

CITY OF ROLLINGWOOD DRAINAGE ORDINANCE & DRAINAGE CRITERIA MANUAL

SEPTEMBER 2016



LNV

engineers | architects | surveyors

Overview of Presentation

- I. Scope and Purpose of this Task
- II. Site Development VS. City Drainage System Upgrades
- III. Drainage Ordinance – Why It's Needed
- IV. Drainage Ordinance and Criteria Development Process
- V. Drainage Requirements for Site Development
- VI. Drainage Ordinance Engineering Content VS. Policy Content
- VII. Overview of Drainage Ordinance
- VIII. Conclusion

I. SCOPE & PURPOSE

Task Order No. 11 – Drainage Criteria Review and Recommendation: Develop and implement a drainage criteria ordinance and checklist by collaborating with City committees, commissions, and the public to incorporate their input.

- Policy for drainage improvements on new development
- Provide criteria for estimation and management of runoff to eliminate adverse impact to adjacent property owners
- Provide guidance and criteria to expedite permit approval

TASK ORDER

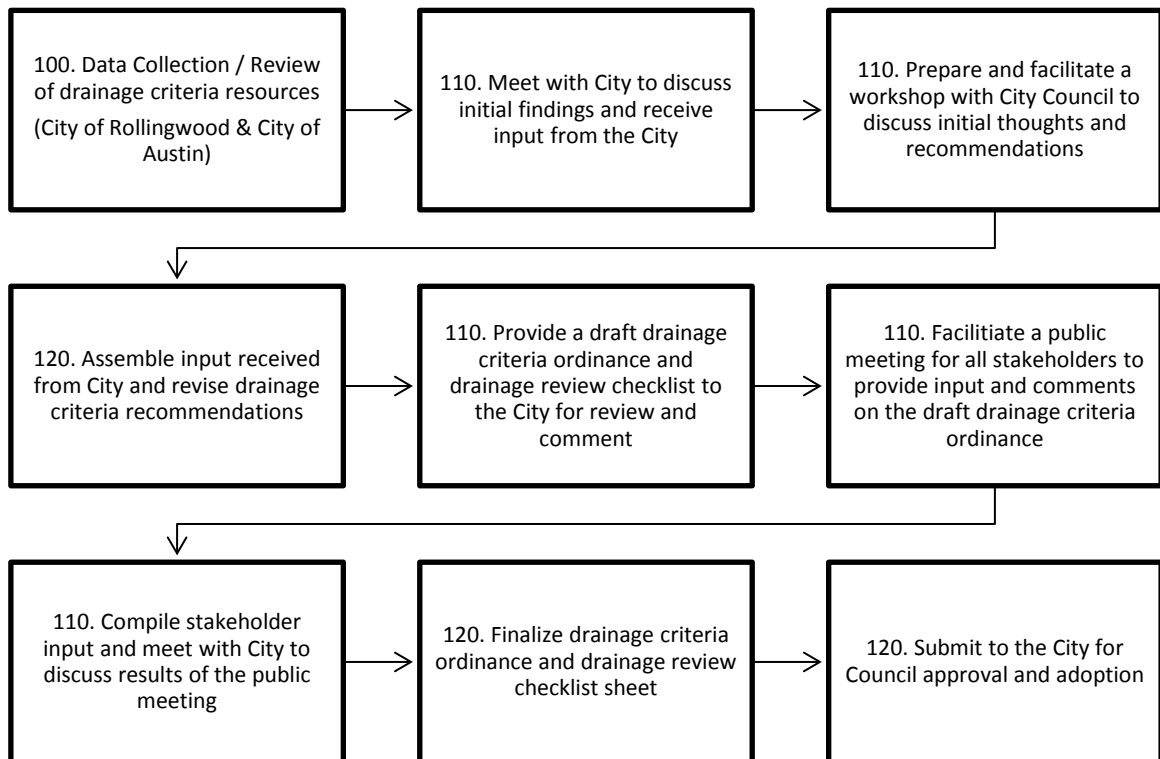
This is Task Order
No. 11, consisting
of 4 pages.

Task Order

In accordance with paragraph 1.01 of the Standard Form of Agreement Between Owner and Engineer for Professional Services – Task Order Edition, dated August 15, 2013 (“Agreement”), Owner and Engineer agree as follows:

1. Specific Project Data

- A. Title: Drainage Criteria Review and Recommendation
- B. Description: Provide consulting services for the review and implementation of a drainage criteria manual for the City of Rollingwood. The general work flow process is outlined below.



TASK ORDER

2. Services of the Engineer

The Engineer Shall:

Scope of Work

Task 100 – Data Collection

- a. Review previously submitted draft City drainage criteria manual.
- b. Evaluate the applicability of the City of Austin Drainage Criteria Manual
- c. Review drainage criteria resources and sort applicable material.

Task 110 – Public Meetings

- a. Conduct a meeting with a City formed committee to discuss initial research and receive input.
- b. Facilitate a City Council and Planning & Zoning workshop to discuss initial thoughts and recommendations.
- c. Facilitate a public stakeholder meeting workshop to receive input and comments on a draft drainage criteria ordinance.
- d. Conduct a joint meeting with Planning & Zoning, and the City formed committee to discuss the results of the public meeting and get final input on the drainage criteria ordinance and drainage review checklist.

Task 120 – Report Recommendations

- a. Select appropriate drainage criteria guidelines to be included and referenced in the City ordinances.
- b. Prepare and submit a draft drainage criteria ordinance and drainage review checklist for review and input from the City Council Workshop.
- c. Compile and incorporate comments from meeting with City staff and from the City Council/Planning & Zoning Workshop.
- d. Compile input from stakeholder meeting and prepare for discussion with the City.
- e. Finalize drainage criteria ordinance and drainage review checklist sheet.
- f. Provide a letter memorandum outlining the recommended drainage criteria for the City and recommend for City Council/Planning & Zoning approval and adoption.

Exclusions: Environmental Engineering, Permitting, Permit Fees, Utility Design, Subsurface Utility Engineering, Geotechnical Engineering, Pavement Design, Bid Phase Services, Easement Acquisition, Platting, Boundary Survey, and WPAP

TASK ORDER

3. Times for Rendering Services

Completion Date _____ 60 days from Notice to Proceed _____

4. Payments to Engineer

A. Owner shall pay Engineer for services rendered as follows:

<u>Category of Services</u>	<u>Compensation Method</u>	<u>Lump Sum, or Estimate of Compensation for Services</u>
<i>Task 100: Data Collection</i>	<i>Lump Sum</i>	<i>\$2,700</i>
<i>Task 110: City/Public Meetings</i>	<i>Lump Sum</i>	<i>\$4,000</i>
<i>Task 120: Report Recommendations</i>	<i>Lump Sum</i>	<i>\$7,800</i>
	Total:	\$14,500

5. Documents Incorporated By Reference:

STANDARD FORM OF AGREEMENT BETWEEN, CITY OF ROLLINGWOOD AND LNV, INC. FOR PROFESSIONAL SERVICES TASK ORDER EDITION Dated August 15, 2013


Terms and Conditions: Execution of this Task Order by Owner and Engineer shall make it subject to the terms and conditions of the Agreement (as modified above), which Agreement is incorporated by this reference. Engineer is authorized to begin performance upon its receipt of a copy of this Task Order signed by Owner.

 **Sec. 3.02.012 Drainage improvements**

(a) Commercial site development permit. The owner or developer of commercial property for which a building permit is required under the building code shall be required, in connection with the work done under such permit, to provide adequate on-site drainage improvements to accommodate the full effects of the development of such property with regard to water quality, erosion, and flooding. Said owner or developer shall provide for water pollution abatement, erosion, and sedimentation control, and the conveyance of all storm drainage flowing through or abutting the subject property, including the drainage naturally flowing through the property by reason of topography and from any future upstream development. Post-development stormwater runoff shall be limited to the amounts generated in the existing condition for the 2-, 10-, 25- and 100-year storms. Water quality treatment shall be provided in a manner consistent with current guidelines as published by the state commission on environmental quality. No building permit will be issued unless it is demonstrated to the satisfaction of the city engineer that the proposed drainage improvements will function properly, will not pose a danger of possible pollution or possible injury to the public health, and will not cause damage to any property, in accordance with the city's drainage and pollution control criteria and the specific drainage requirements set forth in the development plan applicable to each commercial zoning district.

(b) Residential site development permit. The owner or developer of residential property, in the case of new construction or proposed construction in which the footprint and/or roof plan of an existing building or structure on the property is altered, shall be required, in connection with the work done under a building permit, to provide adequate on-site drainage improvements to accommodate the full effects of the development of such property with regard to erosion control and flooding. Said owner or developer shall provide for sedimentation control during construction (including but not limited to silt fencing during construction) and the conveyance of all storm drainage flowing through the subject property, including the drainage naturally flowing through the property by reason of topography and/or previous development. Sedimentation control shall be provided in a manner acceptable to the city engineer. No building permit will be issued unless it is demonstrated to the satisfaction of the city engineer through generally accepted engineering practices that the proposed or required drainage improvements will function properly, will not pose a danger of possible injury to the public health, and will not cause damage to any property and are in accordance with the city's drainage control criteria.

(1987 Code, ch. 11, subch. A, sec. 12)

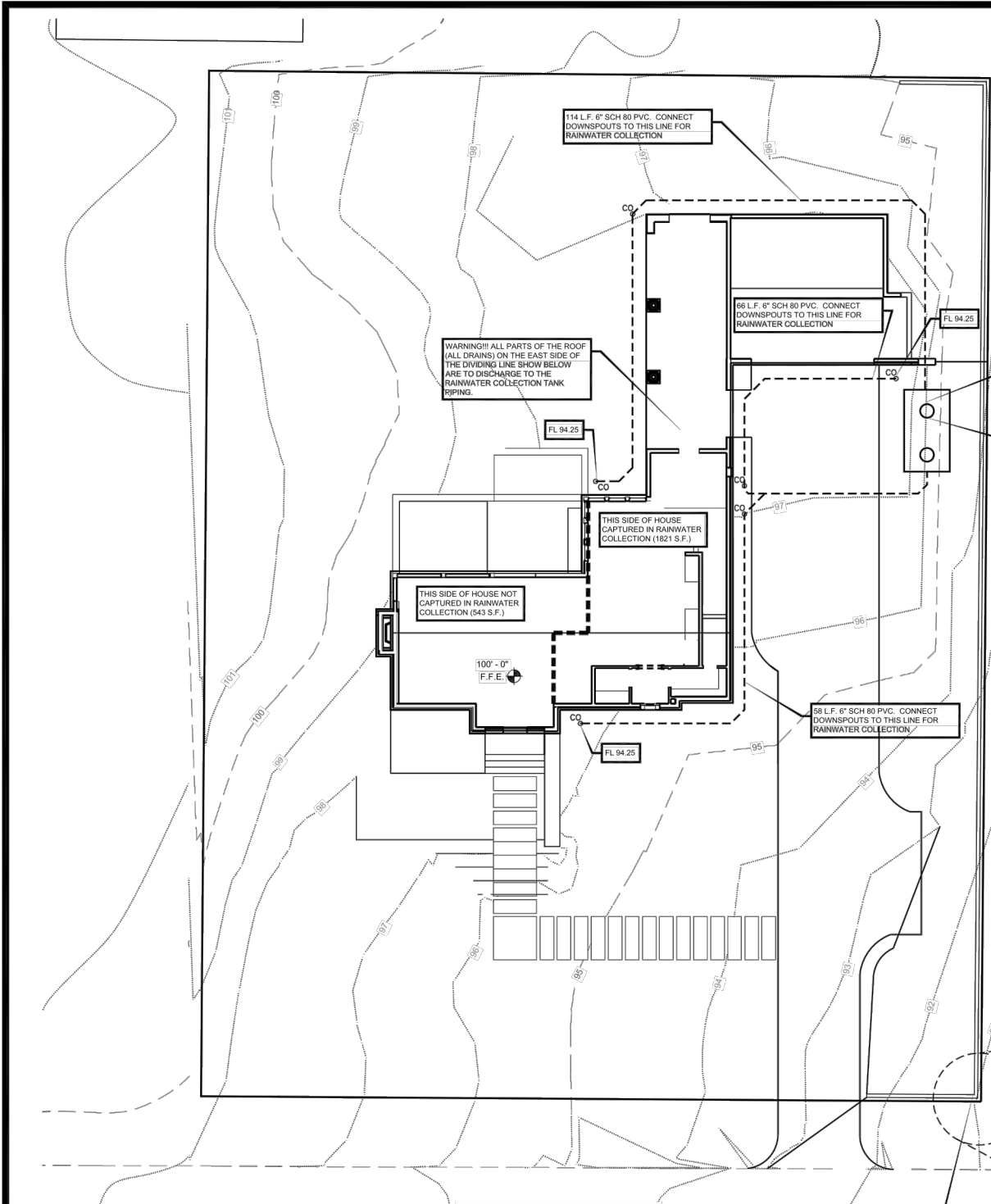
 **Secs. 3.02.013–3.02.050 Reserved**

II. SITE DEVELOPMENT VS. CITY DRAINAGE SYSTEM UPGRADES

SITE DEVELOPMENT - **Permit Required**

Ordinance would be utilized to properly estimate and manage runoff flows to prevent adverse impact on a lot-by-lot basis.

