCEED ALDI'S STANDARD SITEWORK SPECIFICATIONS.

9. PIPE LENGTHS ARE CENTER TO CENTER OF STRUCTURE OR TO END OF END SECTIONS.

10. HANDICAP STALLS SHALL MEET ADA REQUIREMENTS AND SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION AT THE BUILDING ENTRY AND ACCESSIBLE PARKING STALLS. SLOPES EXCEEDING 2.0% WILL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

11. CONTRACTOR TO ADJUST DEPTHS OF EXISTING SERVICE LINES AS NECESSARY

12. ALL CONSTRUCTION TRAFFIC, TEMPORARY TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS SHALL CONFORM TO REQUIREMENTS OF THE LATEST MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

SM Engineering
5507 High Meadow Circle
Manhattan Kansas, 66503
smcivilengr@gmail.com
785.341.9747



SAMUEL D. MALINOWSKI 124497 LICENSED PROFESSIONAL ENGINEER

Revisions

GREEN MEADOW APRTMENTS
3800 GREEN MEADOW DRIVE,
SAN ANGELO, TEXAS 76904

sheet C-5
Civil
GRADING PLAN
permit
1 OCTOBER 2024

# Appendix B

- Hydrology Studio Printouts

# Table of Contents

# Hydrograph by Return Period

Project Name: Green Meadow

10-30-2024

Hydrology Studio v 3.0.0.33

| Hyd. No. | Hydrograph Type | Hydrograph Name | Peak Outflow (cfs) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr |
| 1 | Rational | Existing | | 2.886 | | | | | | 5.649 |
| 2 | Mod Rational | Developed | | 3.219 | | | | | | 5.973 |
| 3 | Pond Route | Green Meadow | | 2.430 | | | | | | 3.854 |

# Hydrograph 2-yr Summary

Project Name: Green Meadow

Hydrology Studio v 3.0.0.33

10-30-2024

| Hyd. No. | Hydrograph Type | Hydrograph Name | Peak Flow (cfs) | Time to Peak (hrs) | Hydrograph Volume (cuft) | Inflow Hyd(s) | Maximum Elevation (ft) | Maximum Storage (cuft) |
|---|---|---|---|---|---|---|---|---|
| 1 | Rational | Existing | 2.886 | 0.08 | 866 | ---- | | |
| 2 | Mod Rational | Developed | 3.219 | 0.08 | 3,767 | ---- | | |
| 3 | Pond Route | Green Meadow | 2.430 | 0.33 | 3,632 | 2 | 1894.35 | 1,491 |

# Hydrograph Report

Project Name: Green Meadow

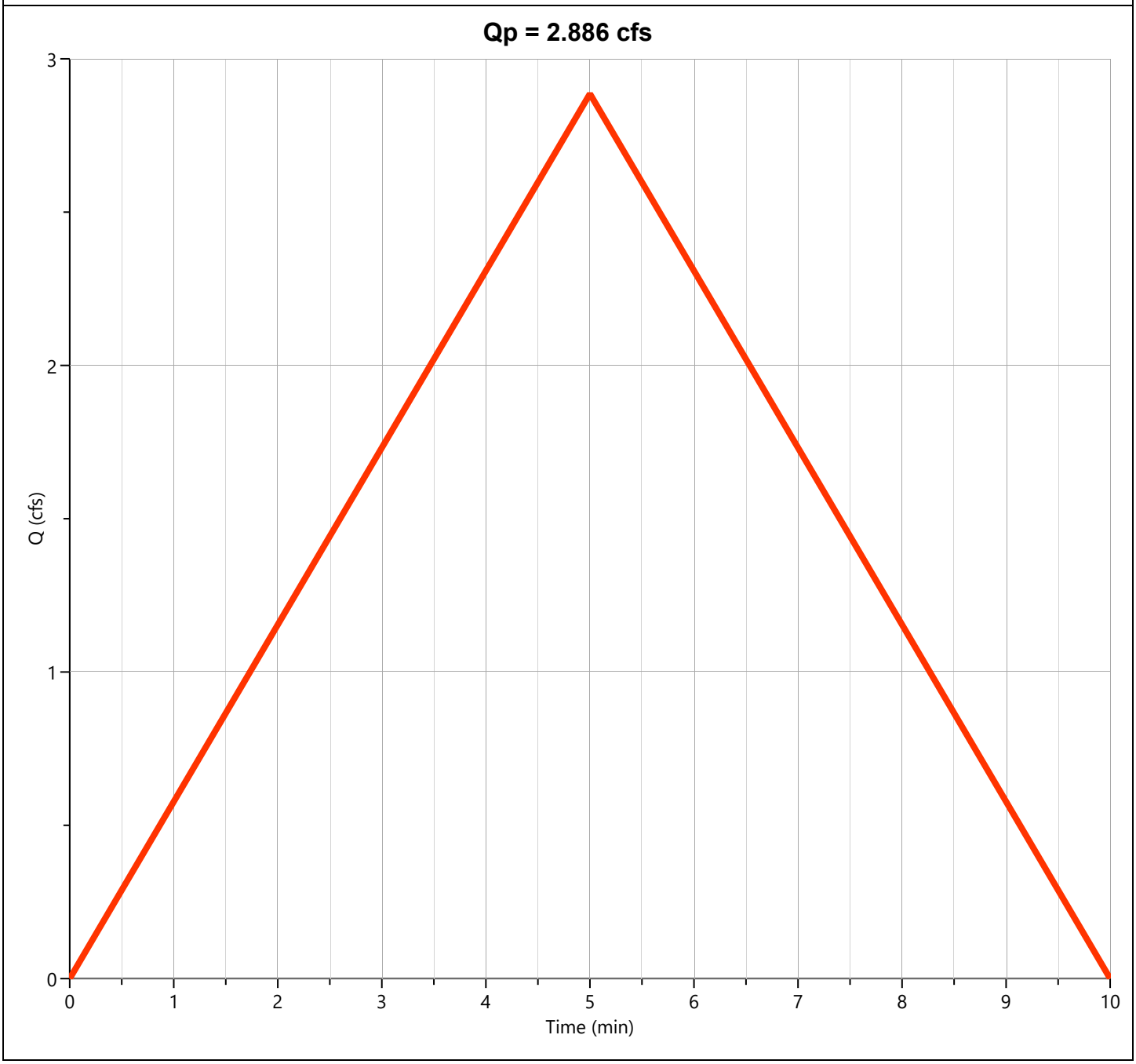
Hydrology Studio v 3.0.0.33

10-30-2024

## Existing

## Hyd. No. 1

| | | | |
|---|---|---|---|
| Hydrograph Type | = Rational | Peak Flow | = 2.886 cfs |
| Storm Frequency | = 2-yr | Time to Peak | = 0.08 hrs |
| Time Interval | = 1 min | Runoff Volume | = 866 cuft |
| Drainage Area | = 1.43 ac | Runoff Coeff. | = 0.4 |
| Tc Method | = User | Time of Conc. (Tc) | = 5.0 min |
| IDF Curve | = San Angelo TX.idf | Intensity | = 5.05 in/hr |
| Freq. Corr. Factor | = 1.00 | Asc/Rec Limb Factors | = 1/1 |



