

Drainage Narrative

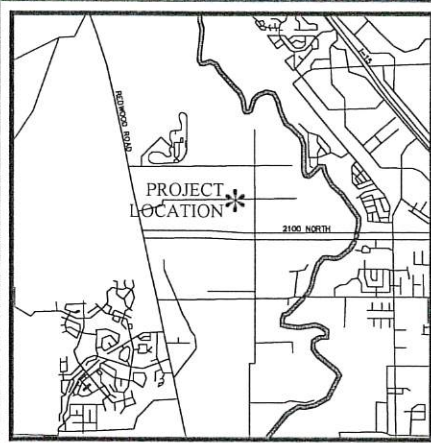
Detention Design

There are two master planned regional detention ponds proposed for Holbrook farms that have been sized for the 100 year 24 hour storm event. Detention Pond #01 is located on the east end of the project in the proposed native park designated as area #19 in the land use plan. Detention Pond #01 will handle the storm water runoff from approximately 410 acres as shown on page SD02 and will be required to hold 573,529 cubic feet of storm water. Calculations for Detention Pond #01 are shown on page SD03A and SD03B. Detention Pond #02 is located on the east end of the flex zone designated as area #1 in the land use plan. Detention Pond #02 will handle the storm water runoff from approximately 193 acres as shown on page SD02 and will be required to hold 185,963 cubic feet of storm water. Calculations for Detention Pond #02 are shown on page SD04. The commercial/office properties as shown on the land use plan will be required to have on-site detention to handle their storm water runoff. They are allowed a storm water release rate of 0.2 cfs/acre. Except Commercial Parcel #17 which will detain water in Detention Pond #1 as shown on sheets SD02 and SD03 B.

Storm Drain Pipe Design

Holbrook farms storm drain piping has been sized for the 10 year 24 hour storm event. The anticipated master planned storm drain pipe locations and sizes for project plan improvements and the Lehi city master planned storm drain pipes that are needed for Holbrook farm as shown on page SD05. These pipes have been sized to handle the proposed flows from the project plan improvements. The calculations for the detained flows from the flex area and commercial/office areas are shown on page SD06. The calculations for the un-detained storm water flows from the residential areas, Commercial Parcel #17 and parks are shown on page SD07. The storm drain pipe capacity calculations to verify that the pipes can handle the proposed flows are shown on page SD08. Storm drainage from Holbrook farms will discharge into the Jordan River at the east end of the project.

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VICINITY MAP
N.T.S.



GRAPHIC SCALE

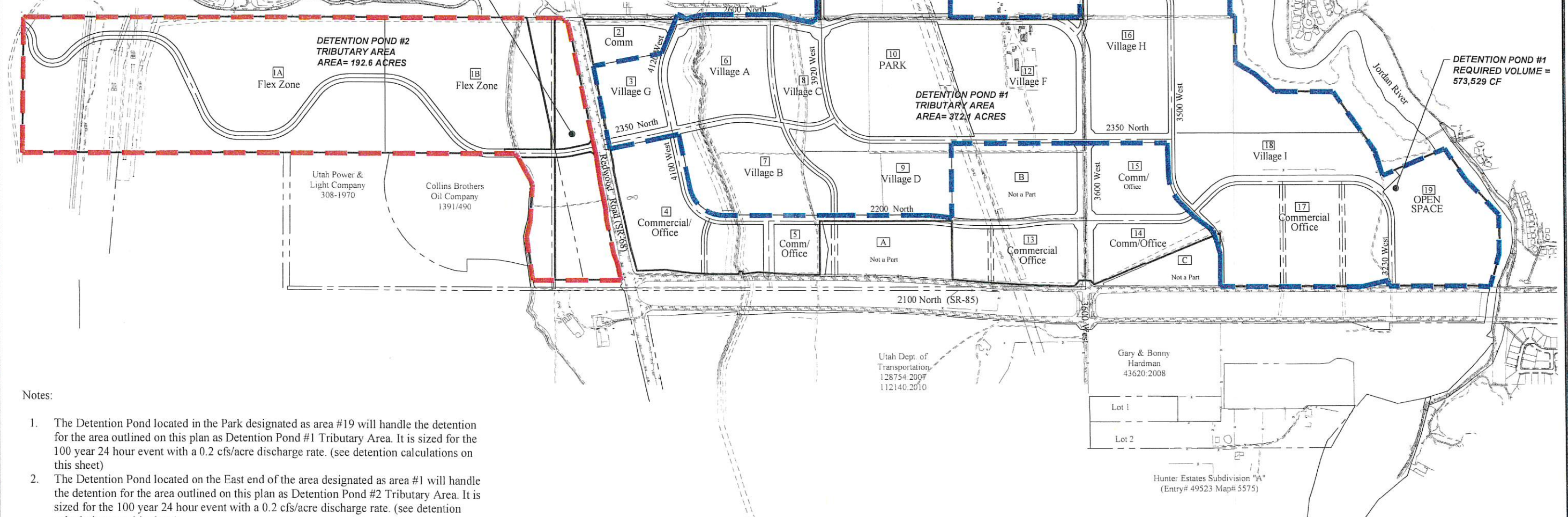
(IN FEET)
1 inch = 45ft.