- Promotes responsible development
- Prevents additional flooding issues



1 GRADING PLAN
SCALE: 1" = 10'

PURPOSE OF PLAN AND EXPLANATION OF COMPUTATIONS

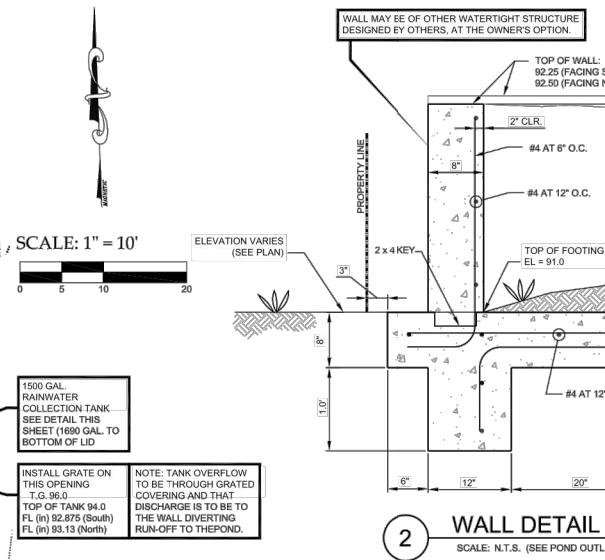
- PURPOSE OF THIS PLAN IS TO PROVIDE A PLAN TO ROUTE THE MAJOR STORMWATER DISCHARGE THROUGH OR AROUND THE HABITABLE STRUCTURES WITHOUT RUN-OFF ENTERING THE FINISHED FLOORS. SPECIFIC FINE GRADING IS NOT INTENDED TO BE ADDRESSED BY THIS PLAN AND NOT ALL AREAS ARE INTENDED TO BE ADDRESSED BY THIS PLAN.
- THIS PLAN WAS PREPARED BASED ON LIMITED SITE TOPOGRAPHY AS BLENDED WITH GIS TOPOGRAPHY TO PROVIDE A MORE COMPLETE PRESENTATION. THE DIFFERENT SOURCES OF INFORMATION DO NOT NECESSARILY MATCH WELL BUT ARE BELIEVED TO BE SUFFICIENT FOR A THIS OVERALL DRAINAGE PLAN.
- THE IMPERVIOUS COVER SHOWN IN THESE COMPUTATIONS ARE BASED ON THE ARCHITECTS PLAN. THE RESULTS MAY CHANGE SHOULD SIGNIFICANT DIFFERENCES BE CONSTRUCTED.
- THE HYDROLOGIC COMPUTATIONS PRESENTED WERE BASED ON THE SCS METHOD AND THE USE OF HEC-HMS 3.2. THE HYDRAULIC COMPUTATIONS PRESENTED WERE BASED ON THE USE OF SWMM 5.0. THE SUMMARY OF THE SWMM COMPUTATIONS IS BEST VIEWED BY REVIEWING THE MODEL SCHEMATIC WHERE THE VELOCITIES ARE SHOWN FOR THE LINKS AND THE DEPTHS OF FLOW AT THE NODES.
- THE INITIAL ABSTRACTION FOR THE HYDROLOGY WAS MODELED BY DETERMINING THE HYDROLOGIC SOIL GROUP AND THEN DETERMINING THE ASSOCIATED CN VALUE. ONCE THE CN VALUE WAS DETERMINED AND PUT IN THE MODEL, THE EFFECT OF IMPERVIOUS COVER ON THE INITIAL ABSTRACTION WAS MODELED BY DETERMINING THE PERCENTAGE OF IMPERVIOUS COVER IN EACH AREA AND PUTTING THAT PERCENTAGE IN HEC-HMS. THAT EFFECT WAS ALSO COMPUTED EXPLICITLY FOR REVIEW (THE COMPOSITE CN) AND IS SHOWN ON THIS SHEET. THE RESULTS OF THIS ASSESSMENT MAY BE FOUND IN THE CN CALCULATION TABLE ON A SHEET IN THE PLANS.
- THE TIME OF CONCENTRATION (AND RELATED LAG FOR USE IN THE HMS MODEL) WAS COMPUTED USING THE EQUATIONS IN THE SCS PUBLICATION TR-55. THE SPECIFIC INFORMATION USED TO PERFORM THE COMPUTATIONS, AS WELL AS THE RESULTS OF THOSE COMPUTATIONS, ARE INCLUDED ON A SHEET IN THE PLANS.

SEQUENCE OF CONSTRUCTION

- INSTALL TEMPORARY BMPs (SILT FENCE, STABILIZED CONSTRUCTION ENTRANCE, ETC) PER THE PLANS BY OTHERS.
- ROUGH IN POND AREA INCLUDING EITHER BUILDING THE WALL OR INSTALLING SILT FENCE IN A MANNER THAT FUNCTIONS AS THE POND FOR THE PURPOSE OF CAPTURING SEDIMENT.
- CLEAR, GRUB, AND GRADE THE SITE.
- PUT UP FORM BOARDS AND PREPARE SELECT FILL FOR SLAB
- INSTALL UTILITIES TO BE IN THE SLAB
- INSTALL RAINWATER TANK.
- POUR THE SLAB (NOTE: TOTAL TIME FROM CLEARING AND GRUBBING TO POURING THE SLAB EXPECTED TO BE 8 WEEKS).
- FRAME THE HOUSE
- DRY IN THE HOUSE INCLUDING INSTALLATION OF THE RUN-OFF COLLECTION PIPES AND TEMPORARY GUTTERS TO ROUTE RUN-OFF TO THE RAINWATER TANK. (NOTE: TOTAL TIME FROM FRAMING TO DRY IN, INCLUDING INSTALLATION OF TEMPORARY GUTTERS AND PIPING TO RAINWATER TANK EXPECTED TO BE 6 WEEKS.
- FINISH OUT INTERIOR AND EXTERIOR OF HOUSE (EXPECTED TO BE 6 MONTHS).
- INSTALL PERMANENT GUTTERS AND CONNECT GUTTERS TO RAINWATER COLLECTION PIPING.
- INSTALL UTILITIES IN THE YARD
- INSTALL FLATWORK ON THE LOT (DRIVEWAY, SIDEWALKS, ETC).
- COMPLETE THE DETENTION POND.
- LANDSCAPE AND RE-VEGETATE THE LOT. (NOTE: TOTAL TIME TO INSTALL UTILITIES AND FLAT WORK AND THEN LANDSCAPE EXPECTED TO BE 6 WEEKS).
- THE OWNER SHALL HAVE THE TCEQ AFFIDAVIT RECORDED PRIOR TO STARTING CONSTRUCTION.

CITY OF ROLLINGWOOD NOTES

- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND INSPECTION (ON A REGULAR BASIS) OF THE SILT FENCE AND STABILIZED CONSTRUCTION ENTRANCE DURING CONSTRUCTION/DEMOLITION INCLUDING THE REMOVAL AND PROPER DISPOSAL ANY ACCUMULATED SILT AND DEBRIS.
- THE CONTRACTOR SHALL NOT BEGIN ANY WORK UNTIL THE SILT FENCE AND TREE PROTECTION (TREE PROTECTION IF REQUIRED BY CODE) HAVE BEEN INSTALLED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND INSPECTING (ON A REGULAR BASIS) ALL EROSION AND SEDIMENTATION CONTROL STRUCTURES, INCLUDING THE REMOVAL AND PROPER DISPOSAL OF ANY ACCUMULATED SILT AND DEBRIS. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR KEEPING THE STREETS FREE OF MUD, DIRT, DEBRIS AND MATERIAL AND SHALL CLEAN SWEEP THE STREETS ON A REGULAR BASIS OR AT THE DIRECTION OF THE CITY AT NO ADDITIONAL COST TO THE CITY OR OWNER.
- THE OWNER SHALL HAVE THE TCEQ AFFIDAVIT RECORDED PRIOR TO STARTING CONSTRUCTION.
- THE CONTRACTOR SHALL NOT BEGIN ANY WORK UNTIL THE EROSION AND SEDIMENT CONTROL, BEST MANAGEMENT PRACTICES (SILT FENCE, CONSTRUCTION ENTRANCES, ROCK FILTER DAMS, ETC.) AND TREE PROTECTION HAVE BEEN INSTALLED.
- INCREASED STORMWATER PEAK FLOWS DURING CONSTRUCTION MUST BE MITIGATED WITH TEMPORARY BEST MANAGEMENT PRACTICES TO PREVENT HARM TO NEIGHBORING PROPERTIES.



2 WALL DETAIL
SCALE: N.T.S. (SEE POND OUTLET DETAIL THIS SHEET)

NEENAH FOUNDRY

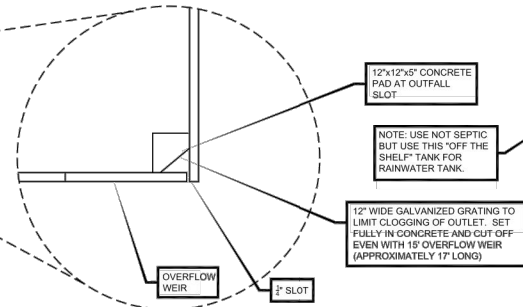
R-4360 Series
Beehive Grate, Frame
Light Duty

Various kinds and types of pipe are made under many specifications and dimensions may vary. Check the grate size as shown on the drawing to be sure it will fit the pipe you are using.