# Hydrograph Report

Project Name: Green Meadow

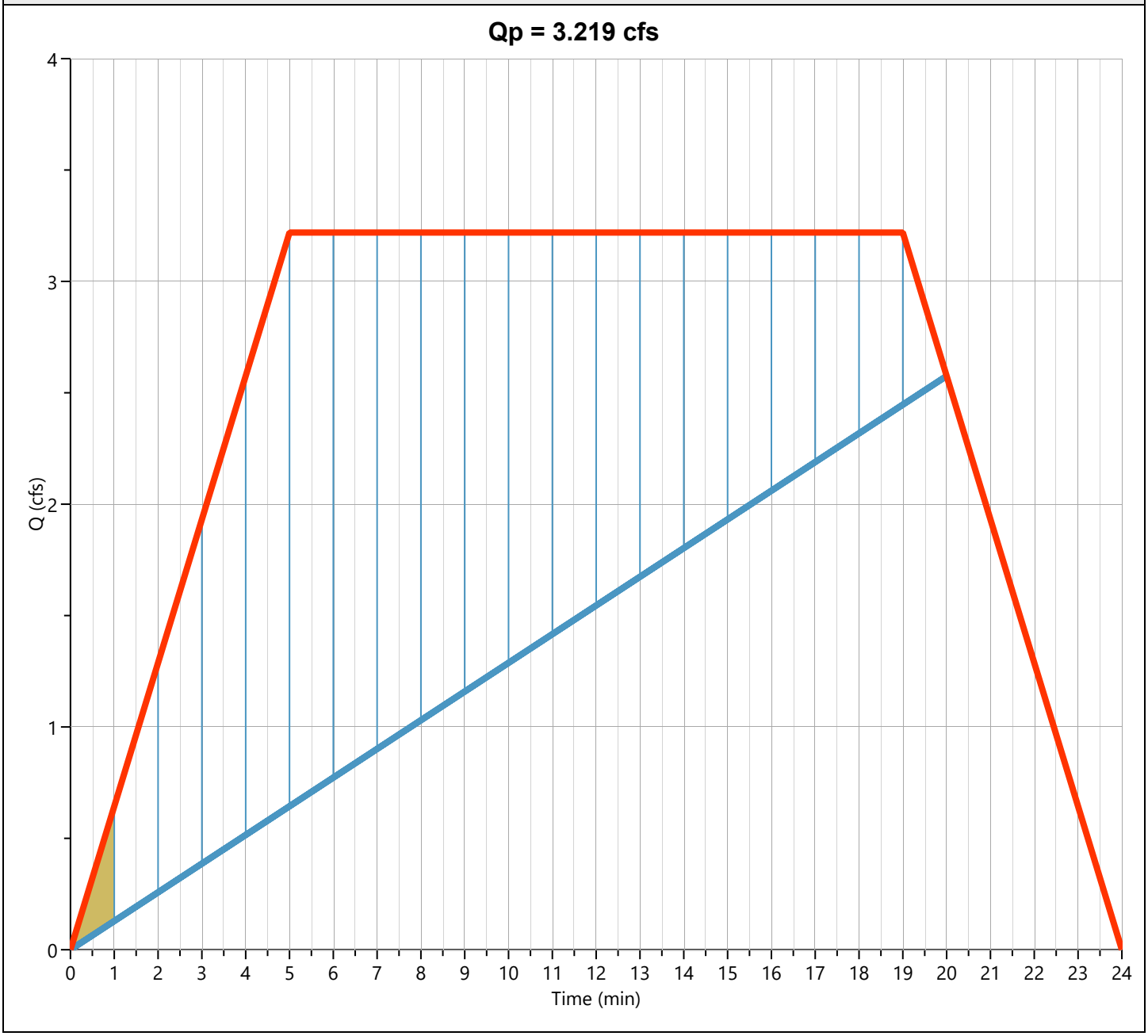
Hydrology Studio v 3.0.0.33

10-30-2024

## Developed

## Hyd. No. 2

| | | | |
|---|---|---|---|
| Hydrograph Type | = Mod Rational | Peak Flow | = 3.219 cfs |
| Storm Frequency | = 2-yr | Time to Peak | = 0.08 hrs |
| Time Interval | = 1 min | Runoff Volume | = 3,767 cuft |
| Drainage Area | = 1.43 ac | Runoff Coeff. | = 0.78 |
| Tc Method | = User | Time of Conc. (Tc) | = 5.0 min |
| IDF Curve | = San Angelo TX.idf | Intensity | = 2.89 in/hr |
| Freq. Corr. Factor | = 1.00 | Storm Duration | = 3.9 x Tc |
| Target Q | = 2.800 cfs | Required Storage | = 1,751 cuft |