DETENTION POND #2
REQUIRED VOLUME =
221,908 CF

DETENTION POND #2
TRIBUTARY AREA
AREA= 192.6 ACRES

DETENTION POND #1
TRIBUTARY AREA
AREA= 372.1 ACRES

DETENTION POND #1
REQUIRED VOLUME =
573,529 CF



Notes:

1. The Detention Pond located in the Park designated as area #19 will handle the detention for the area outlined on this plan as Detention Pond #1 Tributary Area. It is sized for the 100 year 24 hour event with a 0.2 cfs/acre discharge rate. (see detention calculations on this sheet)
2. The Detention Pond located on the East end of the area designated as area #1 will handle the detention for the area outlined on this plan as Detention Pond #2 Tributary Area. It is sized for the 100 year 24 hour event with a 0.2 cfs/acre discharge rate. (see detention calculations on this sheet)
3. All of the properties designated for commercial/office use will be required to detain within their property except for Commercial Parcel #17 which will detain water in Detention Pond #1 due to its close proximity to the proposed detention pond. The Commercial parcels with on-site detention will be required to detain with a release rate of 0.2 cfs/acre for the 100 year 24 hour storm event.
4. All detention pond design shall meet Lehi City Standards for precipitation data & C values.
5. See SD03 A, SD03 B & SD04 for Detention Pond #1 & #2 calculations and sizing.
6. The developer will be responsible to acquire any necessary state or federal permitting for discharging storm water into the Jordan River.

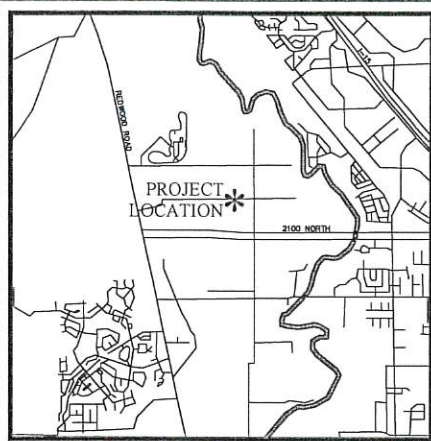
LEGEND

- DETENTION POND #1 TRIBUTARY AREA (Blue dashed line)
- DETENTION POND #2 TRIBUTARY AREA (Red dashed line)

