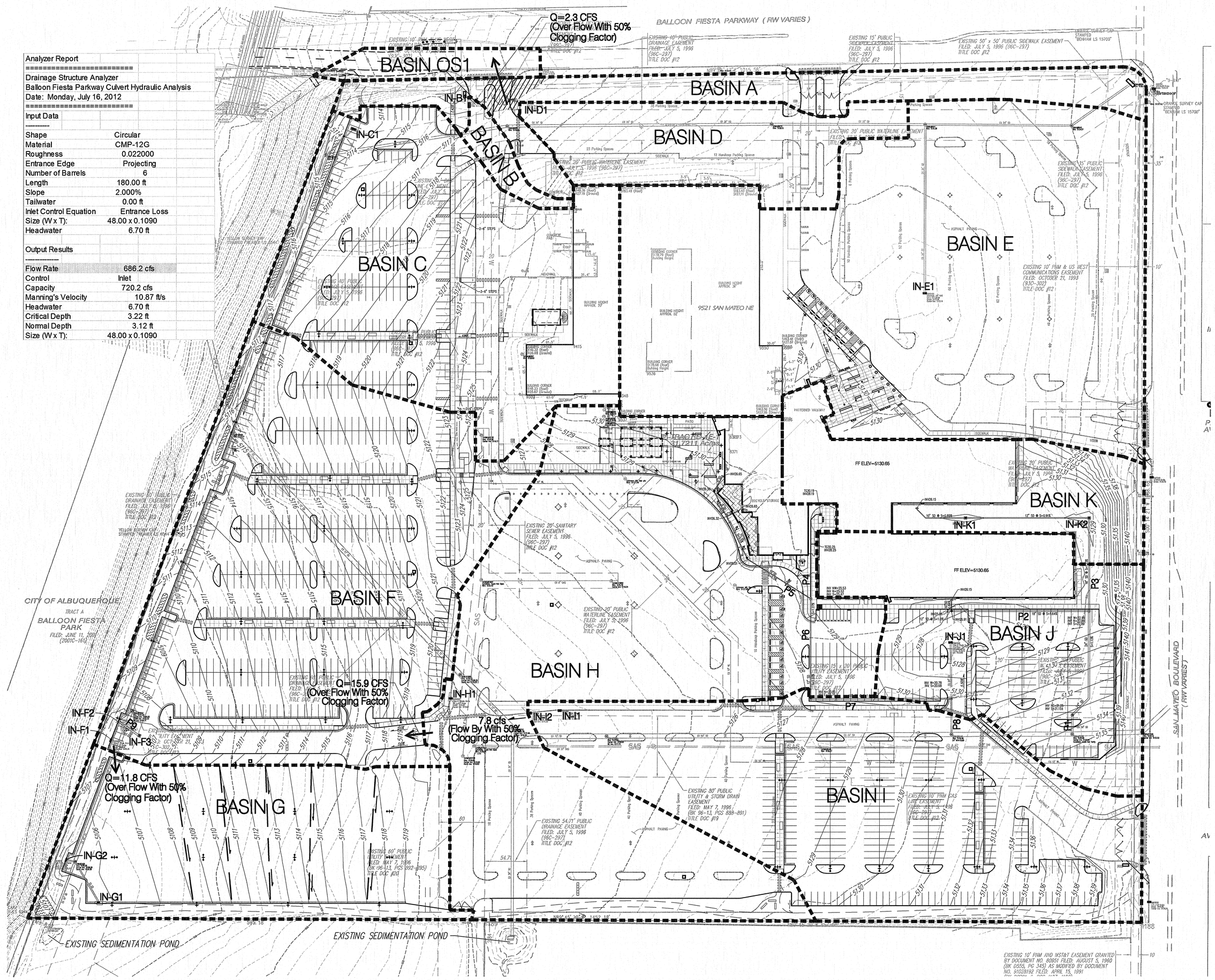


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Analyzer Report
==========================
Drainage Structure Analyzer
Balloon Fiesta Parkway Culvert Hydraulic Analysis
Date:  Monday, July 16, 2012
==========================
Input Data
----------
Shape                   Circular
Material                CMP-12G
Roughness               0.022000
Entrance Edge           Projecting
Number of Barrels       6
Length                  180.00 ft
Slope                   2.000%
Tailwater               0.00 ft
Inlet Control Equation  Entrance Loss
Size (W x T):           48.00 x 0.1090
Headwater               6.70 ft

Output Results
----------
Flow Rate               686.2 cfs
Control                 Inlet
Capacity                720.2 cfs
Manning's Velocity      10.87 ft/s
Headwater               6.70 ft
Critical Depth          3.22 ft
Normal Depth            3.12 ft
Size (W x T):           48.00 x 0.1090
```

I. INTRODUCTION

THE PURPOSE OF THIS SUBMITTAL IS TO PROVIDE A FINAL DRAINAGE MANAGEMENT PLAN AND FINAL GRADING PLAN FOR DEVELOPMENT OF THE PRESBYTERIAN SYSTEMS OFFICE BUILDING LOCATED AT THE SOUTHEAST CORNER OF SAN MATEO BOULEVARD AND BALLOON FIESTA PARKWAY. LEGAL DESCRIPTION OF THE SITE IS TRACTS D-1B-2 & D-1E-1, SISTERS OF THE ORDER OF ST. DOMINIC. TOTAL SITE AREA IS APPROXIMATELY 38.0 ACRES.

II. EXISTING HYDROLOGIC CONDITIONS