# Hydrograph Report

Hydrology Studio v 3.0.0.33

10-30-2024

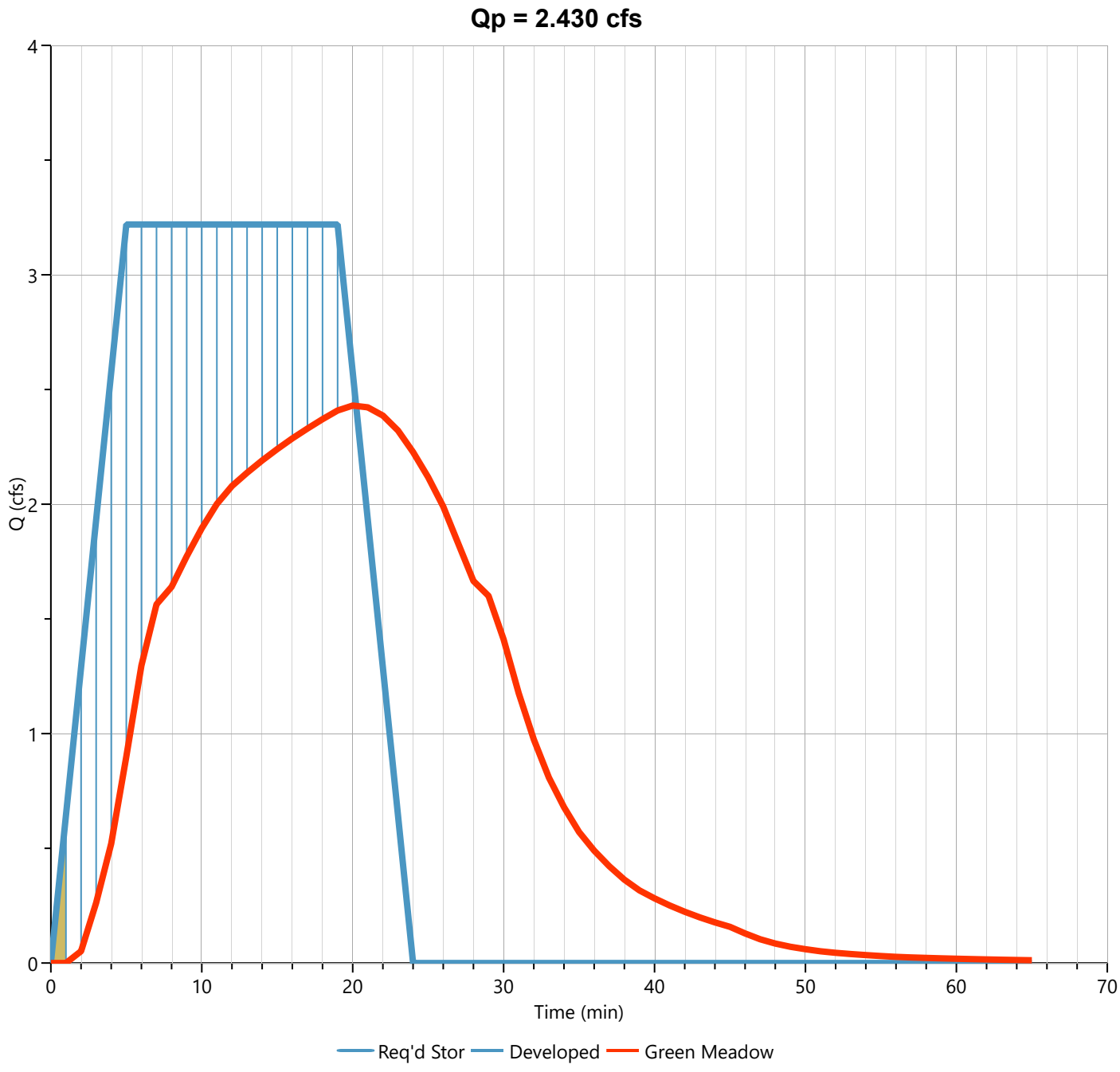
## Green Meadow

## Hyd. No. 3

| | | | |
|---|---|---|---|
| Hydrograph Type | = Pond Route | Peak Flow | = 2.430 cfs |
| Storm Frequency | = 2-yr | Time to Peak | = 0.33 hrs |
| Time Interval | = 1 min | Hydrograph Volume | = 3,632 cuft |
| Inflow Hydrograph | = 2 - Developed | Max. Elevation | = 1894.35 ft |
| Pond Name | = Green Meadow | Max. Storage | = 1,491 cuft |

*Pond Routing by Storage Indication Method*

*Center of mass detention time = 8 min*



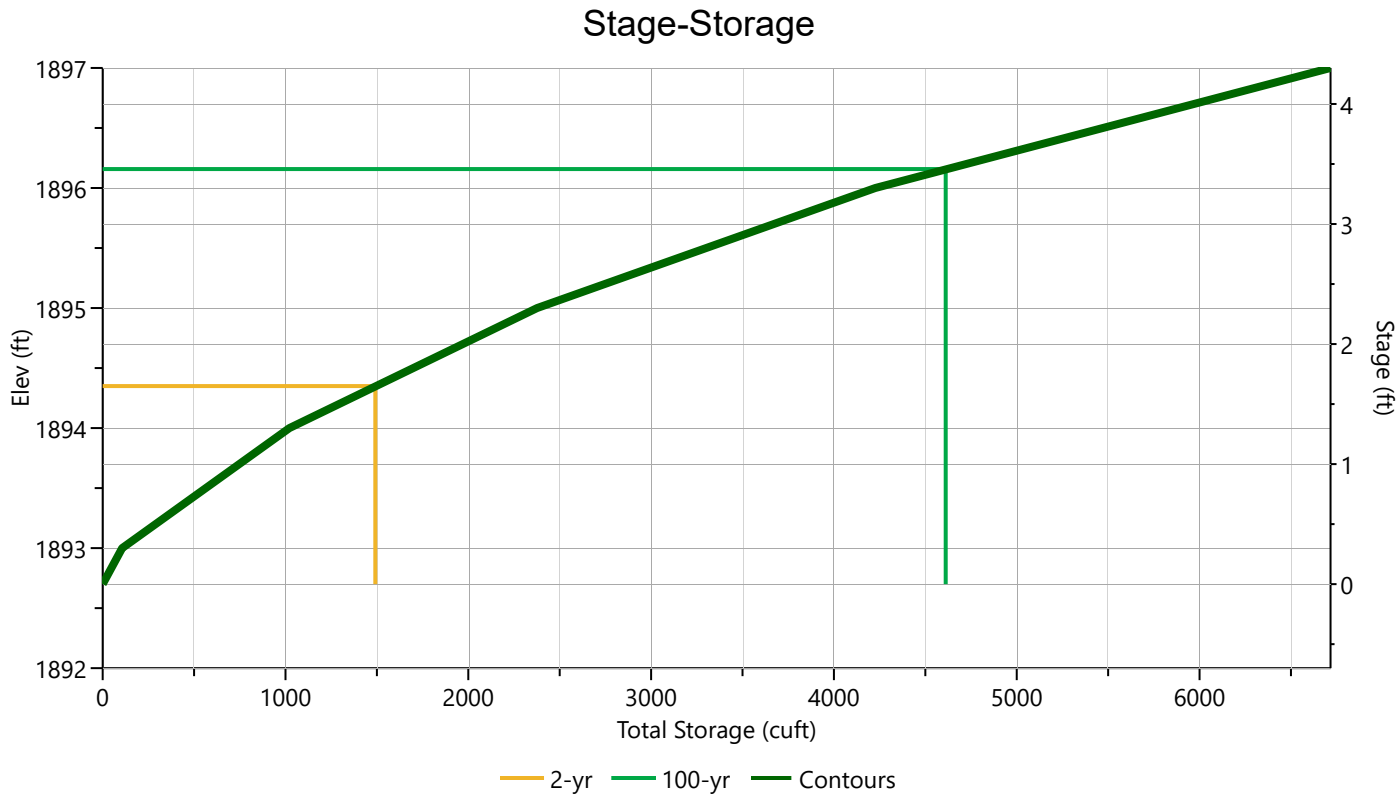
## Green Meadow

## Stage-Storage

| User Defined Contours | |
|---|---|
| **Description** | **Input** |
| Bottom Elevation, ft | 1892.70 |
| Voids (%) | 100.00 |
| Volume Calc | Ave End Area |

