LEE'S SUMMIT
MISSOURI

DESIGN AND CONSTRUCTION MANUAL DESIGN MODIFICATION REQUEST

PROJECT NAME: HT Solutions Building Expansion-Phase 2

PREMISE ADDRESS: 1440 SE Broadway

PERMIT NUMBER: PRCOM 20191001

OWNER'S NAME: Dan Phillips

TO: The City Engineer

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, I wish to apply for a modification to one or more specification (s). The following articulates my request for your review and action. (NOTE: Cite specific code sections and engineering justification and drawings.)
Request for waiver for the per the Design and Construction Manual, Section 5608.4.F.2

The detention bottom elevation has been adjusted to insure it will be dry after rain events and not have back water in the pond from the discharge pipe due to a varying static water elevation of the creek where the pond and pipe discharges. With the adjustments to the bottom elevation and outlet structure openings, all detention design requirement re met, except the 1 ft freeboard for the primary utlet clgged condition at the 100 year event. See attached drawings and revised storm report for documentation.

SUBMITTED BY:
NAME: Kevin Sterrett ( ) OWNER (X) OWNER'S AGENT
ADDRESS: 1411 NE Todd George Road Tel.# 816-703-7098
CITY, STATE, ZIP: Lee's Summit, MO 64086
Email: ksterrett@hgcons.com SIGNATURE: Kevin Sterrett

FORWARDING MANAGER: Kent Monter RECOMMENDATION (X) APPROVAL ( ) DENIAL
SIGNATURE: K D Monter DATE: 11 Mar 2020

GEORGE BINGER III, P.E. – CITY ENGINEER: (X) APPROVED ( ) DENIED
SIGNATURE: David Binger DATE: 3/18/20

COMMENTS: Design Engineer shall provide a recommended basin maintenance plan with typical annual inspections and maintenance activities for the property owner to the property owner with a copy to the City.

A COPY MUST BE ATTACHED TO THE APPROVED PLANS

FINAL STORM WATER DRAINAGE REPORT

HT SOLUTIONS-PHASE 2

LOT 292

NEWBERRY LANDINGS, 1ST PLAT

LEE'S SUMMIT, MISSOURI

1440 SE BROADWAY DRIVE

PREPARED FOR

HT SOLUTIONS

PREPARED BY

HG CONSULT, INC.

February 28, 2019

2-28-20

TABLE OF CONTENTS

3. Project Overview

The proposed project is a building addition to an existing building (Phase 1) and parking lot on the south side of the lot. The new building addition will be contained in a 31,150 square foot building footprint. This entire project is contained on 3.59 acre site. The site is construction ready. No improvement or modification is proposed for the existing detention pond, completed in 2017 with and for Phase1.

The topography of the site is a gentle slope west to the east. The existing storm sewer detention system for Phase 1 is in place on the east side of the site on the east side of the Phase 1 building. An additional amount of detention will be required to accommodate the additional building area (Phase 2) which is provided with this project.

4. Drainage Assessment of the Project Site –Phase 2

Due to the slope of the site and the need for a flat slab, the bench and fill grading method was used for the site along with the need to have positive drainage away from the building, drainage areas directing storm water into new storm sewer catchments that forces storm water into the detention pond. The remainder of the site grading directs pervious areas and impervious areas away from the building and drainage to the proposed detention pond. Design requirements call for a piping system with a minimum capacity for the 10 year event, with the 100 year storm event being routed overland in an above grade manner such as swales and gutters. To insure that higher frequency storms would not cause any ponding problems or inundation of parked vehicles, the structures and piping system have been designed to the 100 year event flows. With the relatively small drainage areas, these flows are low and pipe sizes are 15 inch used to capture the grass area between the building and SE Hamblen Road inch draining to the detention pond.

5. Design and Methodology

The method for evaluating HT Solutions was the use of a PondPack Model. Both Pre-Development and Post-Development conditions were considered:

- PondPack V8i
  - TR-55 Unit Hydrograph Method
    - 2-year, 10-year and 100-year Return Frequency storms
    - AMC II Soil Moisture conditions
    - 24-Hour SCS Type II Rainfall Distribution
    - SCS Runoff Curve Numbers per APWA 5600 (Table 5602-3)

Curve number calculations were calculated based on APWA 5600 for the Kansas City area. The pre-development curve number is 74. The calculations for the post-development curve number are located below.

