CITY OF ALBUQUERQUE

Department of Municipal Development

John R. Castillo, Director

NW Master Plan File

October 21, 2008

Ms. Julie M. Baca
Deputy County Manager for Community Services
Bernalillo County
One Civic Plaza
Albuquerque, NM 87102

RE: Proposed Street and Drainage Improvements on Paradise Boulevard

Dear Ms. Baca,

The City of Albuquerque has completed the design for roadway improvements along Paradise Boulevard between Coneflower and Justin. The primary goal of the proposed improvements is to widen Paradise Boulevard from the existing two lane roadway section to a four lane section with medians and bike lanes. The City will have this project in construction in early 2009.

An integral part of this roadway design project is the implementation of the area drainage improvements described in the ***"Lyon Boulevard Storm Drain Final Mini-Drainage Master Plan"*** completed by Bohannon-Huston in 2002 and approved by AMAFCA (option four) in 2004. The City of Albuquerque has been using this mini-DMP in their development reviews since that time. As you are aware, AMAFCA has already installed elements of this drainage plan, and as a part of the Paradise Project, the City will install the remaining storm drainage improvements.

The City of Albuquerque has held coordination meetings with staff representing the Bernalillo County Parks and Recreation Department and the Bernalillo County Public Works Division. These meetings were held to discuss impacts to the park and to answer questions about the proposed design.

The Department of Municipal Development will continue to coordinate with the County during the implementation of this project, and our contractor will be instructed to maintain access to the Paradise Hills Community Center during construction.

Please sign the letter below acknowledging your concurrence with the Paradise Widening improvements and return to the City of Albuquerque. Thank you for your prompt attention to this matter.

Sincerely,

John R. Castillo, P.E.
Director, Department of Municipal Development

cc: Michael J. Riordan, P.E.; Deputy Director DMD
Melissa R. Lozoya, P.E.; DMD Engineering Division Manager

APPROVED: ______________________ 11/18/08
Julie M. Baca — Date
Deputy County Manager
Community Services

P.O. Box 1293

Albuquerque

New Mexico 87103

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ALBUQUERQUE NEW MEXICO 1706

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 2, 2002

Dan Grochowski, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, New Mexico 87109

RE: Grading and Drainage Plan for Lyon Blvd/Paradise Blvd Conceptual Design Analysis (B11-D4) Draft Report

Dear Mr. Grochowski:

I have reviewed the referenced drainage plan dated July 25, 2001 and forward the following comments.

I agree on your conclusion that option 3 appears to be the best. Another viewpoint would be that if Paseo Del Norte develops into the proposed storm drain area we could drain down to the Piedras Marcadas Dam at a reduced flow. Of course there would have to be ponds in the upstream area as shown in option 3. The possibility would be to use Paradise Boulevard as the divide for runoff to the Calabacillas Arroyo or to the Piedras Marcadas Dam. If you use another option the outfall to the Calabacillas Arroyo through Lyons Boulevard (which would have to be built first) would have excessively large storm drains. By using option 3 we allow for the *possibility* of draining to the Piedras Marcadas and not having to build the large storm drains in Lyons Boulevard. This is just some thoughts that you may consider.

If you have any questions please call me a 924-3982.

Sincerely,

Carlos A. Montoya
City Floodplain Administrator

C: Lynn Mazur, AMAFCA

LYON BOULEVARD STORM DRAIN FINAL MINI DRAINAGE MANAGEMENT PLAN

B-11/D4

June 20, 2002

PREPARED FOR:

AMAFCA
2600 Prospect NE
Albuquerque, NM 87107

Bohannan Huston INC.

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EXECUTIVE SUMMARY

The area south of Paradise Boulevard, west of the Proposed Unser/Lyon Boulevard, and bordered on the west and south by the Piedras Marcadas Watershed Boundary, is the primary subject of this report. There is also a small area east of Unser Boulevard that is included since it has the elevation to drain to the system. An attempt is made to drain all the area that currently does not have a drainage outlet. Drainage in the study area has been limited since the Petroglyph National Monument, the natural drainage outlet, does not allow any developed flows. This "mini" drainage management plan originally investigated three alternatives for draining the area to the Calabacillas Arroyo. A fourth option examining pressure flow in the Paradise Boulevard/Lyon Boulevard storm drain system, was added after review of the preliminary report. This study is sponsored by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA).