**Stage / Storage Table**

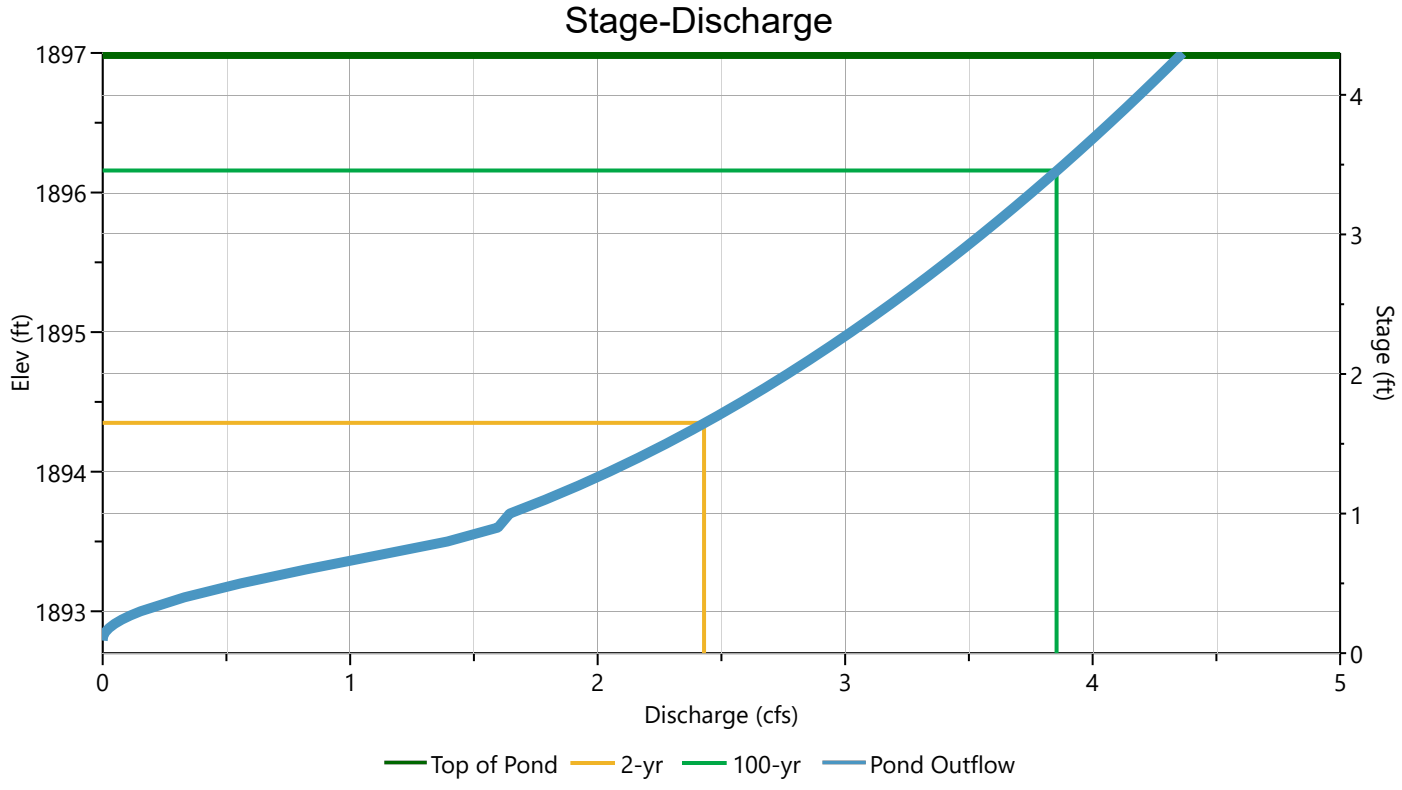
| Stage (ft) | Elevation (ft) | Contour Area (sqft) | Incr. Storage (cuft) | Total Storage (cuft) |
|---|---|---|---|---|
| 0.00 | 1892.70 | 10 | 0.000 | 0.000 |
| 0.30 | 1893.00 | 700 | 107 | 107 |
| 1.30 | 1894.00 | 1,130 | 915 | 1,022 |
| 2.30 | 1895.00 | 1,580 | 1,355 | 2,377 |
| 3.30 | 1896.00 | 2,120 | 1,850 | 4,227 |
| 4.30 | 1897.00 | 2,860 | 2,490 | 6,717 |



## Green Meadow

## Stage-Discharge

| Culvert / Orifices | Culvert | Orifice | | | Perforated Riser | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | | |
| Rise, in | 10 | | | | Hole Diameter, in | |
| Span, in | 10 | | | | No. holes | |
| No. Barrels | 1 | | | | Invert Elevation, ft | |
| Invert Elevation, ft | 1892.80 | | | | Height, ft | |
| Orifice Coefficient, Co | 0.60 | | | | Orifice Coefficient, Co | |
| Length, ft | 60 | | | | | |
| Barrel Slope, % | .8 | | | | | |
| N-Value, n | 0.013 | | | | | |
| **Weirs** | **Riser** | **Weir** | | | **Ancillary** | |
| | | 1 | 2 | 3 | | |
| Shape / Type | | | | | Exfiltration, in/hr | |
| Crest Elevation, ft | | | | | | |
| Crest Length, ft | | | | | | |
| Angle, deg | | | | | | |
| Weir Coefficient, Cw | | | | | | |



## Green Meadow

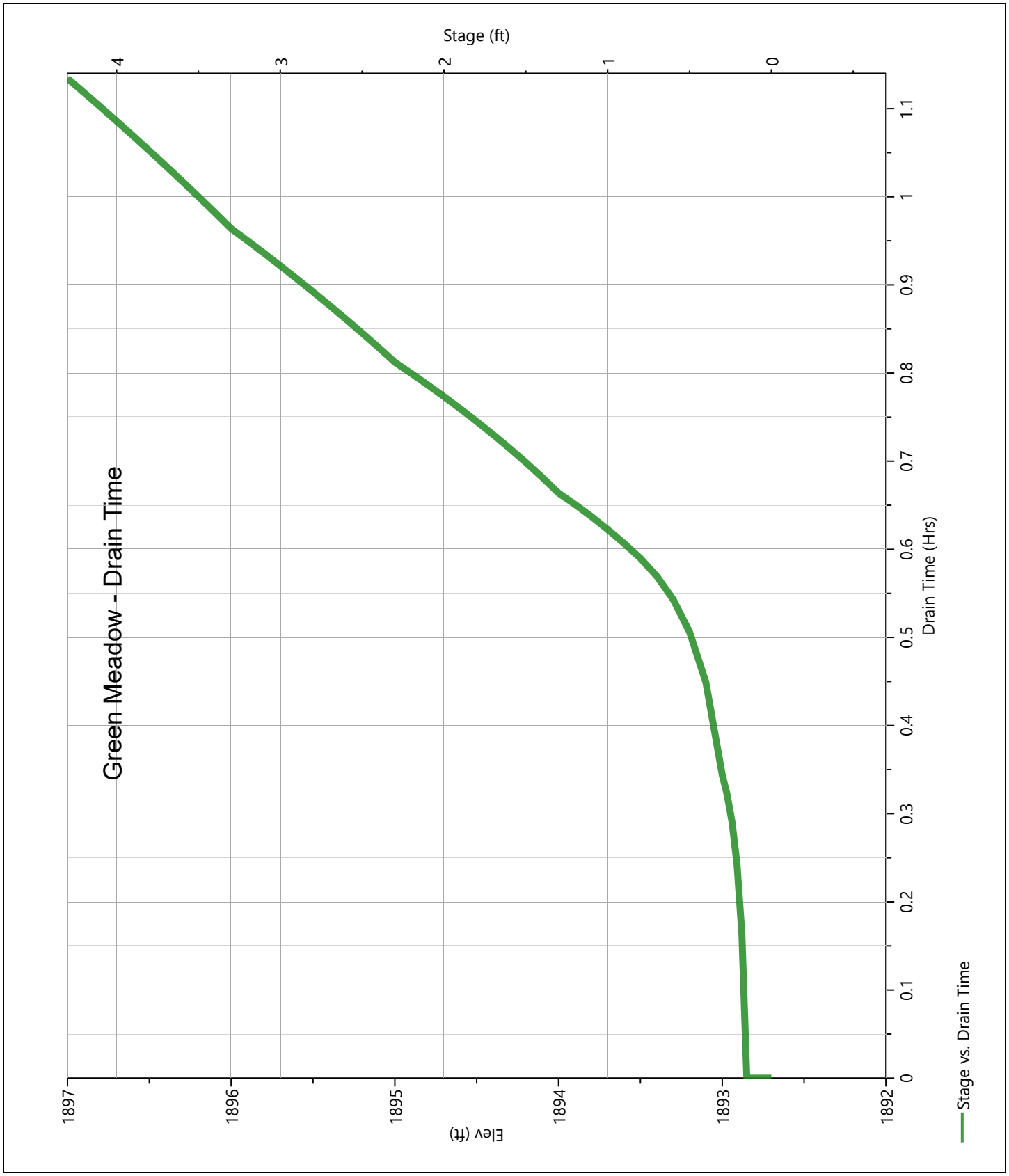
## Stage-Storage-Discharge Summary

| Stage (ft) | Elev. (ft) | Storage (cuft) | Culvert (cfs) | Orifices, cfs | | | Riser (cfs) | Weirs, cfs | | | Pf Riser (cfs) | Exfil (cfs) | User (cfs) | Total (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | | 1 | 2 | 3 | | | | |
| 0.00 | 1892.70 | 0.000 | 0.000 | | | | | | | | | | | 0.000 |
| 0.30 | 1893.00 | 107 | 0.153 ic | | | | | | | | | | | 0.153 |
| 1.30 | 1894.00 | 1,022 | 2.047 oc | | | | | | | | | | | 2.047 |
| 2.30 | 1895.00 | 2,377 | 3.023 oc | | | | | | | | | | | 3.023 |
| 3.30 | 1896.00 | 4,227 | 3.754 oc | | | | | | | | | | | 3.754 |
| 4.30 | 1897.00 | 6,717 | 4.364 oc | | | | | | | | | | | 4.364 |