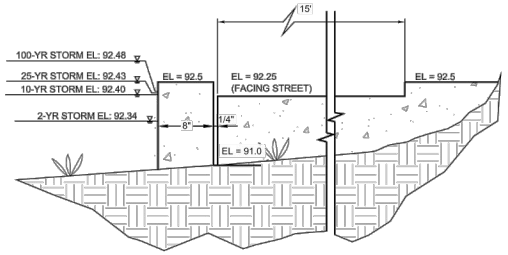
Grating Number	Grate Type	Sp. Post Open	Steel Reinforcing Limited Feet
94360A	Beehive	08	4.3
94360B	Beehive	09	4.7
94360C	Beehive	14	4.5
94360D	Beehive	07	6.3

Grating Number	A	C	F	G	H	I	J
94360A	15-1/4	15-1/4	2-3/4	1	10	1-5/8	
94360B	22	18	2-3/4	1	10	1-5/8	
94360C	23-1/4	17	3-1/2	2	1-1/2	1-3/4	
94360D	26-1/2	24	3-5/8	1	1	3	

4 RAINWATER COLLECTION OVERFLOW DISCHARGE GRATE
SCALE: N.T.S.



WARNING!!!
1) SLOTS TO FACE THE STREET, NOT THE NEIGHBORS PROPERTY.
2) THE PEAK 100-YEAR VELOCITY EXPECTED TO BE LESS THAN 6-FPS AND THEREFORE, NOT EROSION. HOWEVER, CARE SHOULD BE TAKEN WITH THE RE-VEGETATION IN THE VICINITY OF THIS OUTFALL TO ENSURE THERE IS NO EROSION OR WASHOUT.



3 DETENTION POND OUTLET DETAIL
SCALE: 1" = 1'

LOW PROFILE SEPTIC TANKS

STANDARD FEATURES:

- 750, 1000, 1250 & 1500 GALLON
- 4500 PSI CONCRETE
- 1 OR 2 COMPARTMENTS

NOTES:

- ALL TANKS ARE COMPLETE WITH INLET GASKET, OUTLET BAFFLE, GROUDED LID, AND CROSS-OVER BAFFLE ON DIVIDERS
- OUTLET IS 4 IN. PVC, SCH. 40. INLET FITTING WILL ACCEPT BOTH 3 IN. AND 4 IN. FITTINGS
- ALL CAPACITIES ARE MINIMUM WORKING CAPACITIES
- WHEN A PUMP CHAMBER IS REQUIRED, ALL 750, 1000, & 1250 TANKS HAVE DIVIDERS THAT ARE PART OF THE WALL TO ENSURE A WATER TIGHT COMPARTMENT FOR THE PUMP
- IF USED AS A PUMP TANK, SPECIFY WHICH SIDE WILL HOUSE PUMP
- ADD 3 INCHES TO 'A' & 'B' DIMENSIONS FOR 4-INCH WALL TANKS
- SEE SITE PREPARATION SHEET FOR IMPORTANT DEPTH LIMITATION INFORMATION

WARNING!!! CONSULT WITH MANUFACTURER REGARDING THE NEED FOR BALLAST FOR TIMES WHEN GROUNDWATER PRESENT, BUT TANK IS EMPTY.

SIZE:	750	1000	1250	1500
DIMENSION A	88"	124"	132"	144"
DIMENSION B	63"	63"	74"	80"

CAPACITY (GALLONS):	750	1000	1250	1500
COMPARTMENT 1	450	600	750	900
COMPARTMENT 2	300	400	500	600

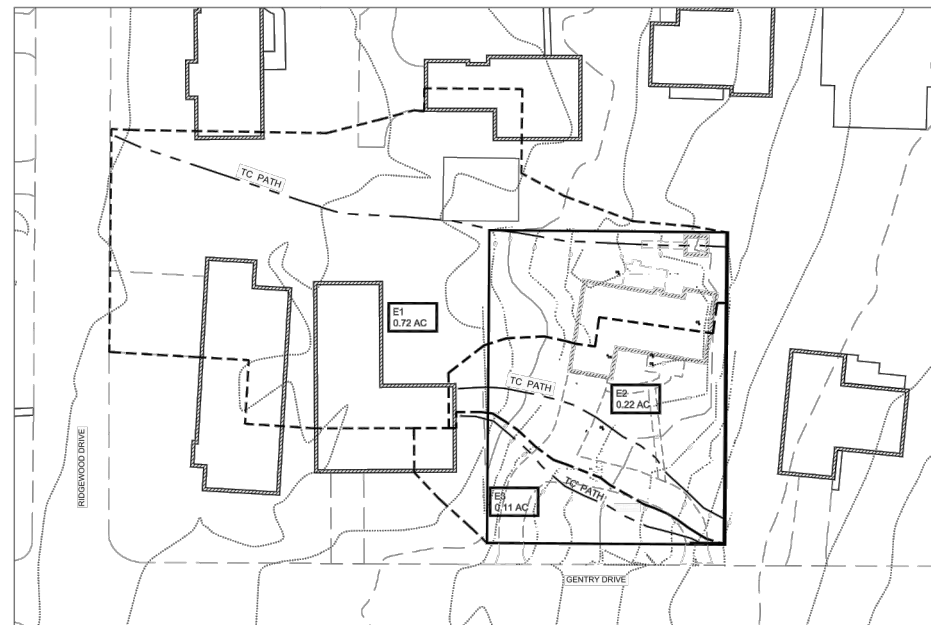
IF PUMP NEEDS TO BE SUBMERGED, COORDINATE WITH MANUFACTURER FOR PROVISION OF OPENING FOR FORMATION OF SUMP FOR PUMP.

HILL COUNTRY CONCRETE PRODUCTS, INC.
PO Box 357
Kyle, Texas 78540
512.288.9711
Austin Line 512.476.5538
Fax 512.288.0215
hillcountryconcrete.com

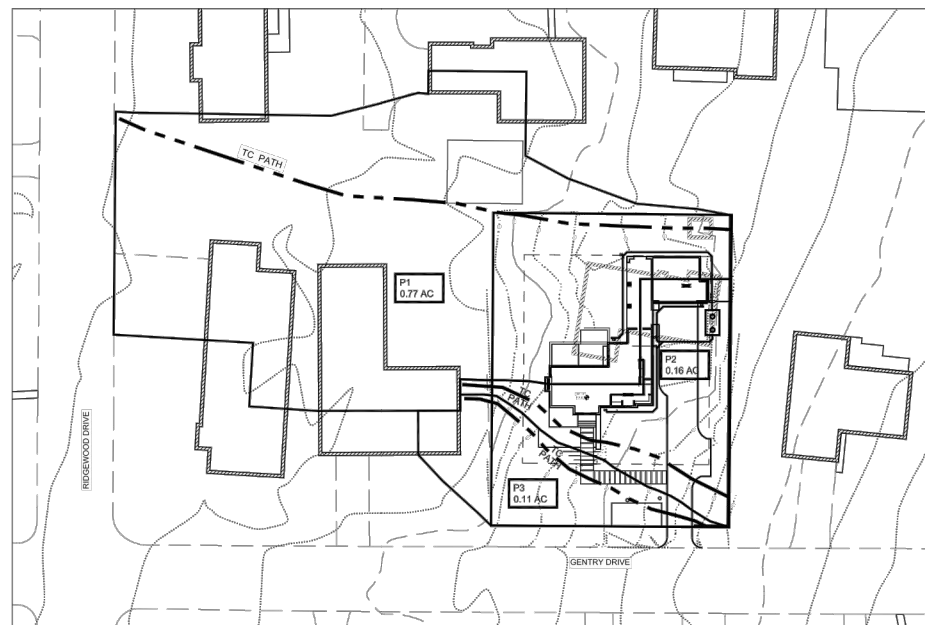
5 RAINWATER COLLECTION TANK
SCALE: N.T.S.

RAINWATER COLLECTION CALCULATIONS:
LOT AREA: 17,183 SF
IC (20%): 3436 SF
IC (PROPOSED) = 5222 SF = 30.39%
IC (REQU. CAPTURE): 1,768 SF
IC (ACTUAL CAPTURE): 1,821 SF
GAL (REQU. CAPTURE): 1,786,125 * 7.48 = 1,689 GAL
GAL (ACTUAL CAPTURE): 1,821,025 * 7.48 = 1,703 GAL
TANK VOLUME (full to top) = 2,094 GAL (1500 GALLON TANK)

WARNING!!!
THE LOCATION OF UNDERGROUND UTILITIES ARE NOT KNOWN AND THEREFORE NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHOULD EXPLORE PRIOR TO EXCAVATION TO BETTER LOCATE ANY UNDERGROUND UTILITIES.

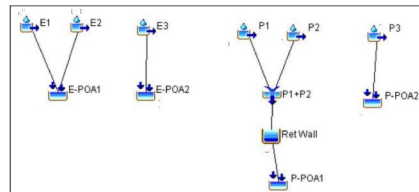


1 EXISTING DRAINAGE PLAN
SCALE: 1/40



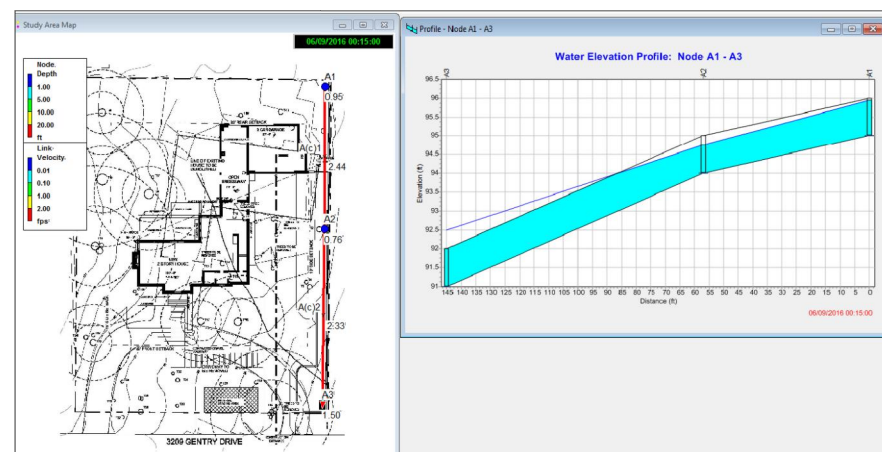
2 PROPOSED DRAINAGE PLAN
SCALE: 1/40

Drainage Area (DA) Table:					
DA name	acres	sq mile	Onsite Offsite	Impervious Cover (IC) %	
E1	0.72	0.00113	0.03	0.21	34.1%
E2	0.20	0.00032	0.06	0.002	30.8%
E3	0.11	0.00017	0.01	0.01	22.0%
Total Existing = 1.04 0.0016 0.11 0.22 32.1%					
P1	0.77	0.00120	0.04	0.21	33.0%
P2	0.16	0.00024	0.07	0.000	47.7%
P3	0.11	0.00017	0.01	0.01	16.2%
Total Proposed = 1.04 0.0016 0.12 0.22 33.4%					



4 HMS MODEL SCHEMATIC
SCALE: N/A

3 AREA AND IC CALCS
SCALE: N/A



5 DIVERSION WALL CALCS
SCALE: N/A

TIME OF CONCENTRATION CALCULATIONS USING THE SOIL CONSERVATION SERVICE (SCS) METHOD
Project: 3209 Gentry Hydrolog

INPUT PARAMETERS

A) Rainfall Volumes - See US Weather Bureau Technical Paper 4-C
3.44 2-year, 24-hour Rainfall "P2" (inches)

B) Watershed Factors (excluding any upstream area as noted):
A Sheet Flow (flow depth to 0.1 ft per SCS TR-55, p.3-3 (June 1986))

	E1	E2	E3	P1	P2	P3	(n1)	Manning's "n"
Reach 1	0.41	0.41	0.41	0.41	0.41	0.41	(n1)	Manning's "n"
	150	148	137	150	142	137	(L1)	Length, ft
	0.020	0.081	0.088	0.020	0.085	0.088	(s1)	Slope, ft/ft
Reach 2	0.20	0.20	0.20	0.20	0.20	0.20	(n1)	Manning's "n"
	0	0	0	0	0	0	(L1)	Length, ft
	0.050	0.050	0.050	0.050	0.050	0.050	(s1)	Slope, ft/ft

B Shallow Concentrated Flow (R of 0.2 to 0.4 per SCS TR-55, Appendix F (June 1986))