THE SITE IS CURRENTLY DEVELOPED WITH THE CITICORP BUILDING. THIS BUILDING AND ASSOCIATED PARKING IS LOCATED IN THE NORTHEAST PORTION OF THE SITE. THE REMAINDER OF THE SITE HAS BEEN MASS GRADED, BUT IS UNDEVELOPED. THE APPROVED SITE PLAN FOR BUILDING PERMIT INCLUDED TWO ADDITIONAL BUILDINGS ON THE SITE PLUS ADDITIONAL PARKING. A DRAINAGE REPORT FOR THE CITICORP SITE DATED MAY 1996 WAS PREPARED BY BOHANNAN HUSTON, INC. THIS DRAINAGE REPORT ADDRESSED THE PUBLIC STORM DRAIN WHICH CROSSES THE SITE PLUS FULL BUILD OUT OF THE CITICORP SITE. PRIVATE STORM DRAINS AND INLETS FOR FULL BUILD OUT OF THE SITE WERE INSTALLED WITH PHASE 1. THE PURPOSE OF THIS DRAINAGE MANAGEMENT PLAN IS TO UPDATE THE ANALYSIS BASED ON THE CURRENT SITE PLAN AND TO VERIFY CAPACITY OF THE EXISTING PRIVATE INLETS.

THE PUBLIC STORM DRAIN WHICH CROSSES THE SITE CONSISTS OF A NORTH AND SOUTH STORM DRAIN SYSTEM. WITHIN THE PRESBYTERIAN SITE THE NORTH STORM DRAIN PIPE SIZES RANGE BETWEEN 24" AND 36". THE SOUTH STORM DRAIN PIPE SIZES RANGE BETWEEN 66" AND 78". THE OUTFALL FOR THIS STORM DRAIN IS NEAR THE NORTHWEST CORNER OF THE SITE. THIS PIPE DISCHARGES TO AN ENERGY DISSIPATER AND OPEN CHANNEL WHICH FLOWS TO THE NORTH. THE PEAK FLOW FOR FULLY DEVELOPED CONDITIONS IS 680 CFS (COA PROJECT NO. 546991). AN EXISTING CULVERT CROSSING (6-48" CMP) AT BALLOON FIESTA PARKWAY CONVEYS FLOWS ACROSS THE ROAD. AN ANALYSIS OF THE THIS CULVERT CROSSING WAS PERFORMED TO VERIFY CAPACITY. THE AVAILABLE HEAD IS 6.7 FEET. THIS CULVERT IS INLET CONTROLLED AND HAS A CAPACITY OF 686 CFS, SEE CULVERT ANALYSIS ON THIS SHEET.