*Suffix key: ic = inlet control, oc = outlet control, s = submerged weir*

## Green Meadow

## Pond Drawdown



# Design Storm Report

Custom Storm filename: Blue Springs.cds

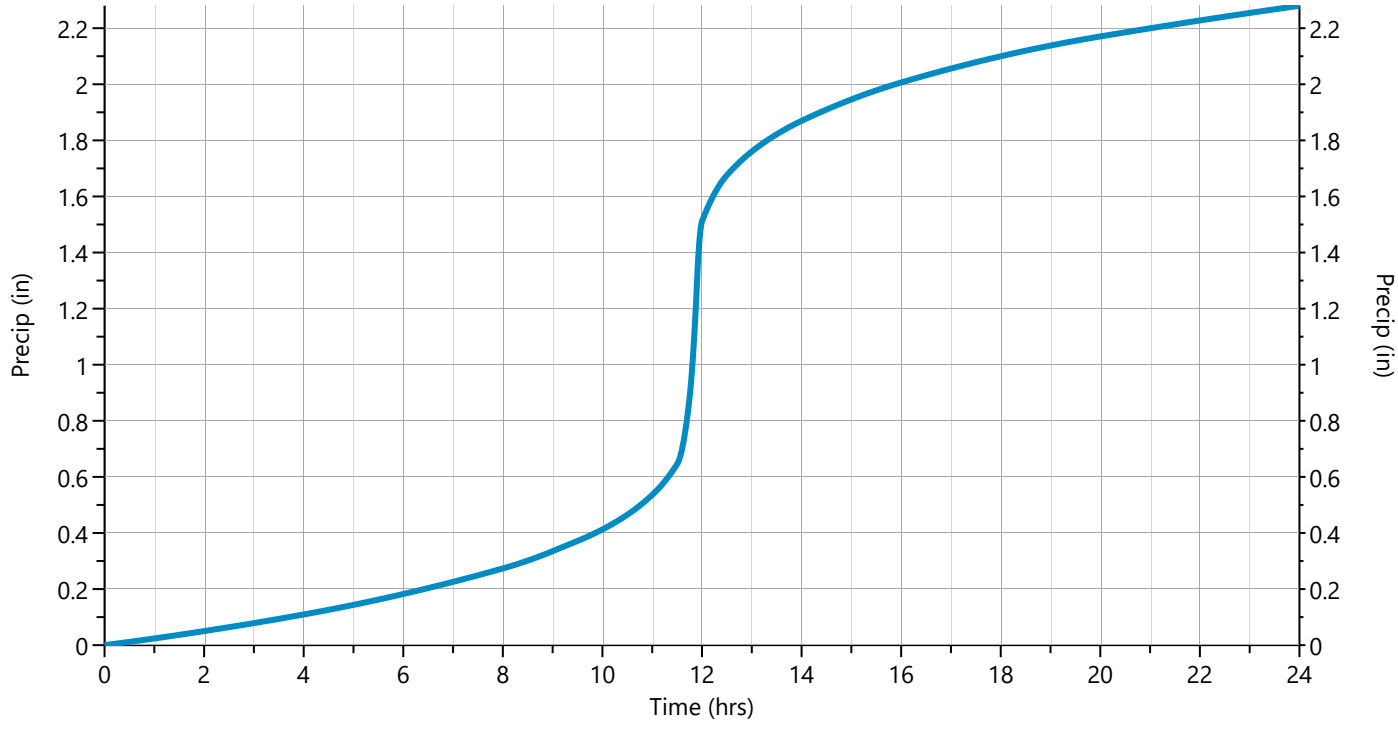
Hydrology Studio v 3.0.0.33

10-30-2024

## Storm Distribution: NRCS/SCS - Type II, 24-hr

| Storm Duration | Total Rainfall Volume (in) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1-yr | ✔ 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| 24 hrs | 1.82 | 2.28 | 0.00 | 2.85 | 3.31 | 3.94 | 4.43 | 4.94 | |

| Incremental Rainfall Distribution, 2-yr | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) |
| 11.42 | 0.004226 | 11.60 | 0.012809 | 11.78 | 0.033312 | 11.97 | 0.031372 | 12.15 | 0.006411 |
| 11.43 | 0.004286 | 11.62 | 0.014308 | 11.80 | 0.037483 | 11.98 | 0.021878 | 12.17 | 0.006266 |
| 11.45 | 0.004347 | 11.63 | 0.015808 | 11.82 | 0.041655 | 12.00 | 0.012385 | 12.18 | 0.006122 |
| 11.47 | 0.004408 | 11.65 | 0.017308 | 11.83 | 0.045826 | 12.02 | 0.007821 | 12.20 | 0.005977 |
| 11.48 | 0.004469 | 11.67 | 0.018808 | 11.85 | 0.049998 | 12.03 | 0.007421 | 12.22 | 0.005833 |
| 11.50 | 0.004530 | 11.68 | 0.020307 | 11.87 | 0.054170 | 12.05 | 0.007277 | 12.23 | 0.005689 |
| 11.52 | 0.005327 | 11.70 | 0.021807 | 11.88 | 0.058341 | 12.07 | 0.007133 | 12.25 | 0.005544 |
| 11.53 | 0.006810 | 11.72 | 0.023307 | 11.90 | 0.062513 | 12.08 | 0.006988 | 12.27 | 0.005400 |
| 11.55 | 0.008309 | 11.73 | 0.024806 | **11.92** | **0.066684** | 12.10 | 0.006844 | 12.28 | 0.005255 |
| 11.57 | 0.009809 | 11.75 | 0.026306 | 11.93 | 0.043606 | 12.12 | 0.006699 | 12.30 | 0.005111 |
| 11.58 | 0.011309 | 11.77 | 0.028920 | 11.95 | 0.040866 | 12.13 | 0.006555 | 12.32 | 0.004967 |



# Hydrograph 100-yr Summary

Project Name: Green Meadow

10-30-2024

Hydrology Studio v 3.0.0.33

| Hyd. No. | Hydrograph Type | Hydrograph Name | Peak Flow (cfs) | Time to Peak (hrs) | Hydrograph Volume (cuft) | Inflow Hyd(s) | Maximum Elevation (ft) | Maximum Storage (cuft) |
|---|---|---|---|---|---|---|---|---|
| 1 | Rational | Existing | 5.649 | 0.08 | 1,695 | ---- | | |
| 2 | Mod Rational | Developed | 5.973 | 0.08 | 9,855 | ---- | | |
| 3 | Pond Route | Green Meadow | 3.854 | 0.48 | 9,638 | 2 | 1896.16 | 4,611 |