	N	Y	Y	N	N	N	(L2)	Paired? (Y or N)
Reach 1	152	0	0	152	0	0	(L2) <td>Length, ft</td>	Length, ft
	0.059	0.050	0.050	0.059	0.050	0.050	(s2) <td>Slope, ft/ft</td>	Slope, ft/ft
Reach 2	Y	N	N	Y	N	N	(L2) <td>Paired? (Y or N)</td>	Paired? (Y or N)
	0	0	0	0	0	0	(L2) <td>Length, ft</td>	Length, ft
	0.038	0.050	0.050	0.038	0.050	0.050	(s2) <td>Slope, ft/ft</td>	Slope, ft/ft

C Channel Flow

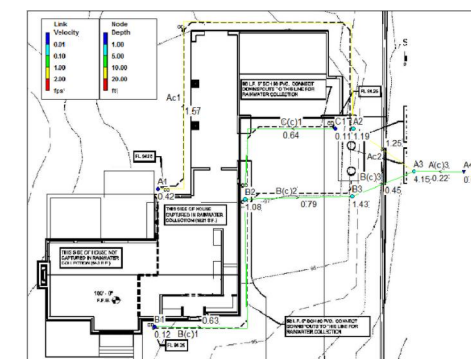
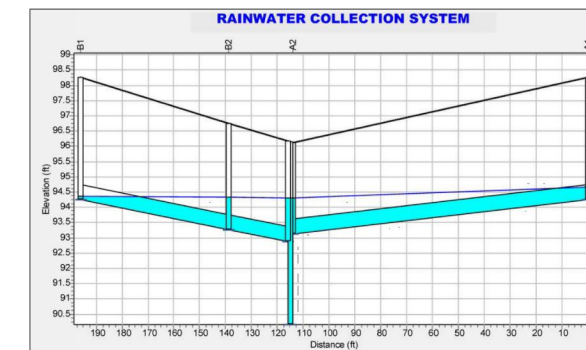
	0.0	0.0	0.0	0.0	0.0	0.0	(V3)	Velocity (ft/s)
	0.100	0.100	0.100	0.100	0.100	0.100	(s3) <td>Slope, ft/ft</td>	Slope, ft/ft
	0	0	0	0	0	0	(L3) <td>Length, ft</td>	Length, ft

RESULTS

	E1	E2	E3	P1	P2	P3	
	29.2	16.5	15.1	29.2	15.7	15.1	min (Tc-1a)
	0.0	0.0	0.0	0.0	0.0	0.0	min (Tc-1b)
	3.9	4.5	4.5	3.9	3.8	3.8	V-2a (ft/s)
	0.6	0.0	0.0	0.6	0.0	0.0	min (Tc-2a)
	4.0	3.8	3.8	4.0	3.8	3.8	V-2b (ft/s)
	0.0	0.0	0.0	0.0	0.0	0.0	min (Tc-2b)
	0.0	0.0	0.0	0.0	0.0	0.0	min = Channel Tc (Tc-3)
	29.9	16.5	15.1	29.9	15.7	15.1	Total (min)
	29.9	16.5	15.1	29.9	15.7	15.1	Total Used (min)
	17.9	9.9	9.0	17.9	9.4	9.0	Lag for HEC-HMS
	5.2	2.9	2.6	5.2	2.7	2.6	Min Modeling Instrument

Equations:
 $Tc1 = 0.007 * (L1 + 1)^{0.8} / (P2^{0.5} * s^{1/3})$ in hours
 $Tc2 = 1.47 * V$ where, per Appendix F.V = 18.1345 * (V-2a) / (V-2b) or V = 20.3282 * (V-2a) / (V-2b)
 $Tc3 = L3 / [V3]$ where, V either assumed or = $1.47 * 1.345 * (V-2a) / (V-2b)$ but w/ 20% increase for channel efficiency.

6 Tc CALCULATIONS
SCALE: N/A



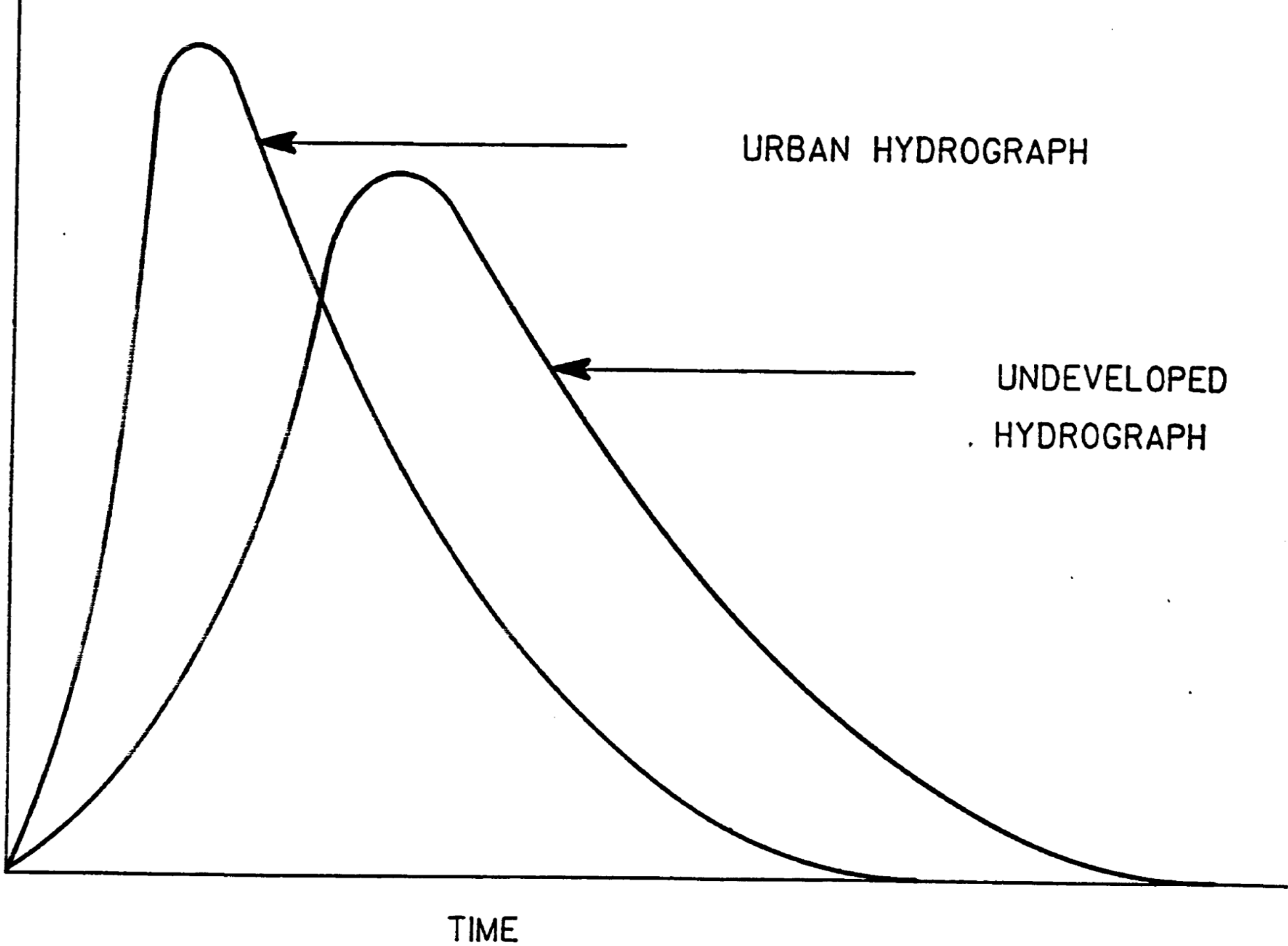
8 RAINWATER COLLECTION CALCS
SCALE: N/A

SUMMARY of the Hydrologic Computations (Using the SCS Method)
Project: 3209 Gentry Hydrolog

Hydrologic Element	Drain Area (MI ²)	2-yr Peak Disch (CFS)	10-yr Peak Disch (CFS)	25-yr Peak Disch (CFS)	100-yr Peak Disch (CFS)	Notes
Existing Discharges:						
E1	0.00113	0.96	2.05	2.69	3.76	
E2	0.00032	0.32	0.70	0.92	1.29	
E3	0.00017	0.17	0.37	0.50	0.70	
E-POA1	0.00145	1.23	2.61	3.43	4.81	Compare to P-POA1
E-POA2	0.00017	0.17	0.37	0.50	0.70	Compare to P-POA2
Proposed Discharges:						
P1	0.00120	1.02	2.17	2.85	3.99	
P1+P2	0.00144	1.23	2.60	3.41	4.75	
P2	0.00024	0.28	0.58	0.73	1.01	
P3	0.00017	0.16	0.37	0.48	0.70	
Retention Discharges:						
Ret Wall	0.00144	1.23	2.61	3.43	4.80	
Proposed Discharges after Retention:						
P-POA1	0.00144	1.23	2.61	3.43	4.80	Compare to E-POA1
P-POA2	0.00017	0.16	0.37	0.48	0.70	Compare to E-POA2
Retention Pond Water Surface Elevations:						
Pond	92.34	92.40	92.43	92.48		
Pond Outlets:						
Elevation	Size (ft)	Coef	No.			
91.00	0.0208	2.8	1	Weir (ft)		
92.25	15.0	2.8	1	Weir (ft)		
Pond Elevation/Area/Outflow Tables:						
	Elevation (sf)	Area (ac)	1 (cfs)	2 (cfs)	Total (cfs)	
	91	0	0.0000	0.00	0.00	
	92	175	0.0040	0.06	0.06	
	93	531	0.0122	0.18	27.28	

7 HMS SUMMARY RESULTS
SCALE: N/A

RUNOFF RATE



URBAN HYDROGRAPH

UNDEVELOPED
HYDROGRAPH

TIME

II. SITE DEVELOPMENT VS. CITY DRAINAGE SYSTEM UPGRADES

CITY DRAINAGE SYSTEM UPGRADES – **Permit Not Required**

Drainage studies by the City could identify, prioritize, and recommend a program with cost and schedule for implementation and reduction of flooding issues within City right of way.