THE CITICORP DRAINAGE REPORT REFERENCED ABOVE INCLUDED ANALYSIS OF OFFSITE FLOWS FROM THE SOUTH. THERE ARE TWO SEDIMENTATION PONDS THAT WERE CONSTRUCTED WITH THE CITICORP ONISITE PROJECT (COA PROJECT NO. 546981). THE LOCATION OF THESE PONDS ARE SHOWN ON THE DRAINAGE MANAGEMENT PLAN. THE OFFSITE FLOWS ENTERING THE STORM DRAIN ARE 58.3 CFS (APP) AND 21.5 CFS (APB). THIS DRAINAGE REPORT ALSO INCLUDES INLET CAPACITY CALCULATIONS FOR THE EXISTING INLETS IN BALLOON FIESTA PARKWAY. THERE IS AN EXISTING INLET IMMEDIATELY UPSTREAM OF THE WEST ENTRANCE. BASED ON THE ANALYSIS CONTAINED IN THE APPROVED DRAINAGE REPORT, THE INLET INTERCEPTS ALL OF THE FLOW WITHIN BALLOON FIESTA PARKWAY. AN EXISTING CONCRETE RUNDOWN NEAR THE NORTHWEST CORNER OF THE SITE CONVEYS STREET DRAINAGE DOWNSTREAM OF THE INLET TO THE EXISTING CHANNEL. BASIN OS1 DEFINES THE DRAINAGE AREA BETWEEN THE EXISTING RUNDOWN AND UPSTREAM INLET. BASIN A FREE DISCHARGES INTO BALLOON FIESTA PARKWAY. IT IS NOT CLEAR FROM THE REPORT WHETHER THIS BASIN WAS INCLUDED IN THE INLET CALCULATIONS. EXISTING INLET IN-D1 WAS ANALYZED WITH A 50% CLOGGING FACTOR. THIS INLET DOES NOT HAVE ADEQUATE CAPACITY WITH THE AVAILABLE HEAD. IN THE EVENT THAT THE INLET BECOMES 50% CLOGGED, THEN2.3 CFS WILL OVERFLOW INTO BALLOON FIESTA PARKWAY (THIS ANALYSIS DOES NOT INCLUDE ADDITIONAL CAPACITY PROVIDED BY THE CURB OPENING). ASSUMING BASIN A IS NOT INTERCEPTED BY THE BALLOON FIESTA PARKWAY INLET AND INLET IN-D1 IS 50% CLOGGED THEN THE PEAK FLOW AT THE RUNDOWN WILL BE 7.3 CFS.

III. PROPOSED HYDROLOGIC CONDITIONS

THIS PROJECT INCLUDES THE CONSTRUCTION OF A NEW 192,700 SQUARE FOOT BUILDING, NEW PARKING AND LANDSCAPING. THE EXISTING AND PROPOSED IMPROVEMENTS ARE SHOWN ON THE GRADING PLAN. THE HYDROLOGIC ANALYSIS FOR THIS SITE IS BASED ON THE 100-YR, 6-HR STORM EVENT IN ACCORDANCE WITH CHAPTER 22.2 OF THE CITY OF ALBUQUERQUE DEVELOPMENT PROCESS MANUAL. WATER HARVESTING WILL BE INCORPORATED INTO THE GRADING AND DRAINAGE DESIGN. 12" WIDE CURB OPENINGS ARE SHOWN ON THE UPSTREAM SIDE OF LANDSCAPE ISLANDS. THESE OPENINGS WILL DIVERT STORM WATER TO THE LANDSCAPE ISLANDS. FLOWS IN EXCESS OF AVAILABLE CAPACITY WILL BYPASS THE WATER HARVESTING AREA AND BE INTERCEPTED BY DOWNSTREAM INLETS AND STORM DRAIN SYSTEM. SEE THE GRADING PLAN FOR LOCATION OF CURB OPENINGS.

THE APPROVED DRAINAGE REPORT FOR THE CITICORP SITE DELINEATED THE ONSITE DRAINAGE BASINS AND LAND TREATMENTS. THESE DRAINAGE BASINS AND LAND TREATMENTS WERE UPDATED BASED ON THE CURRENT SITE PLAN.