Table 5.1 –Curve Number Calculations

Type	Area (ac)	CN
Undeveloped	0.28	74
Undeveloped	0.32	74
Impervious	1.01	98
Total	**1.61**	**89**

Time of concentration was considered using TR-55; however, due to the small size of the drainage basin and the amount of impervious area on the site that will just be conveying sheet flow, a time of concentration of 5 minutes was assumed. This is the minimum time of concentration per APWA 5600.

Per APWA Section 5608.4 and City of Lee's Summit criteria, the post-development discharge rates from the site shall not exceed those indicated below:

- 50% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

The existing and proposed drainage area is 1.61 acres and flows to the same single point of interest where the proposed detention pond is located. Therefore, no off-site drainage will be bypassing the detention pond. The table below states the discharges for the allowable discharge rates per APWA 5600 and pre-development and post-development discharge rates.

Table 5.2 –Discharge Rates

	2-year	10-year	100-year
APWA Allowable Discharge Rates	0.81	3.22	4.83
Pre-Development Discharge Rates	2.04	4.45	7.99
Post-Development Discharge Rates	0.80	2.33	4.83

APWA 5608.4 also requires a 40-hour extended release of the water quality storm event (1.37"/24-hour rainfall) per Section 8.10 of the BMP Manual. The detention facility will release the water quality event over a 40-hour period. The perforated riser structure contains a 1" orifice at the base elevation of 986.95 and another 1" orifice at elevation 987.40 to achieve the 40-hour extended detention. The Time vs. Volume graph is located in the Design Calculations Section.

The existing detention pond (Phase 1) serves the existing building and parking lot. It was also designed to accommodate some of the Phase 2 building and the new parking lot on the south side of the lot, per the storm drainage report for the Phase 1 project, constructed in 2016-2017. No new drainage has been designed to go to the existing pond and no modifications are anticipated.

To meet the APWA allowable peak flow requirements stated above in Table 5.2, the concrete riser box was designed with 1-1.5" orifice at elevation 988.20, a 6"x6" opening at elevation 989.35, and a 9" diameter slotted opening on top of the riser box. The 6"x6" opening will be fitted with #4 rebar at a spacing of 3" to catch debris. This will allow the structure to meet the APWA allowable peak flow rates stated above in Table 5.2 for the 2-year, 10-year and 100-year discharges. For more information, Pondpack calculations can be seen in the Design Calculations Section.

6. Emergency Spillway Design

APWA 5600 also requires an emergency spillway in the detention pond sized for the 100-year event, assuming 100% clogging of the primary outlet works and zero available storage in the detention pond. The emergency spillway will be 10-feet in length at an elevation of 992.7. This will meet the requirements for the 0.5 feet of freeboard according to APWA 5600. The freeboard for the clogging condition is 0.7 feet and will not meet the APWA 5600 requirement of 1.0 feet. A waiver will be submitted. Emergency spillway calculations can be found in the Design Calculations Section.

waiver

7. Rip Rap Design

The downstream channel riprap and spillway was designed using the guidance from USACE Hydraulic Design Criteria, Sheet 712-1, Stone Stability, and Velocity vs. Stone Diameter. The riprap layer thickness, length, and width were designed in accordance with the MoDOT Design Standard 609.70C. The calculated gradation for the 165 pcf stone is as follows for the riprap channel:

	Avg. Stone Diameter (inches)	Stone Weight (lbs)
D_{100}	24	691
D_{50}	15	205
D_{15}	10	102

8. Temporary Erosion and Sediment Control

During construction and prior to paving, it will be necessary to control erosion and sediment from the site during storms with in the construction timeframe. To insure that sediment does not enter the existing storm system or runs off to the existing street, perimeter containment is controlled by silt fence installation, inlet protection and an engineered detention release structure. To keep construction traffic from tracking silt and debris onto the adjacent city street, a stabilized rock construction entrance will need to be installed. These erosion control devices, and their maintenance throughout the construction timeframe, are required by ordinance and the details for them are referenced by the City's Design and Construction Manual and shown on Detail Sheets 7 and 8.

Post development water quality will be addressed through the use of water quality detention release structure within the detention pond. The owner will need to have a routine maintenance policy for the cleaning, repair and replacement of the detention release structure.