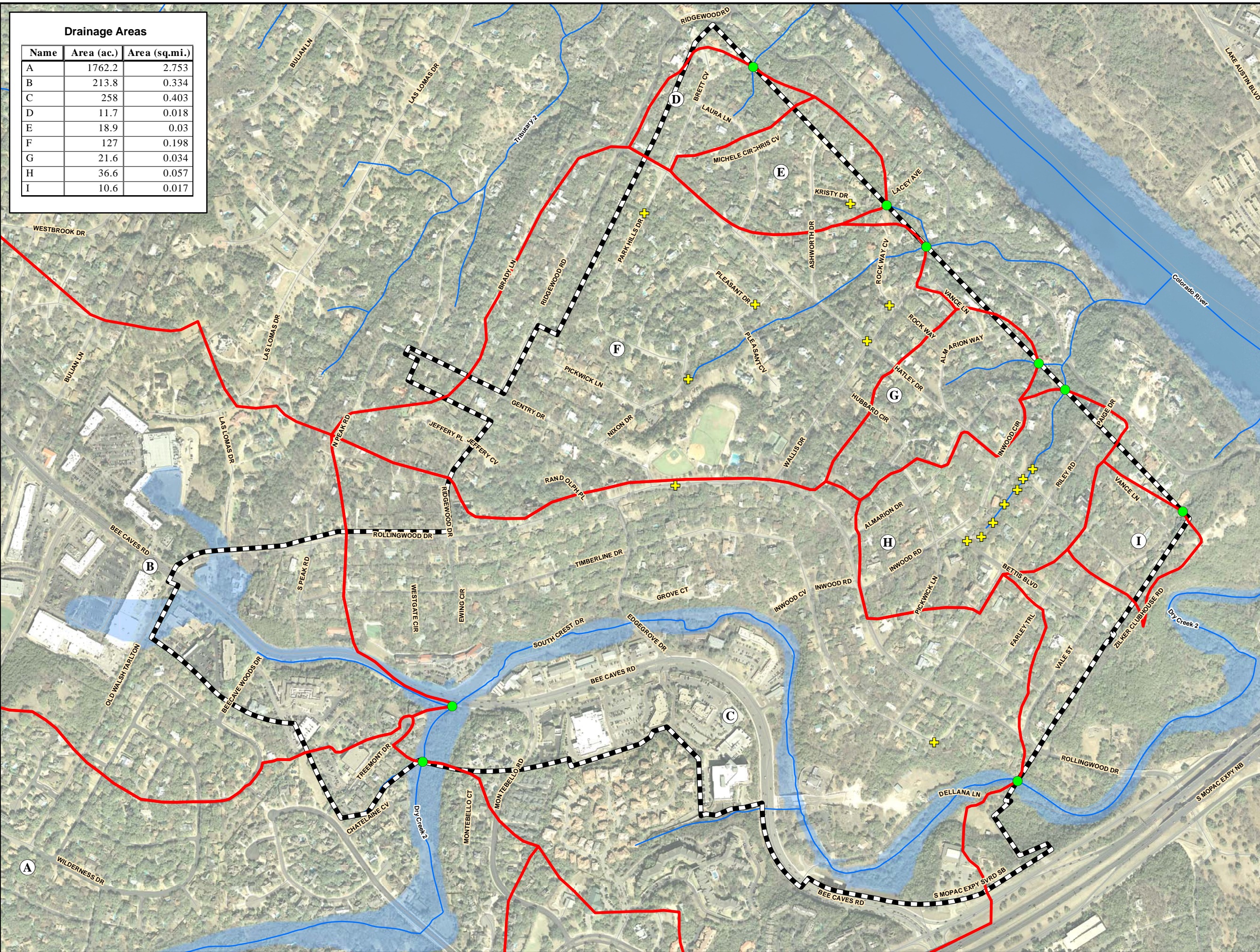
Example: Drainage Improvements at Hatley Culvert currently bidding.

Regional detention would not help with many of the complaints due to the lot-to-lot drainage patterns in the City.

City of Rollingwood Drainage Area Map

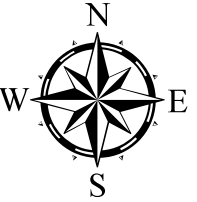


Drainage Areas		
Name	Area (ac.)	Area (sq.mi.)
A	1762.2	2.753
B	213.8	0.334
C	258	0.403
D	11.7	0.018
E	18.9	0.03
F	127	0.198
G	21.6	0.034
H	36.6	0.057
I	10.6	0.017

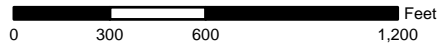


Legend

- Computation Point
- + Flooding Complaint Location
- ~ FEMA Stream Centerline
- CAPCOG Regional Roads
- Drainage Area Boundaries
- City Limits
- FEMA 100YR Floodplain



1 inch equals 600 feet



May 14, 2012



engineers | architects | contractors

TBPE FIRM NO. F-366



Note: CAPCOG data was acquired from <http://www.capcog.org/data-maps-and-reports/geospatial-data/> and is current as of May 2012. FEMA data was requested and acquired through the FEMA website and is current as of March 2012.

III. NEED FOR DRAINAGE ORDINANCE

Problems associated with limited drainage ordinance (current):

- Limited ability to enforce drainage policy
- Lack of direction on drainage requirements
- Lack of direction on site plan improvement submittal

What the proposed drainage ordinance provides:

- Drainage policy
- Drainage design technical requirements
- Other requirements (setbacks, grading, aesthetics)
- Site plan submittal requirements and guidance
- Operations and maintenance requirements

IV. DRAINAGE ORDINANCE AND CRITERIA PROCESS

Drainage Subcommittee

- Created by Council to facilitate drainage initiatives
- Collaborated to decide on content of drainage ordinance
- Reviewed draft drainage ordinance and provided input/feedback

Joint meetings of Utilities and P&Z Commissions

- Iterative review and edit of the draft ordinance
- Held public meetings to collect input on draft ordinance
- Recommended to City Council for adoption after iterative review and edit process

V. REQUIREMENTS FOR SITE DEVELOPMENT

Complete Site Improvement Form

Permittee completes form to identify improvements, increase in impervious cover, construction period, drainage improvements, and soil erosion control methods.

Site Plan

Permittee provides a drainage improvement plan that identifies the following:

- Drainage map of existing and proposed conditions
- Drainage improvement facilities
- Drainage calculations
- Comparison of peak discharge for pre vs. post development conditions.
- Soil erosion control plan
- Construction sequence
- Rainwater harvest system

Operation & Maintenance schedule – City Provided

VI. ENGINEERING CONTENT VS. OTHER POLICY CONTENT

Engineering Content:

- City of Austin Drainage Criteria Manual (Suppl. 9 – 2014, Sec. 2-8)
 - Hydrologic analyses, computations, and design
- Drainage Channel & Detention Design
- Erosion Control

Policy Content:

- Aesthetic requirements for facilities.
- *Setback requirements for facilities
- *Grading requirements at property line and within setback
- *Chapter 213, Edwards Aquifer Rules (Water Quality)
- *Operation & Maintenance
- *Permit Requirements/Enforcement (Special Permit)

*these requirements affect drainage but are not engineering driven

VII. OVERVIEW OF DRAINAGE ORDINANCE

1. Drainage Policy

1-1 General explanation & purpose of Ordinance

1-2 Drainage policy

- Stormwater runoff control for development
- Reference to TCEQ requirements

1.2.2 General:

- Drainage analysis and design requirements
- Operation and maintenance of drainage facilities
- Special drainage permit

1.2.3 Easements: establish requirements for:

- New easements
- Identify easements on site plans

1.2.4 Stormwater Drainage Channels

- Criteria for sizing, shaping, and construction of channels

1.2.5 Stormwater Drainage Detention

- Criteria for sizing, shaping, and construction for detention

VII. OVERVIEW OF DRAINAGE ORDINANCE

2. Sediment and Soil Erosion Control

2-1 General

- Policy for temporary and permanent bmp's

2-2 Plan Requirements

- Sequence of construction, sec controls, details, and construction notes

3. Water Quality BMP Plan

3-1 General

- TCEQ – 30 TAC Chapter 213 Edwards Aquifer rules

A. Water quality facilities to be shown on plans

B. Aesthetic enhancement and setback requirements

4. O&M & Permit Requirements

A. Operations and maintenance requirements of drainage facilities

B. Special permit for site improvements that have drainage impacts

5. Site Disturbance

A. Cut/fill, grading, and setback requirements.

VIII. CONCLUSION

The current Rollingwood ordinance is very brief and not well defined and does not provide criteria for design principles and practices to prevent adverse impact to adjacent property owners.

The new ordinance will establish policy with criteria for drainage design and practices for controlling post-development runoff and will guide permittees through the permit process identifying design and submittal requirements.

DISCUSSION

1. OPERATION AND MAINTENANCE (O&M): (SEE EXAMPLE O&M)
 - OWNER TO PERFORM INSPECTIONS OF DRAINAGE FACILITIES
 - OWNER TO MAINTAIN DRAINAGE FACILITY FOR PROPER FUNCTIONALITY
2. TYPES OF DRAINAGE FACILITIES ALLOWED:
 - ORDINANCE SPECIFIES SIZING, GRADING, SETBACK, AND AESTHETICS
3. RECORD KEEPING OF HOMES WITH DRAINAGE PLANS
4. BUDGET FOR MAINTENANCE OF DRAINAGE PERMIT MANAGEMENT
5. WILL DRAINAGE ORDINANCE SOLVE CURRENT DRAINAGE ISSUES AND HOW WILL IT PREVENT FLOODING?
6. IS THE CITY CURRENTLY ANALYZING IMPACTS OF DEVELOPMENT ON CITY DRAINAGE FEATURES?
7. IS REFERENCE TO COA DCM FULLY VETTED? IS THE 2014 EASILY ACCESSIBLE AFTER FUTURE VERSIONS REPLACE IT?
8. SPECIFIC DESIGN CRITERIA – SHOULD WE KEEP LANGUAGE ON RW VS. COA AND REQUIRING MORE STRINGENT TO APPLY?
9. DO 1.2.2 GENERAL – IS THIS SECTION CLEAR OR DO WE NEED CHANGES TO REDUCE RISK OF MISINTERPREATION.
10. HOW WAS THE 250 SF LIMIT DECIDED ON FOR NEED OF DRAINAGE ANALYSIS.
11. WHAT IS STANDARD STORM DESIGN FOR PEAK FLOW ANALYSIS? 100 YR? WHY NOT OTHER?
12. SPECIAL PERMITS – WHAT'S PURPOSE? HOW TO PROCESS IN TERMS OF FEES, SCOPE, LANGUAGE, ETC.

Drainage Ordinance

**City of
Rollingwood**

**September
2016**

Drainage and Water Quality Ordinance

PREFACE

The rules and design criteria contained herein shall be known as the City of Rollingwood Drainage Ordinance. The purpose of this ordinance is to establish standard principles and practices for the design and construction of drainage improvements within the City of Rollingwood, Texas. The design requirements are intended for use only as engineering guides in the solution of drainage problems and proper conveyance and disposal of stormwater. Responsibility for actual design remains primarily with the design engineer. Users of this ordinance should be knowledgeable and experienced in the theory and application of drainage engineering principles.

Storm drainage facilities shall be designed and constructed in compliance with the City of Austin (COA) - Drainage Criteria Manual (DCM) (Supplement 9 – 2014) Sections 2-8. No amendments made to the COA-DCM by the COA shall become effective with Rollingwood standards unless adopted by the Rollingwood City Council.

SPECIFIC DESIGN CRITERIA

The design engineer shall prepare construction drawings in conformation to City requirements and accepted engineering practices. If the specifics of a project identify any conflicts between Rollingwood's and COA's design criteria, the more stringent policy shall prevail.

Methods of design other than those indicated herein may be considered in those cases where experience indicates they are appropriate. However, any variations from practices established herein must have the expressed written approval of the City Council.

This ordinance represents the application of accepted principles of surface drainage engineering and is complementary to basic information obtainable from standard references on hydrology, hydraulics and water resources. It is presented in a format that assists in the logical development of solutions to the problems of storm drainage.

EXECUTIVE SUMMARY

CITY OF ROLLINGWOOD REQUIREMENTS FOR DRAINAGE:

The intent of the City's drainage policy for stormwater management is to implement design principles and practices that control runoff from all development, during and after construction, such that no development will result in additional adverse flooding impacts. Any development that causes an increase in stormwater runoff requires mitigation by providing drainage analysis and a drainage plan performed by a Professional Engineer licensed in the State of Texas. The City's drainage policy shall govern the planning and design of drainage facilities within the Corporate Limits of the City. Definitions, criteria, procedures and data in this ordinance have been developed to support this policy.

For developments requiring drainage facilities, construction plans and all associated documents shall be provided to the City and shall conform to the requirements described within the Drainage Ordinance and the City's Drainage Criteria Manual. Drainage facilities located on private property shall be maintained by the property owner. Developments that include drainage improvements require an Operations and Maintenance (O&M) plan and schedule for routine inspection and maintenance of the drainage facilities to ensure proper functionality. The owner is responsible for complying with the O&M requirements.