AN ANALYSIS OF THE NEW STORM DRAIN PIPES AND EXISTING INLETS WAS PERFORMED. ALL OF THE INLETS, EXCEPT IN-B1, IN-F2 AND IN-I1 WERE DESIGNED IN A SUMP CONDITION. THE CAPACITY OF THE INLETS ON A CONTINUOUS GRADE WERE ANALYZED USING HEC-22 METHOD. THIS ANALYSIS DEMONSTRATES THAT ALL OF THE EXISTING INLETS HAVE ADEQUATE CAPACITY EXCEPT IN-C1 AND THE PAIRED INLETS IN-F1 AND IN-F2. THE EXISTING INLET DESIGNED FOR BASIN C WAS ORIGINALLY A TYPE 'C' SINGLE GRATE. THIS INLET DID NOT HAVE ADEQUATE CAPACITY AND WAS NOT PLACED IN A LOCATION THAT WORKED WITH THE NEW SITE PLAN. A NEW TYPE 'D' DOUBLE GRATE INLET (IN-C1) WILL BE CONSTRUCTED TO PROVIDE THE NECESSARY CAPACITY. TO PROVIDE THE ADDITIONAL CAPACITY FOR BASIN F, A NEW TYPE 'D' SINGLE GRATE INLET (IN-F3) WILL BE ADDED.

ALL OF THE INLETS IN A SUMP CONDITION HAVE CAPACITY TO INTERCEPT THE PEAK FLOW RATE; HOWEVER IF A 50% CLOGGING FACTOR IS APPLIED THEN BASIN I WILL HAVE INCREASED FLOW TO BASIN H. BASIN H WILL OVERFLOW TO BASIN F AND BASIN F WILL OVERFLOW TO BASIN G. THE COLUMN TITLED 'CAPACITY CHECK' SHOWS THE SURPLUS OR DEFICIT (IN PARENTHESES) CAPACITY FOR THE INLETS OR GROUP OF INLETS IN THEIR RESPECTIVE DRAINAGE BASIN.. IF ALL OF THE INLETS IN SUMP CONDITION BECOME 50% CLOGGED AND OVERFLOW TO THE NEXT DOWNSTREAM BASIN, THEN THE DOWNSTREAM MOST INLETS IN BASIN G HAVE ADEQUATE CAPACITY TO INTERCEPT THE CALCULATED PEAK FLOW.

V. CONCLUSION

THIS DRAINAGE MANAGEMENT PLAN PROVIDES FOR GRADING AND DRAINAGE ELEMENTS WHICH ARE CAPABLE OF SAFELY PASSING THE 100 YEAR STORM IN ACCORDANCE WITH CITY REQUIREMENTS AND ARE IN CONFORMANCE WITH THE PREVIOUSLY APPROVED DRAINAGE REPORT FOR THE CITICORP SITE. WITH THIS SUBMITTAL WE ARE REQUESTING FINAL GRADING AND DRAINAGE PLAN APPROVAL FOR BUILDING PERMIT.