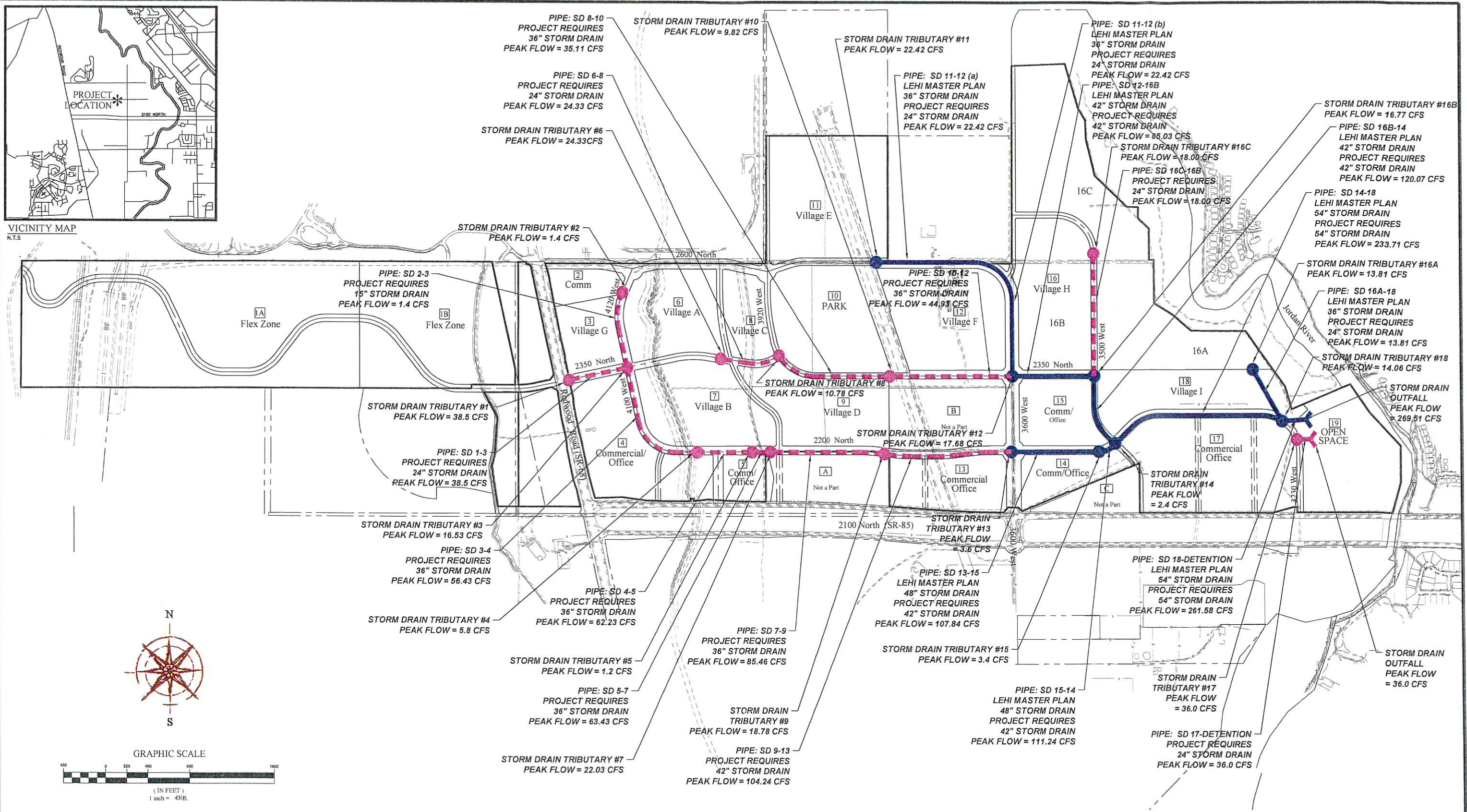
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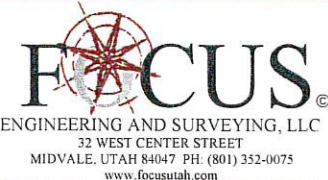
VICINITY MAP
N.T.S



GRAPHIC SCALE
(IN FEET)
1 inch = 450'

- Notes:
- See sheets SD06 & SD07 for Storm Drain Flow Calculations.
 - See sheet SD08 for Drain Pipe Capacity Calculations

LEGEND
PROJECT PLAN PIPE
MASTER PLAN PIPE



Holbrook Farms

Lehi City
Storm Drain Pipe Plan

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Scale:	1"=450'	Drawn:	TMR
Date:	09/21/16	Job #:	14-273
Sheet:			

SD05

Detention Pond #1 From Residential Parcels

Project: Holbrook Farms
 Location: Lehi, Utah
 Date: 8/17/2015
 Calculated By: Thomas Romney, P.E.