9. Conclusion

The proposed project is a building addition to an existing building (Phase 1) and parking lot on the south side of the lot. The report has been prepared to evaluate the stormwater discharge at the site to ensure the requirements of APWA 5600 are met. The detention pond and release structure was designed to not increase peak discharges from existing conditions as well as meeting the maximum releases from APWA 5600 for the 2-year, 10-year, and 100-year discharges. It is not anticipated that the HT Solutions Development will have any downstream impacts.

10. Design Calculations and Exhibits

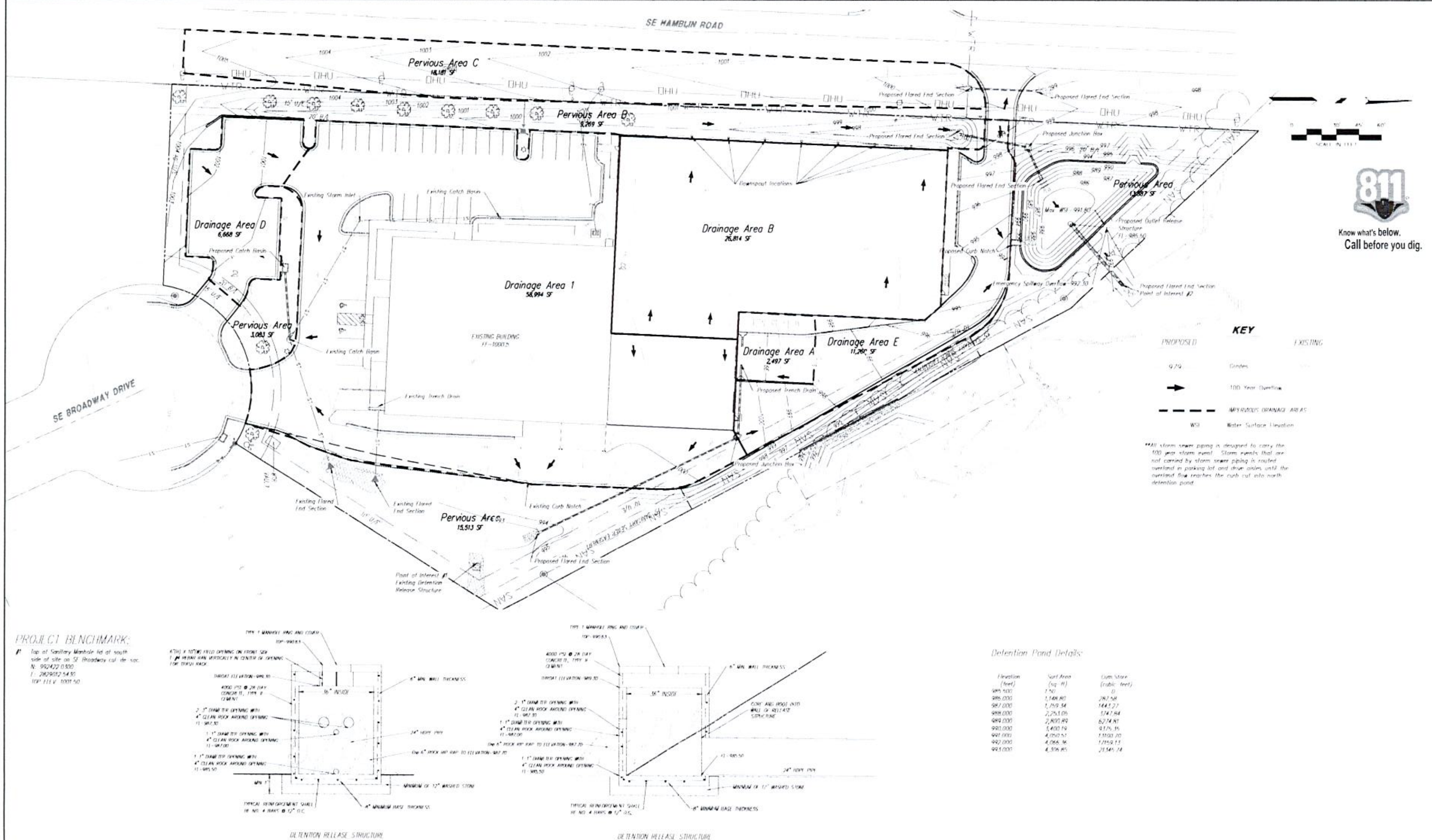
See the attached for drainage area calculations, flows, pipe sizing, inlet sizing and water quality calculations for Phase 2. In addition, the report for Phase 1 is included.