TCEQ REQUIREMENTS FOR WATER QUALITY:

The City of Rollingwood is located within the Edwards Aquifer Recharge Zone. The Texas Commission on Environmental Quality (TCEQ) regulates activities having potential for polluting surface streams which recharge the Edwards Aquifer to protect existing and potential beneficial uses of groundwater in the Edwards Aquifer. TCEQ rules and regulations are found in the Texas Administrative Code – Chapter 213 Edwards Aquifer – Subchapter B. The City does not establish water quality design criteria within this ordinance. Any construction activity that requires TCEQ regulation shall conform to TCEQ chapter 213 requirements and required mitigative measures shall be presented to the City to demonstrate conformance. The City's drainage requirements are separate from TCEQ requirements and water quality BMP's provided per TCEQ requirements are to be separated from drainage facilities provided for the City's drainage requirements unless approved by the City Engineer.

Definitions:

BMP means Best Management Practices and is a term used to describe a type of water pollution control method and/or stormwater runoff control. The method may be temporary (for construction period) or permanent and may be structural or non-structural.

Construction activity means the disturbance of soils associated with clearing, grading, grubbing, demolition or excavating activities or other construction activities.

Conveyance refers to streams, channels, drainage ways, floodplains, storm drainage systems, watercourse, waterways and other means to convey runoff.

Critical Root Zone means an imaginary circle on the ground that corresponds with the dripline of the tree equal in feet to twice the number of inches of the tree's trunk diameter. For example, a tree with a 15 inch trunk diameter would be represented by a 30 foot concentric circle centered on the tree trunk location.

Discharge means any addition or introduction of stormwater, pollutants, sediment, or any other substance whatsoever into the municipal separate storm sewer system (MS4) or conveyances.

Design Engineer means the engineer responsible for performing engineering design for construction plans or engineering studies.

Detention Pond means a low lying area that is designed to temporarily hold a set amount of water while slowly releasing the water at a controlled rate.

Drainage Facility means any structure, installation, or activity from which purpose serves to convey or control stormwater runoff.

EPA means the United States Environmental Protection Agency and any federal department, agency, regional office, or commission under the authority and authorized official of the EPA.

EAPP means Edwards Aquifer Protection Plan, regulated by the TCEQ, and is an outline of best management practices that will be implemented and maintained – both during and after construction activities – to prevent contaminants found in stormwater reaching the Edwards Aquifer. The EAPP may include: a water pollution abatement plan, organized sewage collection system plan, underground storage tank facility plan, aboveground storage tank facility plan, contributing zone plan, or a modification, exception, or extension request granted by the TCEQ executive director.

Hazardous Substance means pollutants or contaminants in terms of their negative impact on people and the environment and include any material, substance, waste or combination thereof, because of its quantity, concentration or physical, chemical or

infectious characteristic, may cause or significantly contribute to an increase in serious illness or pose a substantial or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Hazardous substances are as described in the Code of Federal Regulations - 40 CFR 261 and extremely hazardous substances are as described in 40 CFR 355 – Emergency Planning and notification.

HEC-HMS means Hydrologic Engineering Centers Hydrologic Modeling System designed by the US Army Corps of Engineers to simulate the complete hydrologic processes of dendritic watershed systems.

HEC-RAS means Hydrologic Engineering Centers River Analysis System designed by the US Army Corps of Engineers to perform one-dimensional steady flow, unsteady flow, sediment transport/mobile bed computations, and water temperature modeling.

Impervious Cover (IC) means impermeable, constructed, or installed coverage of natural ground surfaces and includes only the footprint on a horizontal plane (vertical walls are not included).

Regulated Activity means (per TCEQ) any construction-related activity or post construction activity on the recharge zone of the Edwards Aquifer having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams. Activities include: construction of buildings, utility station, utility lines, roads, highways, or railroads; clearing, excavation, or other disturbances of topography, geologic, or existing recharge characteristic of a site; any installation of aboveground or underground storage tanks, or any other activity that may pose a potential for contaminating the Edwards Aquifer and hydrologically connected surface streams.

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the MS4 or conveyances.

Site means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Stormwater Runoff means precipitation from rain events that flows over land or impervious surfaces and does not percolate into the ground.

SWPPP means Storm Water Pollution Prevention Plan. It is a site-specific, written document that Identifies potential sources of stormwater pollution at the construction site, describes practices to reduce pollutants in stormwater discharges from the construction site, and identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit.

TCEQ means Texas Commission on Environmental Quality or any duly authorized official of said agency.

TPDES means Texas Pollutant Discharge Elimination System and is a program delegated to the State of Texas by EPA pursuant to 33 USC 1342(b).

Trash/Garbage/Debris means any solid waste consisting of combustible materials such as paper, rags, cartons, furniture, synthetic materials, yard clippings, twigs, or noncombustible materials such as sediment, dirt, rock, gravel, sand, glass, and any metal waste.

WPAP means Water Pollution Abatement Plan and is a plan that outlines the best management practices that will be implemented in order to protect water quality when a regulated activity is conducted in the Edwards Aquifer recharge zone.

Water Quality means a standard, as set by TCEQ 31 Tex. Admin. Code Ch. 307, created to maintain the quality of water in the state consistent with public health and enjoyment, propagation and protection of terrestrial and aquatic life. Water Quality is also regulated by Ch. 213 Edwards Aquifer, created to regulate activities having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams in order to protect existing and potential uses of groundwater and maintain Texas Surface Water Quality Standards.

Water Quality Facility means permanent BMP's that are designed for water quality control for total suspended solids (TSS) reduction. Typically BMP's include basins for capturing the first flush of stormwater runoff from upgradient drainage areas.

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Drainage Ordinance

SECTION 1 - DRAINAGE POLICY

1-1. GENERAL

This ordinance represents the application of accepted principles of storm water drainage engineering and is a working supplement to basic information obtainable from standard drainage handbooks and other publications on drainage. The policy statements of this section provide the underlying principles by which all drainage facilities shall be designed. The application of the policy is facilitated by the technical criteria contained or referenced in the remainder of the ordinance.

1-2. CITY OF ROLLINGWOOD DRAINAGE POLICY

A. Stormwater Runoff Control:

The intent of the City's drainage policy for stormwater management is to implement design principles and practices that control runoff from all development, during and after construction, such that no development will result in additional adverse flooding impacts.

B. Water Quality:

The city of Rollingwood is located within the Edwards Aquifer Recharge Zone. The Texas Commission on Environmental Quality (TCEQ) regulates activities having potential for polluting surface streams which recharge the Edwards Aquifer to protect existing and potential beneficial uses of groundwater in the Edwards Aquifer. TCEQ rules and regulations are found in the Texas Administrative Code – Chapter 213 Edwards Aquifer – Subchapter B. The City does not establish water quality design criteria within this ordinance. Any construction activity that requires TCEQ regulation shall conform to TCEQ chapter 213 requirements and required mitigative measures shall be presented to the City to demonstrate conformance.

1.2.1. APPLICATION

The City's drainage policy shall govern the planning and design of drainage facilities within the Corporate Limits of the City. Definitions, criteria, procedures and data in this ordinance have been developed to support this policy. If any condition requiring some additional measure of protection is identified during design or construction, the engineer shall make provisions within the design.

1.2.2. GENERAL

A. The developer shall be responsible for the conveyance of all storm water

drainage flowing through or originating from the subject property.

- B. If development includes any of the following, a drainage analysis shall be required by a professional engineer licensed in the state of Texas:
1. Increase of impervious cover (see definition). If development includes a net increase of impervious cover less than 250 square feet, a drainage plan may be prepared by other than a professional engineer.
 2. Change in topography that redirects and/or increases stormwater runoff to neighboring properties.
 3. Change in roofline that redirects stormwater runoff to neighboring properties.
 4. Any site improvements that cause an increase in stormwater runoff at any point along the property boundary.

The required drainage analysis shall include a hydrologic analysis, computations, and design of drainage facilities, provided in accordance with City of Austin (COA) - Drainage Criteria Manual (DCM) (Supplement 9 – 2014) Sections 2-8. HEC-HMS with SCS curve number loss method and SCS unit hydrograph transform method shall be used for hydrologic modeling.

- C. All drainage facilities shall be designed to control storm water runoff peak flow rates for 2, 10, 25, and 100 year frequency storms such that peak flows are not increased for each storm event. To the extent possible, pre-development flow patterns along the property boundary shall be maintained to the greatest degree possible.
- D. Exceptions for stormwater detention requirements may be granted for properties that are adjacent to Eanes Creek or as determined by the City Engineer for a specific instance related solely to beneficial storm water runoff flows due to specific topographical site conditions. TCEQ Chapter 213 requirements and the City's soil erosion and sedimentation standards still apply for these sites.
- E. Proposed drainage improvements for a site development shall be installed prior to any construction. If the contractor is unable to install the permanent drainage facilities prior to construction, temporary drainage facilities are allowed with the approval of the City Engineer and shall be designed with the same storm water drainage control criteria as the permanent drainage facility.
- F. Drainage and water quality facilities located on private property shall be maintained by the property owner. For all developments that include drainage improvements, the City will provide an Operations and Maintenance (O&M) plan and schedule for routine inspection and maintenance of the drainage facilities to ensure proper functionality. The owner is responsible for complying with the O&M requirements.

- G. For any activity that causes a drainage feature or facility to fail to perform to the standard required of the feature or facility in a permit for improvement of the affected property, the owner shall obtain a special permit from the City of Rollingwood for such activity that is separate from any other permit. The purpose of the permit is to establish that the owners of the property shall:
1. Install or provide drainage facilities in accordance with the Rollingwood Drainage Ordinance as conditioned by the City engineer to achieve the affected standard of performance or any new applicable standard of performance, and
 2. Operate and maintain the new or alternative drainage facilities in accordance with an O&M plan issued by the City.
- H. If a drainage facility shows signs of potential failure, authorized inspectors shall have the right of entry on the land or premises for the purpose of inspection of required maintenance. Owners will be notified 24 hours prior to inspection. In the case of an emergency, an inspector may access the site without notice. If the facilities are damaged and/or failing, the property owner shall be responsible for restoration of the facilities within 30 days of notice. If the maintenance is not accomplished, the city may coordinate the necessary restoration and assess the property owner for costs, or authorize injunction, mandamus, abatement, or any other action available in law or equity to prevent, enjoin, abate, correct or remove such unlawful structure, use or activity.
- I. All development within the city of Rollingwood's jurisdiction shall comply with TCEQ Edwards Aquifer Recharge Zone - Chapter 213 Rules. Owner or developer shall provide the city of Rollingwood with evidence of communication to TCEQ indicating if an Edwards Aquifer Protection Plan (EAPP) is required. If mitigated measures are taken to comply with TCEQ Chapter 213 Rules, the owner or developer is responsible for providing the City of Rollingwood with water quality plans. The City's drainage requirements are separate from TCEQ requirements and water quality BMP's provided per TCEQ requirements are to be separated from drainage facilities provided for the City's drainage requirements unless approved by City Engineer.

1.2.3. DRAINAGE EASEMENTS

- A. All easements across private property shall contain the necessary language to permit the required unobstructed water flow, require maintenance of vegetation by the property owner(s), and permit the necessary access by city officials for inspection.
- B. All easements, one-hundred year flood boundaries, and buffer zones shall be clearly shown on drainage and site plans.