100-Year Detention Sizing

Design Criteria

Intensity Table: Per Lehi City Standards
 Return Period: 100 year
 Allowable Discharge: 0.20 cfs/acre Per Lehi City Standards

Allowable Discharges

Storm Drain Discharge: 74.27 cfs
 Other Discharge: 0.00 cfs Source:
 Total Discharge: 74.273 cfs

Weighted "C" Value

Surface Type	Area (sf)	"C" Value	C*A
Low Residential Density	6,162,744	0.40	2,465,098
High Residential Density	500,069	0.80	400,055
Medium Residential Density	6,767,425	0.50	3,383,713
Park	2,746,458	0.15	411,969
Totals	16,176,696		6,660,834
Weighted "C" Value		0.41	

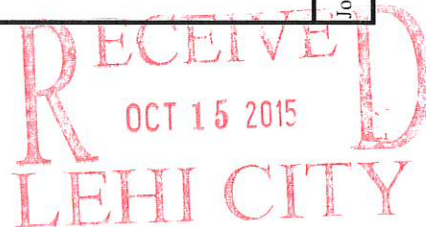
Drainage Calculations

Duration	Intensity	Runoff C	Area	Rainfall	Accumulated Flow	Allowable Discharge	Discharge	Required Storage
min	in/hr		Ac	cfs	cf	cfs	cf	cf
15.0	3.20	0.41	371.37	489.32	440,386	74.27	66,846	373,540
30.0	2.10	0.41	371.37	321.11	578,006	74.27	133,692	444,315
60.0	1.30	0.41	371.37	198.79	715,627	74.27	267,383	448,243
120.0	0.75	0.41	371.37	114.68	825,723	74.27	534,767	290,956
180.0	0.55	0.41	371.37	84.10	908,296	74.27	802,150	106,145

Maximum Storage Requirement: 448,243
 Maximum Storage Requirement (ac-ft): 10.29

Job #: 14-273

Sheet: SD03 A



UNDETAINED STORM DRAIN FLOWS

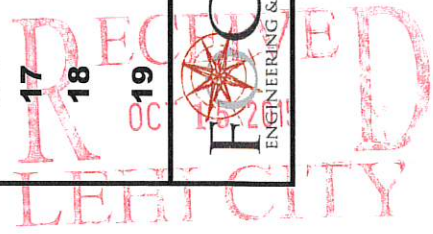
Tributary #	Zone	Time of Concentration Min.	C Value	Intensity In/HR	Acreage Acres	Q10 cfs
3	Village G	18	0.80	1.80	11.48	16.53
6	Village A	15	0.50	2.00	24.33	24.33
7	Village B	25	0.50	1.50	29.37	22.03
8	Village C	18	0.50	1.80	11.98	10.78
9	Village D	31	0.50	1.25	30.04	18.78
10	Park	23	0.15	1.60	40.92	9.82
11	Village E	29	0.50	1.30	34.49	22.42
12	Village F	29	0.40	1.30	34.00	17.68
16A	Village H	40	0.40	1.15	30.02	13.81
16B	Village H	33	0.40	1.25	33.54	16.77
16C	Village H	33	0.40	1.25	36.00	18.00
17	Commerical	43	0.85	1.10	38.45	35.95
18	Village I	42	0.50	1.15	24.46	14.06
19	Park	43	0.15	1.10	28.19	4.65