DRAINAGE AREA MAPS

STORM SEWER CALCULATIONS

HT SOLUTIONS

STORM SEWER NO	SEWER LOCATION: FROM STRUCTURE NO.	SEWER LOCATION: TO STRUCTURE	TRIBUTARY AREA (AC.): AREA DESIGNATION	TRIBUTARY AREA (AC.): ACRES	TRIBUTARY AREA (AC.): TOTAL	COMPOSITE RUNOFF COEFFICIENT	TIME OF FLOW: Ti	TIME OF FLOW: Tt	TIME OF FLOW: Tc	10 YEAR DESIGN: INTENSITY [in/hr] I[10]	10 YEAR DESIGN RUNOFF [cfs]: AREA Q[10]	10 YEAR DESIGN RUNOFF [cfs]: In Pipe Upstream (cfs)	10 YEAR DESIGN RUNOFF [cfs]: By Pass In (cfs)	10 YEAR DESIGN RUNOFF [cfs]: Total Q[10]	100 YEAR DESIGN: INTENSITY [in/hr] I[100]	100 YEAR DESIGN RUNOFF [cfs]: AREA Q[100]	100 YEAR DESIGN RUNOFF [cfs]: In Pipe Upstream (cfs)	100 YEAR DESIGN RUNOFF [cfs]: By Pass In (cfs)	100 YEAR DESIGN RUNOFF [cfs]: TOTAL Q[100]	In Pipe Downstream [cfs]	CURB INLET: By Pass Out [cfs]	CURB INLET: Pipe Size [in]	CURB INLET: Pipe Slope [%]	PIPE DESIGN: Pipe Type	PIPE DESIGN: Rough Coeff [MANNG]	PIPE DESIGN: Design Velocity [fps]	PIPE DESIGN: Depth Flow (inches) Q[100]	PIPE DESIGN: Full Velocity [fps]	PIPE DESIGN: Full Flow [cfs]
LINE 1	TRENCH DRAIN	JB	A	0.05	0.05	0.90	5.0	0.0	5.0	7.35	0.3	0.0	0.0	0.3	10.32	0.6	0.0	0.0	0.6	0.6	0.0	12	0.80	HDPE	0.011	2.94	7.9	4.8	3.7
LINE 1	JB	FES	-	0.00	0.05	0.00	0.0	0.0	0.0	7.35	0.0	0.3	0.0	0.3	10.32	0.0	0.6	0.0	0.6	0.6	0.0	12	0.98	HDPE	0.011	3.26	6.5	5.3	4.2
LINE 2	FES	JB	B	0.83	0.88	0.72	5.0	0.0	5.0	7.35	4.4	0.3	0.0	4.7	10.32	7.7	0.6	0.0	8.3	8.3	0.0	15	2.00	HDPE	0.011	8.39	6.0	8.8	10.8
LINE 2	JB	FES	-	0.00	0.88	0.00	0.0	0.0	0.0	7.35	0.0	0.0	0.0	0.0	10.32	0.0	0.0	0.0	0.0	0.0	0.0	15	9.40	HDPE	0.011	8.4	7.0	9.6	11.6
LINE 3	OUTLET	FES	-	0.00	0.88	0.00	-	-	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	8	0.50	HDPE	0.011	10.6	8.0	10.6	3.7
LINE 4	FES	FES	C	0.41	1.29	0.20	5.0	0.0	5.0	7.35	0.6	0.0	0.0	0.6	10.32	1.1	0.0	0.0	1.1	1.1	0.0	15	1.00	HDPE	0.011	5.6	2.4	6.2	7.6
LINE 5	CB	EX. CB	D	0.15	1.44	0.90	5.0	0.0	5.0	7.35	1.0	0.6	0.0	1.6	10.32	1.7	1.1	0.0	2.8	2.8	0.0	12	6.26	HDPE	0.011	5.4	6.0	4.2	5.4
-	FLUME	NORTH DETENTION POND	E	0.26	1.70	0.90	5.0	0.0	5.0	7.35	1.7	NA	NA	1.7	10.32	2.7	NA	NA	2.7	NA	NA	NA	NA	NA	NA	1.8	3.0	1.8	2.7



1/28/19 Revised per city comments dated 1/30/19
4/24/19 Revised per city comments dated 4/5/19