Presbyterian PSO

Proposed Conditions Basin Data Table

This table is based on the DPM Section 22.2, Zone: 2

Basin ID	Area (SQ. FT)	Area (AC.)	Land Treatment Percentages A	B	C	D	Q(100) (cfs/ac.)	Q(100) (CFS)	WT E (inches)	$V_{(100\text{-}24hr)}$ CF
A	49313	1.13	0.0%	0.0%	87.0%	13.0%	3.34	*3.8*	*1.26*	*5386*
B	6096	0.14	0.0%	0.0%	35.0%	65.0%	4.15	*0.6*	*1.77*	*1033*
C	143506	3.29	0.0%	0.0%	18.0%	82.0%	4.42	*14.6*	*1.94*	*27144*
D	48134	1.11	0.0%	0.0%	22.0%	78.0%	4.36	*4.8*	*1.90*	*8882*
E	254577	5.84	0.0%	0.0%	22.0%	78.0%	4.36	*25.5*	*1.90*	*46974*
F	208862	4.79	0.0%	0.0%	13.0%	87.0%	4.50	*21.6*	*1.99*	*40716*
G	104188	2.39	0.0%	0.0%	14.0%	86.0%	4.48	*10.7*	*1.98*	*20190*
H	247231	5.68	0.0%	0.0%	11.0%	89.0%	4.53	*25.7*	*2.01*	*48768*
I	160426	3.68	0.0%	0.0%	13.0%	87.0%	4.50	*16.6*	*1.99*	*31274*
J	98807	2.27	0.0%	0.0%	20.0%	80.0%	4.39	*10.0*	*1.92*	*18460*
K	59935	1.38	0.0%	0.0%	46.0%	54.0%	3.98	*5.5*	*1.66*	*9393*
OS1	10625	0.24	0.0%	0.0%	0.0%	100.0%	4.70	*1.1*	*2.12*	*2231*

PRESBYTERIAN PSO

STORM DRAIN PIPE TABLE

PIPE #	Contributing Basins & Pipes	Size in.	Slope	Capacity* cfs	ACTUAL FLOW cfs	PIPE LENGTH ft	INVERT OUT	INVERT IN
STORM DRAIN PIPE								
P1	K + 50% Basin J (Basin J to be diverted with future building addition)	24	1.13%	24.1	5.5	145.0	21.25	22.89
P2	Pipe P2 is for future roof drains (Assumes 50% of Basin J when future addition is completed)	18	1.64%	13.5	5.0	178.0	22.99	25.91
P3	K	18	1.13%	11.1	5.5	120.0	22.99	24.34
P4	1% of Basin H	8	2.24%	1.8	0.3	119.0	25.53	28.19
P5	5% of Basin H	10	0.50%	1.5	1.3	159.0	25.53	26.32
P6	P4+P5	12	1.27%	4.0	1.5	128.0	23.85	25.47
P7	P6 (Pipe size increased for future addition)	18	1.66%	13.5	1.5	179.0	20.78	23.75
P8	P7 + Basin J	24	3.68%	43.4	11.5	47.0	18.95	20.68
P9	F	24	1.00%	22.6	21.6	32.00	2.68	3.00

*CAPACITY IS BASED ON GRAVIT FLOW, USING MANNING'S EQUATION WITH n=0.013

PRESBYTERIAN PSO

INLET TABLE

INLET #	CONTRIBUTING BASIN	INLET TYPE	TOP OF GRATE	ACTUAL FLOW CFS	***REQUIRED HEAD FT	AVAIL. HEAD FT	CAPACITY CFS	Grate Calculation	CAPACITY CHECK CFS
* IN-B1	B	1-A-SGL	5114.14	0.6	N/A	N/A	0.6	Cont Grade	N/A
IN-C1	C	1-D-DBL	5113.20	14.6	0.9	1.3	21.4	Sump	6.8
* IN-D1	D	1-C-SGL	5117.16	4.8	0.8	0.5	2.5	Sump	(2.3)
* IN-E1	E	1-D-DBL	5127.09	25.5	2.1	2.9	32.0	Sump	6.5
* IN-F1	F + BASIN H OVERFLOW	1-C-SGL	5106.41	**	1.2	1.1	7.2	Sump	
* IN-F2	F + BASIN H OVERFLOW	1-A-SGL	5106.84	**	0.8	0.7	7.1	Sump	
IN-F3	F + BASIN H OVERFLOW	1-D-SGL	6106.00	37.1	1.6	1.5	11.4	Sump	(11.4)
* IN-G1	G + BASIN F OVERFLOW	1-A-SGL	5105.67	22.2	1.2	1.2	10.4	Sump	
*IN-G2	G + BASIN F OVERFLOW	1-A-SGL	5104.97	**	1.9	1.9	13.0	Sump	1.3
* IN-H1	H + BASIN I FLOW BY	1-A-DBL	5119.47	33.5	1.3	1.0	18.0	Sump	(15.5)
* IN-I1	I	1-A-SGL	5121.48	**	N/A	N/A	7.6	Cont Grade	N/A
* IN-I2	I	1-C-SGL	5120.90	16.6	1.2	0.3	1.2	Sump	(7.8)
* IN-J1	J	1-D-SGL	5126.62	10.0	1.0	2.7	16.7	Sump	6.7
IN-K1	K	1-D-SGL	5128.67	2.7	0.3	0.5	4.0	Sump	1.2
IN-K2	K	1-D-SGL	5128.70	2.7	0.3	0.8	8.1	Sump	5.3

* Existing inlet constructed with the phase 1 building or reconstructed with this project.