Holbrook Farms

Storm Drain Flow Calculations

Job #: 14-273

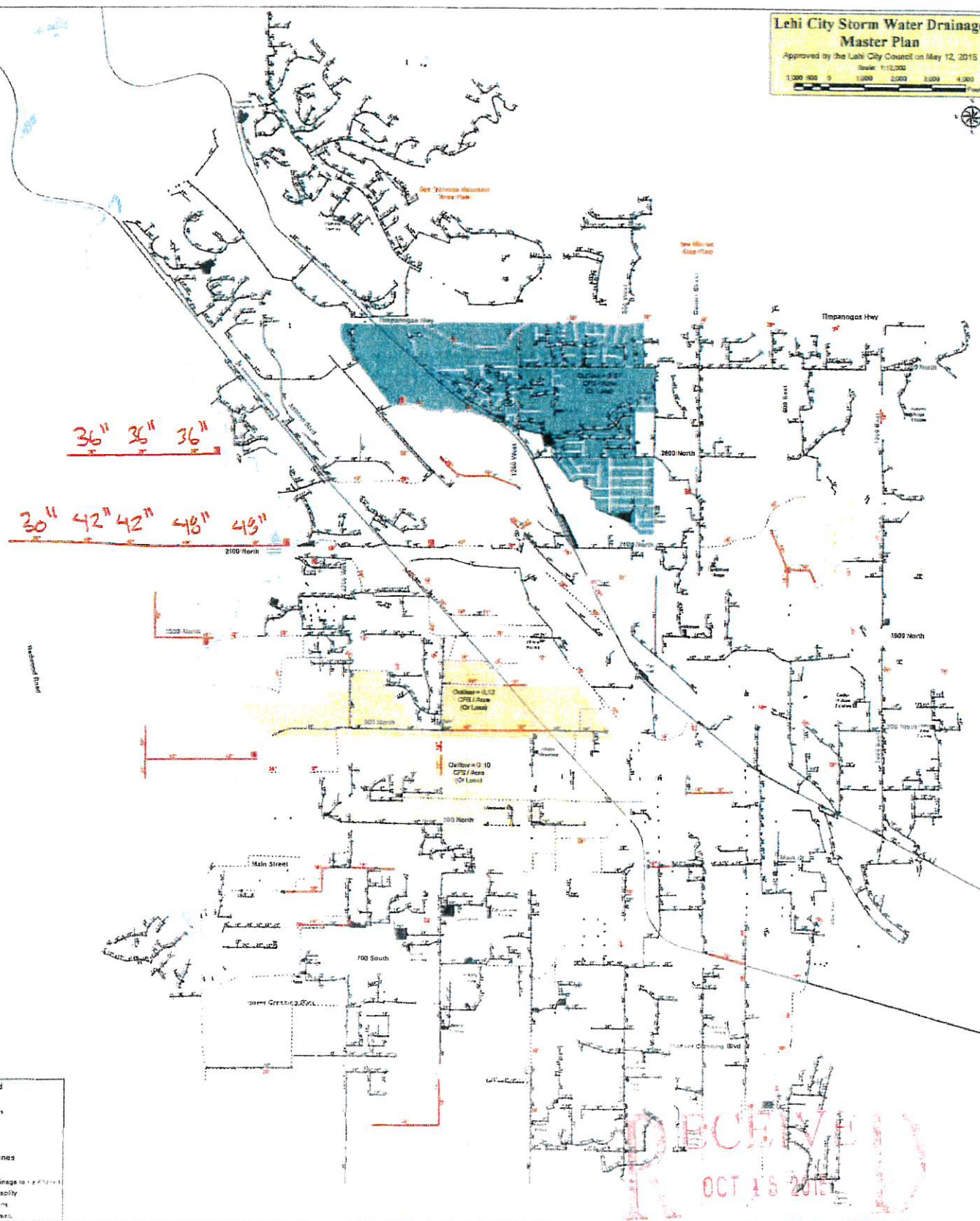
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STORM DRAIN PIPE CAPACITY TABLE

Pipe Name	Size (Inches)	Slope (%)	Qcap (CFS)	Q10 (CFS)
17-DETENTION	24	3.00%	39.3	35.950
SD 1-3	24	3.00%	39.3	38.500
SD 2-3	15	1.00%	6.5	1.400
SD 3-4	36	1.50%	81.9	56.430
SD 4-5	36	1.50%	81.9	62.230
SD 5-7	36	1.50%	81.9	63.430
SD 6-8	24	2.00%	32.1	24.330
SD 7-9	36	2.00%	94.6	85.460
SD 8-10	36	1.25%	74.8	35.110
SD 9-13	42	1.00%	100.9	104.240
SD 10-12	36	1.00%	66.9	44.930
SD 11-12 (a)	24	1.50%	27.8	22.420
SD 11-12 (b)	24	1.00%	22.7	22.420
SD 12-16B	42	1.00%	100.9	85.030
SD 13-15	42	1.25%	112.8	107.840
SD 14-18	54	1.50%	241.5	233.710
SD 15-14	42	1.25%	112.8	111.240
SD 16A-18	24	1.50%	27.8	13.810
SD 16B-14	42	1.50%	123.6	120.070
SD 16C-16B	24	1.50%	27.8	18.000
SD 18-DETENTION	54	1.80%	264.5	261.580

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Legend

- Existing Sumps
- 100 ft Storm Manholes
- Storm Drain Outlets
- Storm Drain Lines
- Existing Ditches
- Future Storm Drain Lines
- Type
- Existing Irrigation Drainage to 1/2" (2000)
- Proposed Drainage Facility
- Future Storm Drain Lines
- Existing 1800 manholes

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SD 09