1.2.4. STORMWATER DRAINAGE CHANNELS

- A. Channels should be designed for the 25 year storm with provisions for the 100 year storm event to be contained within the property right-of-way.
- B. New channels shall be designed with dense grasses and materials that would provide adequate soil erosion control based on quantity of flow and design velocities. Channels shall be designed, at a minimum, with the following criteria:
 - 1. Side slopes of channels shall not exceed four 4:1 (four (4) horizontal to one (1) vertical) unless slope stabilization for steeper areas are approved by the City Engineer.
 - 2. For grass lined channels, the maximum permissible velocity for the one hundred 100 year storm event is six (6) feet per second.
 - 3. All constructed and altered drainage channels, sediment ponds, and detention ponds shall be stabilized with vegetation, and if necessary, synthetic erosion control matting, immediately after final grading.
- C. Permanent erosion control measures shall be required for all proposed channels as needed to prevent loosening of earth and migration of soils from designated drainage channels. Methods to prevent soil erosion may include, maintained vegetation, mulch blankets, energy dissipaters (check dams, filter socks, etc.), geogrid or geotextile reinforcement (mats/blankets). Grass lined channels are preferred. If the project site conditions create difficulty for the design of grass lined swales, then swales with concrete, mortared rocks, rock rip-rap or other materials are acceptable upon the approval of the City Engineer.
- D. Natural drainage channels shall be preserved whenever possible. Modification of an existing channel is only allowed if approved by the City Engineer. The design engineer should check the requirements of Section 404 of the Clean Water Act, and if required a permit should be obtained from the U.S. Army Corps of Engineers by the design engineer.

1.2.5. STORMWATER DETENTION

- A. Permanent stormwater detention designed for post-construction, along with any other drainage facilities in combination, shall be designed such that post-development peak flows do not exceed pre-development peak flows along the perimeter of the subject property for 2, 10, 25, and 100 year storm events. Drainage calculation methods shall be based on the COA DCM (Supplement 9 – 2014) Sections 2-8. Stormwater detention facilities shall be designed and sealed by a Texas licensed professional engineer.

- B. The permanent stormwater detention pond or an equivalent temporary detention pond, as approved by the City Engineer, shall be provided for the construction phase and rough cut prior to rough grading a site.
- C. All computations for all drainage related design shall be submitted with the plans for review.
- D. Side slopes of detention pond earth berms shall not be steeper than 3:1 (three (3) horizontal to one (1) vertical) unless approved by the City Engineer.
- E. Aesthetic enhancement is required for exposed concrete of drainage facilities that are visible from adjacent roadways and neighboring properties. All concrete shall be stained and/or stamped concrete or veneered with rock, brick, steel, tile or other material or method as approved by the City Engineer. If indisputable evidence is provided that demonstrates that drainage facilities will not be visible from adjacent properties or roadways, due to significant differences in elevation, screening may not be required. If topography is claimed in lieu of screening, the developer shall provide a contour map to scale with sections at appropriate intervals that clearly illustrates the topographic differences.
- F. Detention facilities shall be located at minimum 10 foot setback from all property lines unless approved by the City Engineer. The setback requirement shall be measured from the edge of any portion of the facility such as top of embankment, end of concrete apron/rock rip rap or top of structural wall.

SECTION 2 - SEDIMENT AND SOIL EROSION CONTROL

2-1. GENERAL

No rough cutting or site clearing shall be permitted without an approved temporary and permanent sediment and soil erosion control plan (BMP's) as part of the building permit process. No permanent certificate of occupancy shall be issued before all approved BMP's have been installed and established as necessary to effectively control sediment and soil erosion.

The developer shall provide a combination of measures, structural and non-structural, management and planning techniques to control erosion and sedimentation for the construction period and for post-development conditions.

2-2. SOIL EROSION CONTROL PLAN REQUIREMENTS

The sedimentation and soil erosion control plan shall include the following:

- A. general/sequence of construction
- B. location of all soil erosion and sedimentation controls
- C. Standard details for soil erosion and sedimentation controls
- D. Standard soil erosion and sedimentation control notes

SECTION 3 - WATER QUALITY BMP PLAN

3-1. GENERAL

The Edwards Aquifer Rules (30 TAC Chapter 213) regulate activities having the potential for polluting the Edwards Aquifer and associated surface waters. The goals of the rules are the protection of existing and potential uses of groundwater and the maintenance of Texas Surface Water Quality Standards. The activities addressed are those that pose a threat to water quality. The city of Rollingwood is located within the Edwards Aquifer Recharge Zone and all development must comply with the Chapter 213 Rules.

Per Chapter 213 rules, construction within the Edwards Aquifer Recharge Zone may require a protection plan to be reviewed and approved by TCEQ. A protection plan may not be required based on the size of property and amount of impervious cover (Refer to current Chapter 213 rules to determine). The developer is responsible for communicating with TCEQ and adhering to all applicable rules. The developer shall provide Rollingwood with proof of communication to TCEQ.

3-2. WATER QUALITY BMP PLAN REQUIREMENTS

General requirements for Water Quality BMP's:

- A. Water Quality BMP's, as required by TCEQ, shall be designed and installed to capture the first stormwater flush and to filter sediment and pollutants including captured off-site runoff unless bypassed or diverted.
- B. Water quality facilities shall be located at a minimum 10 foot setback from all property lines.
- C. Water quality facilities shall be operated and maintained per TCEQ Chapter 213 requirements.
- D. Stormwater detention facilities are to be separated from designated water quality control facilities but may be allowed if approved by the City Engineer.
- E. Aesthetic enhancement is required for exposed water quality facilities that are visible from adjacent roadways and neighboring properties. All facilities shall be stained and/or stamped concrete or veneered with rock, brick, steel, tile or other material or method as approved by the City Engineer. If indisputable evidence is provided that demonstrates that water quality facilities will not be visible from adjacent properties or roadways, due to significant differences in elevation, screening may not be required. If topography is claimed in lieu of screening, the developer shall provide a contour map to scale with sections at appropriate intervals that clearly illustrates the topographic differences.

SECTION 4 - O&M, & PERMIT REQUIREMENTS

4-1. O&M REQUIREMENTS

Proper maintenance is vital for water quality control and ensures that engineered controls will function effectively and as intended. An O&M schedule will be provided by the City based on the BMP controls designated for drainage improvements. The O&M will provide a plan for routine inspection and maintenance of the facilities to ensure proper functionality. The property owner shall inspect on a routine basis, and after heavy rainfalls, all drainage facilities including inlets, storage tank, outlets, etc. for any garbage, trash, debris, sediment, etc. and remove as necessary to ensure proper functionality.

4-2. PERMIT REQUIREMENTS

For any activity that causes a drainage feature or facility to fail to perform to the standard required of the feature or facility in a permit for improvement of the affected property, the owner shall obtain a special permit from the City of Rollingwood for such activity that is separate from any other permit. The purpose of the permit is to establish that the owners of the property shall:

- A. Install or provide drainage facilities in accordance with the Rollingwood Drainage Ordinance as conditioned by the City engineer to achieve the affected standard of performance or any new applicable standard of performance, and
- B. Operate and maintain the new or alternative drainage facilities in accordance with an O&M plan issued by the City.

SECTION 5 – SITE DISTURBANCE

5-1. SITE DISTURBANCE REQUIREMENTS FOR CUT AND FILL

The following requirements are adopted by this ordinance regarding site disturbance. Disturbance is defined by the depth of cut and height of fill.

- A. No rough cutting or site clearing shall be permitted without first obtaining a building permit.
- B. No rough cutting or site clearing shall be permitted until the construction of temporary erosion and sedimentation controls and tree protection are in place.
- C. No grade changes are allowed at any point along the property line.
- D. Grading slopes inside a 10 foot setback shall be a maximum of 4:1 (four (4) horizontal to (1) foot vertical) unless approved by City Engineer for construction of allowable drainage facility.
- E. Outside of the designated building envelope and outside of the 10 foot setback, the maximum allowable depth of cut is 8 feet.
- F. Outside of the designated building envelope and outside of the 10 foot setback, the maximum allowable height of fill is 8 feet.
- G. Outside of the 10 foot setback, vertical cut slopes should not be used unless the cut is in stable rock or adequately cemented soil.
- H. Outside of the 10 foot setback, maximum slopes for cut and fill shall be 2:1 slopes provided that adequate slope stabilization is provided as need to prevent movement of loose earth.
- I. Disturbance of earth in the 100-year floodplain is not allowed.
- J. Grade changes will not be approved that negatively impact adjacent property owners, or adjacent street flow.
- K. Slope stability shall be required for areas of cut or fill with steep slopes as needed to resist and prevent movement of loose earth. The method of stabilization shall be chosen as appropriate to the local soil conditions, steepness of slope, ability of vegetation to properly grow, and any other variable that would affect the functionality of the chosen stabilization method. Allowable stabilization methods include, geogrid or geotextile reinforcement (mats/blankets), rock rip-rap, rock rip-rap encased in concrete, retaining walls, rock gabions, slope roughening, and terracing. Refer to Rollingwood

Ordinance Sec. 14.02.124 Vision Clearance for more information on grading and retaining wall design requirements.

- L. All construction shall require contractor to take special care when grading in the vicinity of critical root zones, including root zones for off-site trees with root zones that overlap property boundaries. Any permitted construction requiring tree removal that will negatively alter drainage flows as determined by the City Engineer shall require approval by the City Engineer or specific mitigation for the area effected.

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Drainage Criteria Manual

City of Rollingwood

September 2016

PREFACE

CITY OF ROLLINGWOOD REQUIREMENTS FOR DRAINAGE:

The intent of this manual is to implement design principles and practices that control runoff from all development, during and after construction, such that no development will result in additional adverse flooding impacts. Any development that causes an increase in stormwater runoff requires mitigation by providing drainage analysis and a drainage plan performed by a Professional Engineer licensed in the State of Texas. The City's drainage policy shall govern the planning and design of drainage facilities within the Corporate Limits of the City. Definitions, criteria, procedures and data in this manual have been developed to support this policy.

For developments requiring drainage facilities, construction plans and all associated documents shall be provided to the City and shall conform to the requirements described within the Drainage Ordinance and the City's Drainage Criteria Manual. Drainage facilities located on private property shall be maintained by the property owner. Developments that include drainage improvements require an Operations and Maintenance (O&M) plan and schedule for routine inspection and maintenance of the drainage facilities to ensure proper functionality. The owner is responsible for complying with the O&M requirements.

TCEQ REQUIREMENTS FOR WATER QUALITY:

The City of Rollingwood is located within the Edwards Aquifer Recharge Zone. The Texas Commission on Environmental Quality (TCEQ) regulates activities having potential for polluting surface streams which recharge the Edwards Aquifer to protect existing and potential beneficial uses of groundwater in the Edwards Aquifer. TCEQ rules and regulations are found in the Texas Administrative Code – Chapter 213 Edwards Aquifer – Subchapter B. The City does not establish water quality design criteria within this ordinance. Any construction activity that requires TCEQ regulation shall conform to TCEQ chapter 213 requirements and required mitigative measures shall be presented to the City to demonstrate conformance. The City's drainage requirements are separate from TCEQ requirements and water quality BMP's provided per TCEQ requirements are to be separated from drainage facilities provided for the City's drainage requirements unless approved by the City Engineer.

Definitions:

BMP means Best Management Practices and is a term used to describe a type of water pollution control method and/or stormwater runoff control. The method may be temporary (for construction period) or permanent and may be structural or non-structural.

Construction activity means the disturbance of soils associated with clearing, grading, grubbing, demolition or excavating activities or other construction activities.

Conveyance refers to streams, channels, drainage ways, floodplains, storm drainage systems, watercourse, waterways and other means to convey runoff.

Discharge means any addition or introduction of stormwater, pollutants, sediment, or any other substance whatsoever into the municipal separate storm sewer system (MS4) or conveyances.

Design Engineer means the engineer responsible for performing engineering design for construction plans or engineering studies.

Detention Pond means a low lying area that is designed to temporarily hold a set amount of water while slowly releasing the water at a controlled rate.

Drainage Facility means any structure, installation, or activity from which purpose serves to convey or control stormwater runoff.

EPA means the United States Environmental Protection Agency and any federal department, agency, regional office, or commission under the authority and authorized official of the EPA.