# Hydrograph Report

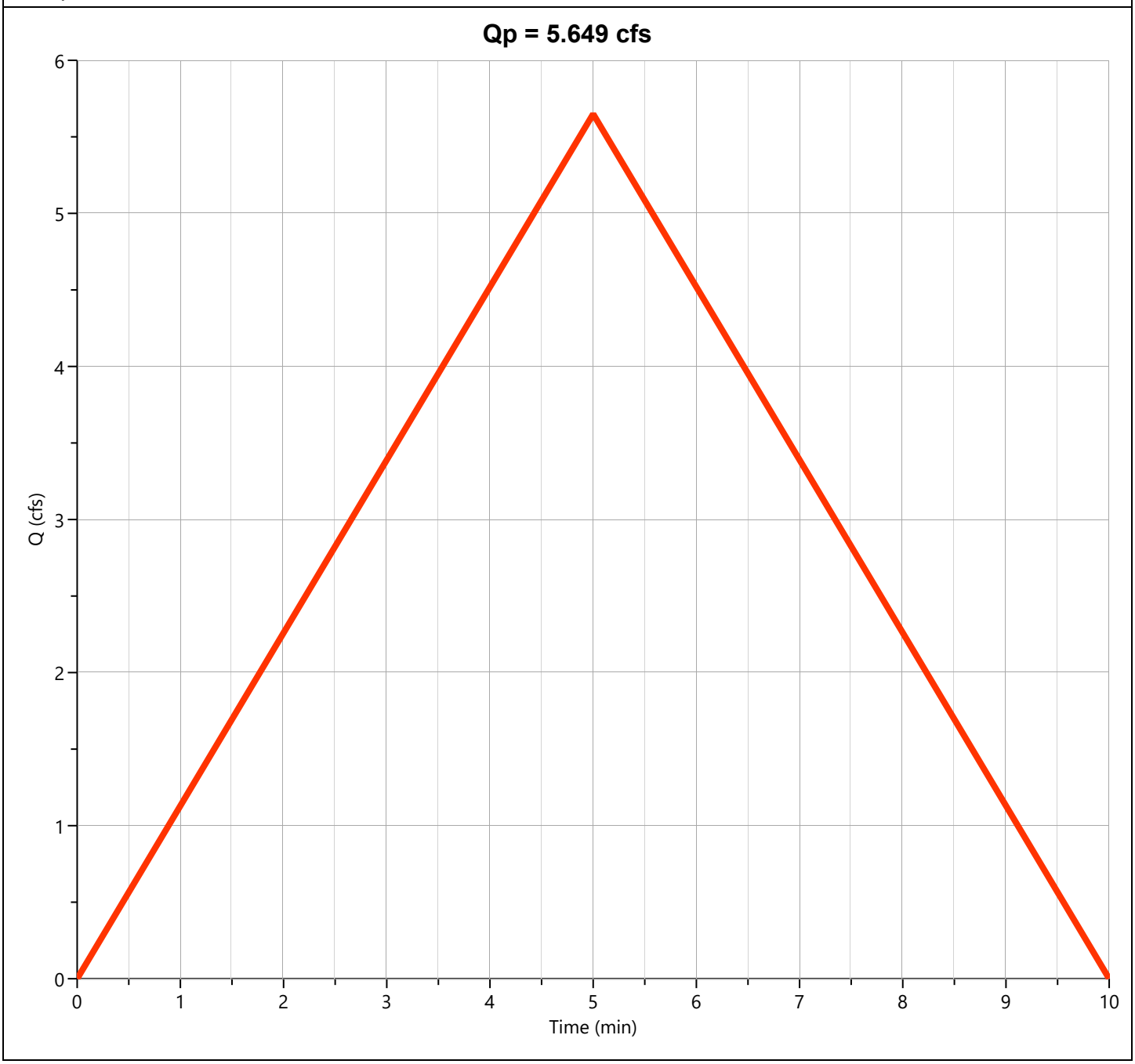
Hydrology Studio v 3.0.0.33

10-30-2024

## Existing

## Hyd. No. 1

| | | | |
|---|---|---|---|
| Hydrograph Type | = Rational | Peak Flow | = 5.649 cfs |
| Storm Frequency | = 100-yr | Time to Peak | = 0.08 hrs |
| Time Interval | = 1 min | Runoff Volume | = 1,695 cuft |
| Drainage Area | = 1.43 ac | Runoff Coeff. | = 0.4 |
| Tc Method | = User | Time of Conc. (Tc) | = 5.0 min |
| IDF Curve | = San Angelo TX.idf | Intensity | = 9.88 in/hr |
| Freq. Corr. Factor | = 1.00 | Asc/Rec Limb Factors | = 1/1 |