** Inlets IN-F1, IN-F2 & IN-F3 intercept runoff from Basin F. Inlets IN-G1 & IN-G2 intercept runoff from Basin G. Inlets IN-I1 & IN-I2 intercept runoff from Basin I

***This is the required head for the inlets to intercept the peak flow with the inlet 50% clogged. Inlets IN-F1, IN-F2 & IN-F3 all intercept flows from Basin F and the grate elevations vary. The required head is based on the maximum water surface elevatio

Note the inlet capacity includes a 50% clogging factor for inlets in sump condition. Additional capacity for throat opening in curb inlets is not included in capacity calculations.

PRESBYTERIAN PSO
Contributing Area
HEC-22 METHOD
100 -YEAR ONSITE FLOWS

Manning's Coefficient for Street and Pavement Gutters n= 0.016

BASIN ID FOR INLET	BASIN ID	Contributing Area (acres)	Basin Q (cfs)	Total Rtd Q (cfs)	Inlet Width (ft)	Inlet Length (ft)	Inlet Type	Total Spread of Water T (ft)	Depth of Flow d (ft)	Intercept Q Qi (cfs)	Bypass Q Qb (cfs)	Long. Slope S_L (ft/ft)	Cross Slope S_X (ft/ft)	Splash Over V_O (fps)	Gutter Velocity V (fps)	Ratio Frontal Flow Eo	Total Frontal Flow Rf	Total Side Flow Rs	Efficiency E
B	IN-B1	0.14	0.6	0.6	2.08	3.33	C	2.8	0.11	0.6	0.0	0.0667	0.0375	10.0	4.0	0.97	1.0	0.2	0.98
F	IN-F2	4.80	21.6	21.6	2.08	6.83	A	22.6	0.38	10.5	11.1	0.0196	0.0167	10.0	5.1	0.23	1.0	0.3	0.48
I	IN-I1	3.68	16.6	16.6	2.08	6.83	A	27.3	0.30	7.6	9.0	0.0172	0.0110	10.0	4.1	0.19	1.0	0.3	0.46

NOTES:
1. Design Criteria from the HEC-22 Urban Drainage Design Manual, Second Edition. Flow spread from 10-yr event must maintain one through lane open at all times. Runoff from 100-year storm shall be contained within the R/W
2. Total allowable ponding width for typical section based on COA criteria.
3. Manning's n=0.016 (rough texture- asphalt pavement), HEC-22 Urban Drainage Design Manual Second Edition, pg 4-10.
4. Sediment accumulation is not anticipated.
5. No reduction in routed Q's for attenuation.

LEGEND

DRAINAGE BASIN

N

60 30 0 60

SCALE: 1"=60'

Bohannan Huston

architecture
interiors
landscape
planning
engineering

Dekker
Perich
Sabatini

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ARCHITECT

ENGINEER

GLENN S. BRIGHTON
NEW MEXICO
14471
REGISTERED PROFESSIONAL ENGINEER
11-29-12

PROJECT

Presbyterian Rev. Hugh Cooper Administrative Center
PHASE TWO - BUILDING 2 NEW ADDITION
9521 San Mateo NE
Albuquerque, New Mexico

ISSUED FOR BID

REVISIONS

DRAWN BY	BO
REVIEWED BY	GSB
DATE	November 29, 2012
PROJECT NO.	11-0100.003

DRAWING NAME

DRAINAGE MANAGEMENT PLAN

SHEET NO.

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OF

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Wed, 28-Nov-2012 - 5:42pm, Plotted by: BORTEGA