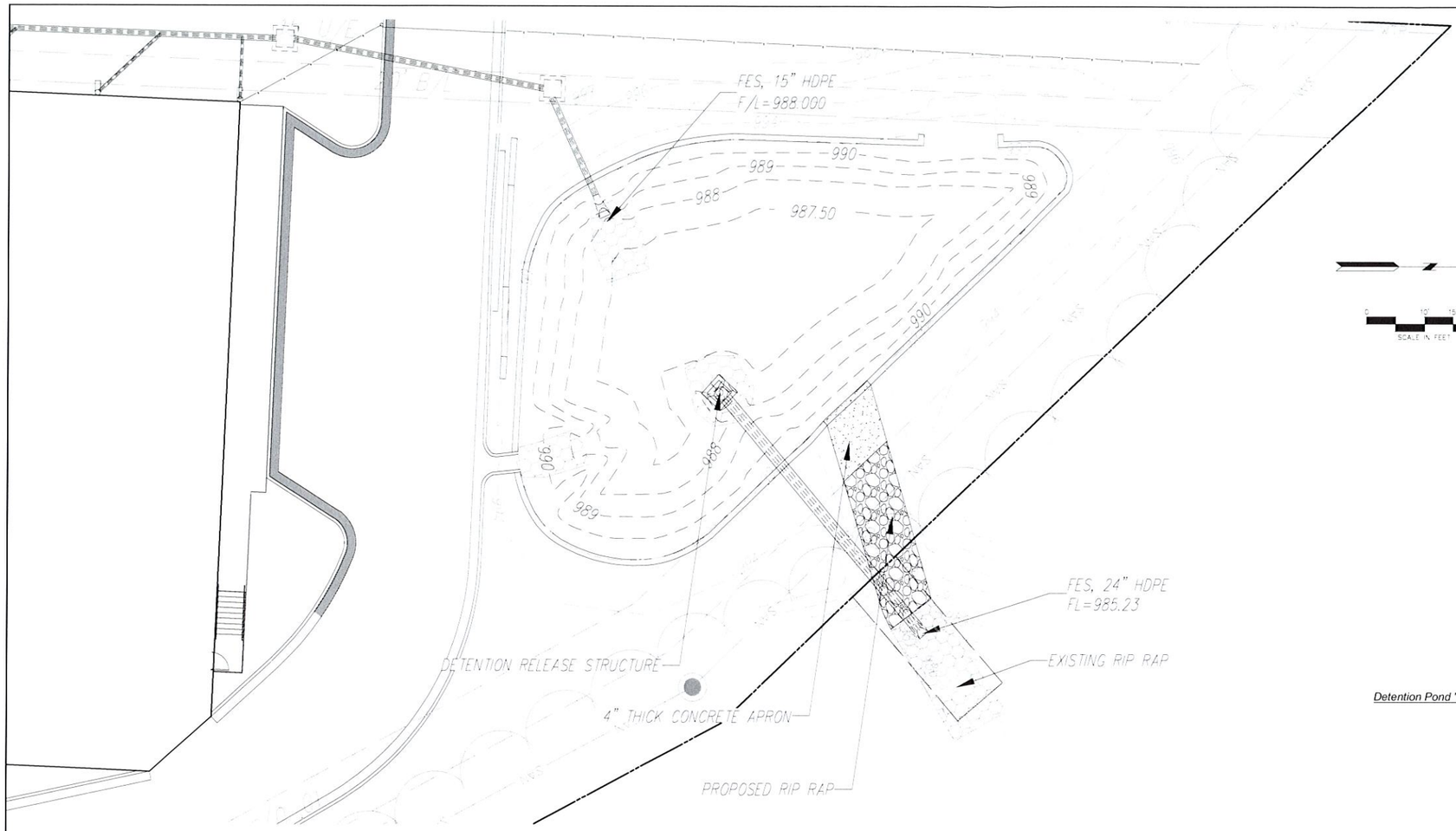
4/24/19

Consult Inc engineers planners

POST DEVELOPMENT
DRAINAGE AREA MAP

HIGH TECH SOLUTIONS

LEE'S SUMMIT - JACKSON COUNTY - MISSOURI



TC Top of Curb
FG Finish Grade
G Gutter Elevation
HP High Point
LP Low Point
FFE Finish Floor Elevation
TG Top of Grade (Retaining Wall)
BG Bottom of Grade (Retaining Wall)
FES Flared End Section