EAPP means Edwards Aquifer Protection Plan, regulated by the TCEQ, and is an outline of best management practices that will be implemented and maintained – both during and after construction activities – to prevent contaminants found in stormwater reaching the Edwards Aquifer. The EAPP may include: a water pollution abatement plan, organized sewage collection system plan, underground storage tank facility plan, aboveground storage tank facility plan, contributing zone plan, or a modification, exception, or extension request granted by the TCEQ executive director.

Hazardous Substance means pollutants or contaminants in terms of their negative impact on people and the environment and include any material, substance, waste or combination thereof, because of its quantity, concentration or physical, chemical or infectious characteristic, may cause or significantly contribute to an increase in serious illness or pose a substantial or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Hazardous substances are as described in the Code of Federal Regulations - 40 CFR 261 and extremely hazardous substances are as described in 40 CFR 355 – Emergency Planning and notification.

HEC-HMS means Hydrologic Engineering Centers Hydrologic Modeling System designed by the US Army Corps of Engineers to simulate the complete hydrologic processes of dendritic watershed systems.

HEC-RAS means Hydrologic Engineering Centers River Analysis System designed by the US Army Corps of Engineers to perform one-dimensional steady flow, unsteady flow, sediment transport/mobile bed computations, and water temperature modeling.

Impervious Cover (IC) means impermeable, constructed, or installed coverage of natural ground surfaces and includes only the footprint on a horizontal plane (vertical walls are not included).

Regulated Activity means (per TCEQ) any construction-related activity or post construction activity on the recharge zone of the Edwards Aquifer having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams. Activities include: construction of buildings, utility station, utility lines, roads, highways, or railroads; clearing, excavation, or other disturbances of topography, geologic, or existing recharge characteristic of a site; any installation of aboveground or underground storage tanks, or any other activity that may pose a potential for contaminating the Edwards Aquifer and hydrologically connected surface streams.

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the MS4 or conveyances.

Site means the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Stormwater Runoff means precipitation from rain events that flows over land or impervious surfaces and does not percolate into the ground.

SWPPP means Storm Water Pollution Prevention Plan. It is a site-specific, written document that identifies potential sources of stormwater pollution at the construction site, describes practices to reduce pollutants in stormwater discharges from the construction site, and identifies procedures the operator will implement to comply with the terms and conditions of a construction general permit.

TCEQ means Texas Commission on Environmental Quality or any duly authorized official of said agency.

TPDES means Texas Pollutant Discharge Elimination System and is a program delegated to the State of Texas by EPA pursuant to 33 USC 1342(b).

Trash/Garbage/Debris means any solid waste consisting of combustible materials such as paper, rags, cartons, furniture, synthetic materials, yard clippings, twigs, or noncombustible materials such as sediment, dirt, rock, gravel, sand, glass, and any metal waste.

WPAP means Water Pollution Abatement Plan and is a plan that outlines the best management practices that will be implemented in order to protect water quality when a regulated activity is conducted in the Edwards Aquifer recharge zone.

Water Quality means a standard, as set by TCEQ 31 Tex. Admin. Code Ch. 307, created to maintain the quality of water in the state consistent with public health and enjoyment, propagation and protection of terrestrial and aquatic life. Water Quality is also regulated by Ch. 213 Edwards Aquifer, created to regulate activities having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams in order to protect existing and potential uses of groundwater and maintain Texas Surface Water Quality Standards.

Water Quality Facility means permanent BMP's that are designed for water quality control for total suspended solids (TSS) reduction. Typically BMP's include basins for capturing the first flush of stormwater runoff from upgradient drainage areas.

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Drainage Criteria Manual

1.1. GENERAL PLAN REQUIREMENTS

All development in the City shall be performed under a building permit obtained prior to any construction activity. Drainage and construction plans shall be submitted as part of the building permit approval process. The drainage plan shall include a vicinity map, construction notes, drainage area maps for pre and post-development conditions, grading and drainage plan, detention and water quality plan, sedimentation and erosion control plan, and construction details.

1.2. SITE IMPROVEMENT PLAN

The drainage plan submittal shall include the drainage plan and additional information as described below:

1.2.1. SITE IMPROVEMENT PLAN FORM

A Site Improvement Plan form will be provided when a building permit is applied for. The form requires input on the following aspects:

1. Existing site conditions
2. Summary of proposed improvements
3. Estimated construction time and completion date
4. Description of pre and post-development drainage conditions
5. Description of method for post-development control of runoff
6. Results of drainage analysis
7. Name of Professional Engineer assigned to drainage plan
8. Discussion on how TCEQ Chapter 213 requirements are met.

1.2.2. SITE PLAN

The site plan shall include a drainage plan, sediment and soil erosion control plan, and a rain harvest system plan (if applicable).

1.2.2.1. DRAINAGE PLAN

Provide drainage area maps for pre-development and post-development

conditions as two (2) individual maps. The pre-development drainage area map should demonstrate the on and off-site contributing watershed boundaries and all existing structures and hard surfaces that are to be demolished (if applicable). The post-development map should demonstrate the on and off-site watershed boundaries and all proposed construction with impervious surfaces clearly identified. At a minimum the map should include the following:

- a. Legible drawing(s), at a minimum 11x17, drawn to scale.
- b. On and off-site watershed boundaries with enclosed polylines, surface flow arrows and labeled contours clearly shown.
- c. Time of concentration (T_c) lines demonstrating flow pattern transition points for sheet flow, shallow concentrated, and channel/ditch/pipe.
- d. T_c calculation tables demonstrating equations, variables, and values used for pre-development and post-development conditions.
- e. Discharge points identified for each watershed boundary.
- f. Table demonstrating peak flows for 2, 10, 25, and 100 year storm events for pre-development and post-development conditions. If hand calculations are used to determine peak flows, provide table with equations, variables, and values used. If hydrologic modeling is performed, use HEC-HMS software and provide software generated report showing tabulated peak flows for pre-development and post-development conditions for a 100 year storm event including peak elevation in a detention pond (if applicable). Submit a copy of final hydrologic file with submittal.
- g. Construction details and applicable cross-sections for swales, detention structures, etc. with peak flow elevations demonstrated for a 100 year storm. If swales are designed for the 25 year storm event, provide the 25 year peak flow elevation and demonstrate method to prevent the 100 year storm flows from inundating surrounding properties.
- h. Table of impervious cover with detailed categories for the impervious cover type, i.e. separate sidewalk, driveway, decks, patios, etc. Provide calculations demonstrating total pre and post-development impervious cover (in square feet), as a percent of the total area of the lot, and the net increase (in square footage) of impervious cover with post-development conditions. Note that traditional decks (boards spaced with gaps) are calculated with 50% impervious cover and water surface area of swimming pools are not considered impervious cover.

If development includes a net increase of impervious cover of less than 250

square feet, then items b-h are not required.

1.2.2.2. SEDIMENT AND SOIL EROSION CONTROL PLAN

The sedimentation and soil erosion control plan shall include the following:

- a. Provide a general/sequence of construction for the life of the project as well as a sequence of construction specifically related to the time between when soil erosion control measures are in place, the roof and/or slab are completed and the permanent storm water controls are provided. The sequence must clearly identify the following:
 - 1) Install all BMP controls such as silt fence, stabilized construction entrance, sediment ponds, and drainage channels prior to any other site disturbances.
 - 2) Sequencing for all construction activities that require soil erosion control such as site clearing, grubbing, topsoil stripping, stockpiling, soil stabilization, and vegetation.
 - 3) Sequencing of post construction final measures including:
 - a) Vegetation for any bare soil areas
 - b) Inspection of all drainage facilities and removal of sediment and debris
 - c) Removal of temporary soil erosion control measures
 - d) Monitoring of seeded areas to ensure proper vegetation is established
- b. Clearly demonstrate the location of all erosion and sedimentation control plans including stabilized construction entrance, silt fence, triangular filter dikes, rock berms, check dams, etc.
- c. If an existing paved driveway is to be used as the construction entrance, please indicate on plans that machinery and construction related traffic shall be limited to the driveway for R.O.W access.
- d. Standard details for the silt fence, tree protection and a stabilized construction entrance, etc. City of Austin details are preferred.
- e. The following notes shall be required on plans:

- 1) The contractor shall be responsible for maintaining and inspecting, on a regular basis, all erosion and sediment control best management practices including the silt fences, construction entrances, rock filter dams, etc. during construction/demolition and including the removal and proper disposal of any accumulated silt and debris.
- 2) The contractor shall not begin any work until tree protection and the erosion and sediment control best management practices such as silt fence, construction entrances, rock filter dams, etc. have been installed.
- 3) The contractor shall be responsible for keeping the streets free of mud, dirt, debris and material at all times and shall clean/sweep the streets on a regular basis and at the direction of the City.
- 4) Increased stormwater peak flows during construction must be mitigated with temporary best management practices to prevent harm to neighboring properties.

1.2.2.3. WATER QUALITY BMP PLAN

Indicate if a BMP is planned with the site improvements and provide a description of the method including the stormwater runoff capture area and BMP method including runoff storage detention time and release rate (if applicable). If a rainwater harvest (RWH) system is the BMP chosen for compliance with TCEQ Chapter 213 requirements, please provide the following to the City Engineer:

- a. Indicate the amount of area to be captured by the rainwater harvesting system to decrease the effective IC, as required, to account for the net increase associated with the new construction.
- b. Indicate the size of the tank required, its location, and the size of the discharge area.
- c. Show the route and the discharge location for the overflow of the rainwater harvesting tanks. If the RWH overflow is to be directed to a detention facility, provide grading detail and any pipes, channels, etc. necessary to convey overflow.
- d. Provide a construction detail for the RWH system including the location, mounting and support of the tanks, overflow, pumps (if applicable), etc. with plan view and cross-section shown.

Site Improvement and Drainage Plan Information for Building Permits

1. Please provide a summary of each important/critical aspects of the project below:

A. Existing Site Conditions: _____

B. Summary of Proposed Improvements: _____

C. Estimated construction time and completion date: _____

2. Please provide a summary of each drainage aspect below:

A. Provide a brief description of pre-development and post-development drainage patterns and discharge points and any proposed changes in the flow patterns for post-development conditions: _____

B. Discuss how peak flows during construction and for post-development conditions will be addressed including a discussion on chosen methods and drainage facilities to control runoff: _____

C. Summarize the results of drainage calculations and/or hydrologic modeling results:

100 year peak flow(s) for existing conditions:_____

100 year peak flow(s) for proposed conditions:_____

D. Name the professional engineer (licensed in the state of Texas) will be responsible for providing the drainage plan and a final completion letter that will indicating that the BMP's have been constructed per plan:_____

E. Include a discussion pertaining to protection of the Edwards Aquifer. Per TCEQ Chapter 213 – Edwards Aquifer, indicate what if you have communicated with TCEQ and if mitigative measures are planned to conform to TCEQ requirements:_____

F. Site improvements that include improvements to be performed outside of interior home (or other structures) require a soil erosion control plan unless approved by City Engineer. Please provide a description of all soil erosion control measures to be implemented during construction and any permanent structures:_____

O&M Maintenance Requirements and Schedule for Detention Ponds

Inspect pond after intense rainfalls and on a regular basis for the following:

1. Inspect the entire pond including the weir and drainage outlet pipes for accumulated sediment, paper, trash, and debris and remove as needed.
2. Inspect pond for bare soil and revegetate as needed.
3. Maintain vegetation to prevent height from exceeding eighteen (18) inches.
4. Measure depth and widths of pond and reshape pond as necessary to maintain shape per approved drainage plan. NOTE: Overtime, the pond will accumulate sediment, lawn clippings, and leaves that will build up and volume will be lost if not maintained and reshaped as needed.
5. Inspect pond for signs of erosion or any shifting, collapsing, or deterioration of the pond berm, outlet pipes, and weirs and restore to approved drainage plan design.