# Hydrograph Report

Project Name: Green Meadow

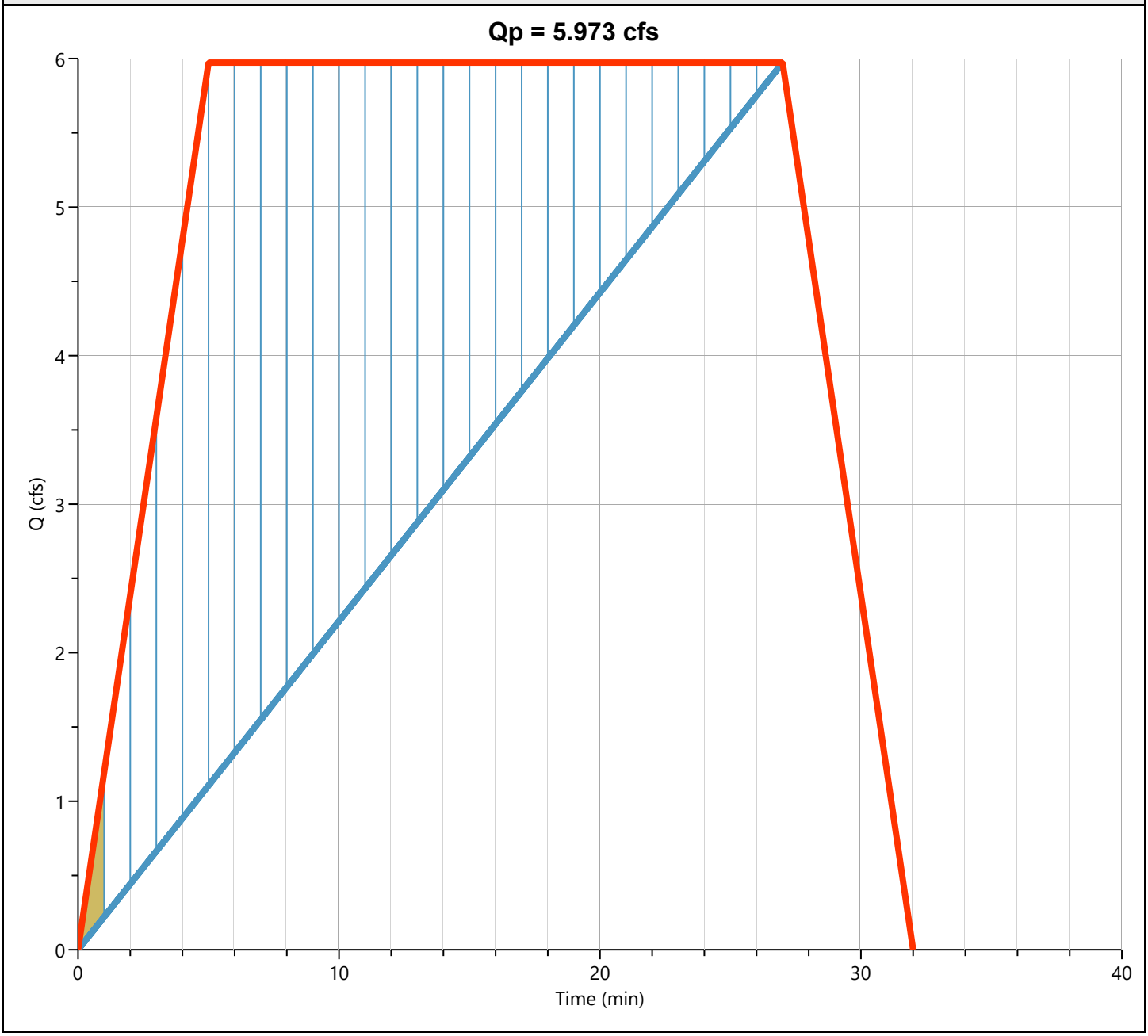
Hydrology Studio v 3.0.0.33

10-30-2024

## Developed

## Hyd. No. 2

| | | | |
|---|---|---|---|
| Hydrograph Type | = Mod Rational | Peak Flow | = 5.973 cfs |
| Storm Frequency | = 100-yr | Time to Peak | = 0.08 hrs |
| Time Interval | = 1 min | Runoff Volume | = 9,855 cuft |
| Drainage Area | = 1.43 ac | Runoff Coeff. | = 0.78 |
| Tc Method | = User | Time of Conc. (Tc) | = 5.0 min |
| IDF Curve | = San Angelo TX.idf | Intensity | = 5.35 in/hr |
| Freq. Corr. Factor | = 1.00 | Storm Duration | = 5.5 x Tc |
| Target Q | = 5.600 cfs | Required Storage | = 4,479 cuft |



# Hydrograph Report

Hydrology Studio v 3.0.0.33

10-30-2024

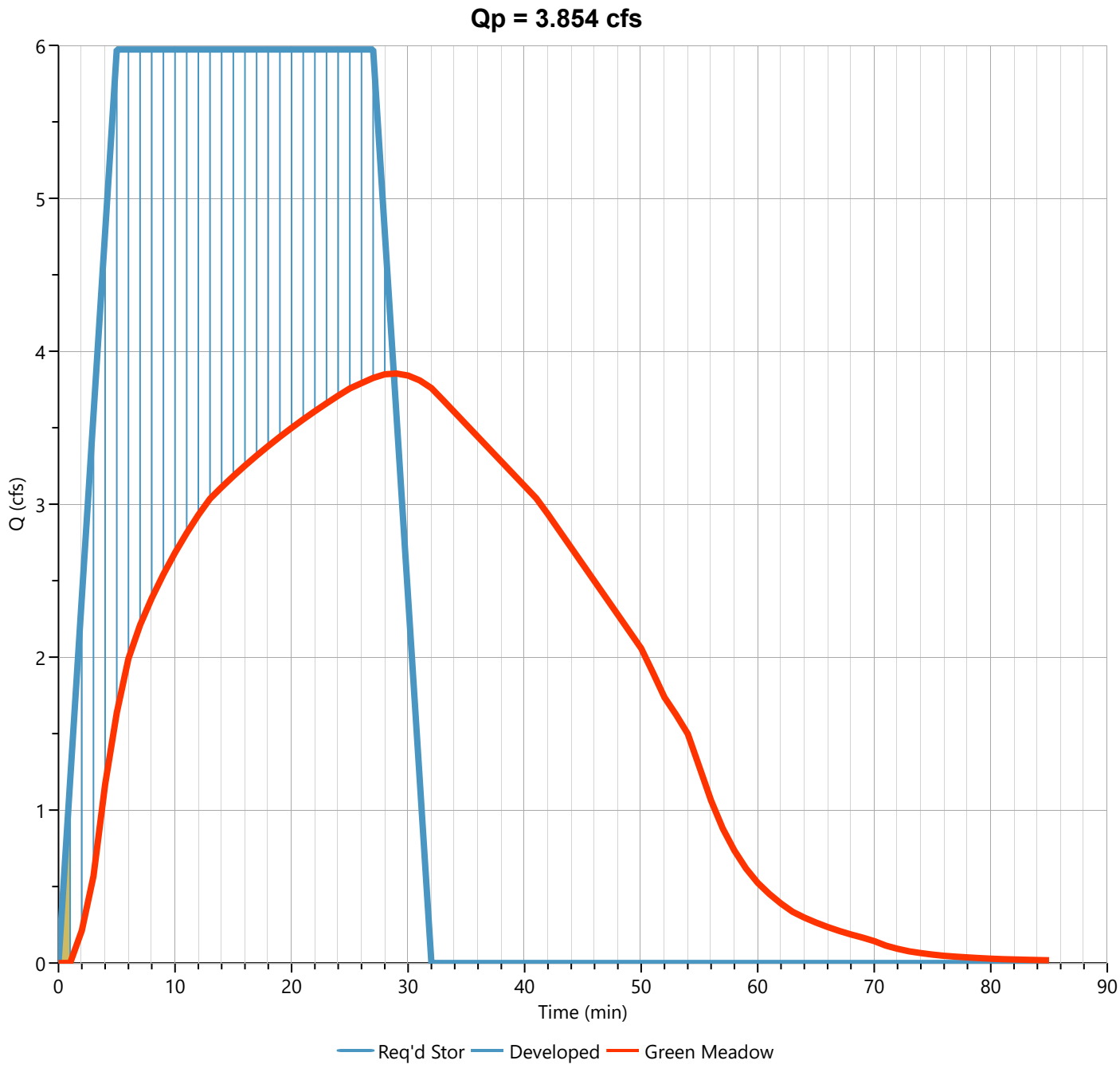
## Green Meadow

## Hyd. No. 3

| | | | |
|---|---|---|---|
| Hydrograph Type | = Pond Route | Peak Flow | = 3.854 cfs |
| Storm Frequency | = 100-yr | Time to Peak | = 0.48 hrs |
| Time Interval | = 1 min | Hydrograph Volume | = 9,638 cuft |
| Inflow Hydrograph | = 2 - Developed | Max. Elevation | = 1896.16 ft |
| Pond Name | = Green Meadow | Max. Storage | = 4,611 cuft |