0 10' 15' 20'
SCALE IN FEET

— — — 962 — — — AS BUILT 1' CONTOURS
— — — 960 — — — AS BUILT 5' CONTOURS

NO.	DATE	REVISION	BY	CK/APP
1	3/28/19	Revised per city comments dated 1/30/19	EDH	RKS
1	4/24/19	Revised per city comments dated 4/8/19	EDH	RKS
4	7/10/19	Construction revisions	EDH	RKS
5	2/18/20	Construction revisions	EDH	RKS

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STATE OF MISSOURI
R. KEVIN STERRETT
NUMBER E-25449
PROFESSIONAL ENGINEER
3/11/2020

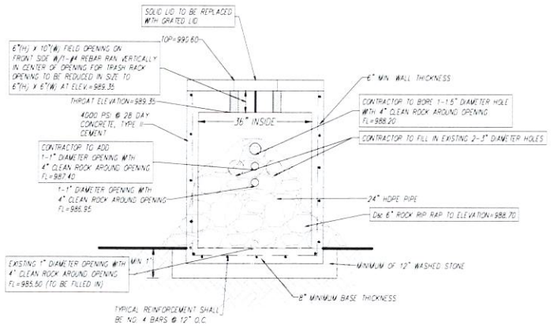
R. KEVIN STERRETT, PE NO. E-25449

Consult Inc engineers planners
CORPORATE LICENSE NO. E2010005873

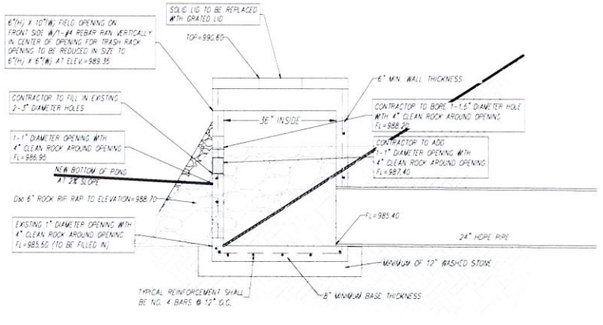
DETENTION POND
CONSTRUCTION REVISION

HIGH TECH SOLUTIONS

LEE'S SUMMIT - JACKSON COUNTY - MISSOURI



DETENTION RELEASE STRUCTURE
NTS



DETENTION RELEASE STRUCTURE
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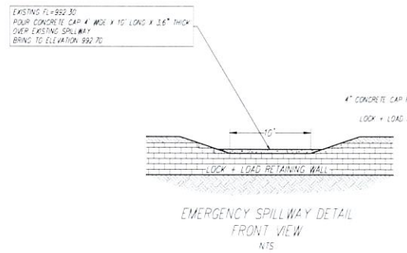
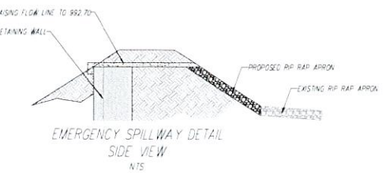


EMERGENCY SPILLWAY DETAIL
FRONT VIEW
NTS



EMERGENCY SPILLWAY DETAIL
SIDE VIEW
NTS

Detention Pond "As-Built" Condition

Detention Pond Original Volumes

Elevation (feet)	Surf.Area (sq-ft)	Cum.Store (cubic-feet)
985.500	1.50	0
986.000	1,148.80	287.58
987.000	1,759.34	1443.27
988.000	2,253.05	3747.84
989.000	2,800.83	6274.81
990.000	3,400.19	9376.35
991.000	4,050.51	13100.70
992.000	4,066.36	17159.13
992.300	4,066.36	18379.65

Detention Pond Revised Design

Elevation (feet)	Surf.Area (sq-ft)	Cum.Store (cubic-feet)
986.90	10	0
987.00	110	5
988.00	2356.6	1239
989.00	3125.5	3980
990.00	3855.5	7490
991.00	4487.5	11682
992.00	4595.6	16223
992.23	**4620.5**	**16988**

PROJECT BENCHMARK:

#1 Top of Sanitary Manhole lid at south side of site on SE Broadway cul-de-sac
N. 992422.0300
E. 2829012.5430
TOP ELEV. 1001.50

X-REF NO.
181309

DRAWING NO.
1806.3

DATE
OCTOBER 12, 2018

JOB NO.
1806.3

SHEET 1 OF 1