*Pond Routing by Storage Indication Method*

*Center of mass detention time = 14 min*



# Design Storm Report

Custom Storm filename: Blue Springs.cds

Hydrology Studio v 3.0.0.33

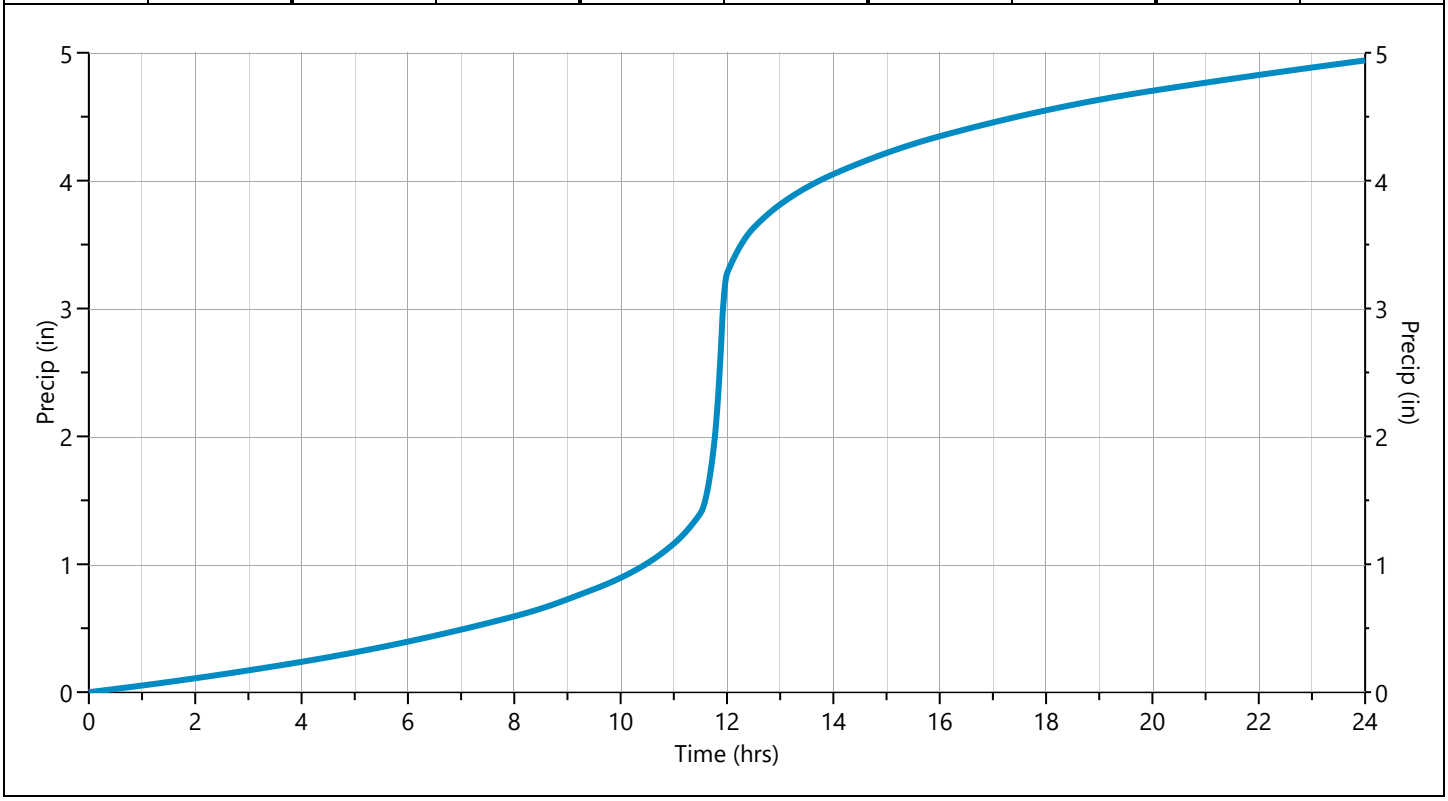
10-30-2024

## Storm Distribution: NRCS/SCS - Type II, 24-hr

| Storm Duration | Total Rainfall Volume (in) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | ✔ 100-yr | |
| 24 hrs | 1.82 | 2.28 | 0.00 | 2.85 | 3.31 | 3.94 | 4.43 | 4.94 | |

**Incremental Rainfall Distribution, 100-yr**

| Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) | Time (hrs) | Precip (in) |
|---|---|---|---|---|---|---|---|---|---|
| 11.42 | 0.009155 | 11.60 | 0.027752 | 11.78 | 0.072175 | 11.97 | 0.067973 | 12.15 | 0.013890 |
| 11.43 | 0.009287 | 11.62 | 0.031001 | 11.80 | 0.081214 | 11.98 | 0.047403 | 12.17 | 0.013577 |
| 11.45 | 0.009419 | 11.63 | 0.034251 | 11.82 | 0.090252 | 12.00 | 0.026834 | 12.18 | 0.013264 |
| 11.47 | 0.009551 | 11.65 | 0.037500 | 11.83 | 0.099290 | 12.02 | 0.016946 | 12.20 | 0.012951 |
| 11.48 | 0.009682 | 11.67 | 0.040750 | 11.85 | 0.108329 | 12.03 | 0.016080 | 12.22 | 0.012638 |
| 11.50 | 0.009814 | 11.68 | 0.043999 | 11.87 | 0.117367 | 12.05 | 0.015767 | 12.23 | 0.012325 |
| 11.52 | 0.011542 | 11.70 | 0.047248 | 11.88 | 0.126406 | 12.07 | 0.015454 | 12.25 | 0.012012 |
| 11.53 | 0.014754 | 11.72 | 0.050498 | 11.90 | 0.135444 | 12.08 | 0.015141 | 12.27 | 0.011699 |
| 11.55 | 0.018004 | 11.73 | 0.053747 | **11.92** | **0.144482** | 12.10 | 0.014828 | 12.28 | 0.011387 |
| 11.57 | 0.021253 | 11.75 | 0.056997 | 11.93 | 0.094479 | 12.12 | 0.014515 | 12.30 | 0.011074 |
| 11.58 | 0.024503 | 11.77 | 0.062659 | 11.95 | 0.088542 | 12.13 | 0.014203 | 12.32 | 0.010761 |



# IDF Report

IDF filename: San Angelo TX.idf

Hydrology Studio v 3.0.0.33

10-30-2024

| Equation Coefficients | Intensity = B / (Tc + D)^E (in/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| B | 17.8240 | 56.3129 | 0.0000 | 70.8619 | 72.7473 | 74.7560 | 104.5665 | 111.0816 | |
| D | 3.2000 | 10.7000 | 0.0000 | 11.7000 | 11.2000 | 9.8000 | 13.6000 | 14.6000 | |
| E | 0.6259 | 0.8761 | 0.0000 | 0.8558 | 0.8278 | 0.7975 | 0.8269 | 0.8134 | |

*Minimum Tc = 5 minutes*

| Tc (min) | Intensity Values (in/hr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1-yr | 2-yr | 3-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | |
| Cf | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| 5 | 4.78 | 5.05 | 0 | 6.37 | 7.25 | 8.72 | 9.32 | 9.88 | |
| 10 | 3.54 | 3.96 | 0 | 5.09 | 5.81 | 6.91 | 7.66 | 8.21 | |
| 15 | 2.90 | 3.28 | 0 | 4.26 | 4.87 | 5.77 | 6.53 | 7.06 | |
| 20 | 2.49 | 2.80 | 0 | 3.68 | 4.22 | 4.99 | 5.72 | 6.22 | |
| 25 | 2.20 | 2.46 | 0 | 3.25 | 3.73 | 4.41 | 5.10 | 5.57 | |
| 30 | 1.99 | 2.19 | 0 | 2.91 | 3.35 | 3.96 | 4.61 | 5.06 | |
| 35 | 1.82 | 1.98 | 0 | 2.64 | 3.05 | 3.60 | 4.21 | 4.64 | |
| 40 | 1.69 | 1.81 | 0 | 2.42 | 2.80 | 3.31 | 3.89 | 4.29 | |
| 45 | 1.58 | 1.66 | 0 | 2.24 | 2.59 | 3.07 | 3.61 | 4.00 | |
| 50 | 1.48 | 1.54 | 0 | 2.08 | 2.41 | 2.86 | 3.37 | 3.74 | |
| 55 | 1.40 | 1.44 | 0 | 1.95 | 2.26 | 2.68 | 3.17 | 3.52 | |
| 60 | 1.33 | 1.35 | 0 | 1.83 | 2.13 | 2.53 | 2.99 | 3.33 | |

*Cf = Correction Factor applied to Rational Method runoff coefficient.*