The first of the four options allows for upsizing of the existing Lyon Boulevard Storm Drain into the Calabacillas Arroyo, and southerly extension into the project area without detention pond(s). The estimated construction cost of this option is $24,831,000 ($9,153,000 for the Paradise/Lyon storm drain). The second option does not allow for upsizing of the existing storm drain, but includes a single 65.4 ac-ft detention pond that requires approximately 9 acres of land. The estimated construction cost of this option is $26,429,000 ($6,040,000 for the Paradise/Lyon storm drain). The third option has several detention ponds and also leaves the existing system in place. The total combined storage of the ponds is 113.6 ac-ft and approximately 15 acres of land is required. The estimated construction cost of this option is $17,359,000 ($4,435,000 for the Paradise/Lyon storm drain). A fourth option has been added at AMAFCA's request. This option is based on the existing storm drain, from the Calabacillas to Irving Boulevard being extended up Lyon and Paradise Boulevards and modeled for pressure flow. It can be used with Options 2 or 3. The purpose of this option is to determine the maximum flow rate that can be allowed from the southern study area without overwhelming the storm drain system. This maximum flow rate is 212 cfs. The estimated construction cost for the Paradise/Lyon Boulevard storm drain under this option is $4,690,000.

For the area south of Paradise Boulevard, Option 3 is recommended. Option 3 has a lower estimated cost due to less trench excavation and smaller pipe size. For the area north of Paradise Boulevard, Option 4 is recommended due to the increased capacity, without significantly

increased costs compared to Option 3 for this area. The storm drain in Option 4 is compatible with the portion of Option 3, which is south of Paradise Boulevard. The increased flowrate (212 cfs compared to 131 cfs) would mean that less detention would be required than is shown in Option 3. The primary cost in each of the options is the basalt rock removal.

I. INTRODUCTION

The Lyon Boulevard Storm Drain Mini Drainage Management Plan deals with an area of northwest Albuquerque that up to this time has had a very limited potential for development due to the lack of an outfall for developed flows. This area is approximately bounded by Unser/Lyon Boulevard on the east, Paradise Boulevard on the north, and on the south and west sides by the limits of the Piedras Marcadas Watershed. An attempt is made to include whole properties into the study area, and some area east of Unser Boulevard is included because it is possible to use the same system. There is an existing 72" storm drain line in the Unser/Lyon Boulevard Alignment from Irving Boulevard to the Calabacillas Arroyo. Past studies have proposed a southern extension of this storm drain to Paradise Boulevard. The intent of this management plan is to determine the feasibility of using the proposed Lyon Boulevard storm drain as the outfall point for the study area. The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA), the chief sponsor of this study, along with the City, and area landowners have funded and provided needed information for this study.

Two past reports are foundational to the work done in this study. The first is the "Piedras Marcadas Drainage Management Plan" by Molzen-Corbin done in May 1993. It deals with drainage issues for the entire Piedras Marcadas Watershed. The other report is the "Conceptual Design Analysis for Lyon (Unser) Boulevard/Paradise Boulevard Storm Drain" by Bohannan-Huston done in June 2000. This report evaluates a proposed storm drain down Paradise to Lyon and then continuing in Lyon connecting to the existing Lyon Boulevard Storm Drain.

As a starting point, for this study, the existing section of storm drain, from Irving to the Calabacillas Arroyo, is analyzed to determine the existing capacity, which is 734 cfs based on Manning's Equation. In addition the maximum area that could be routed to the storm drain is determined. The preliminary layout for the Paradise Boulevard Storm Drain west of Lyon is also examined to determine whether or not it can be reduced due to addition of storm drain line south of Paradise Boulevard. Three options are investigated for diverting the maximum drainage basin to the Lyon Boulevard Storm Drain System, and a fourth option is investigated for the storm drains in Paradise and Lyon Boulevards. The first option assumes an upsizing of the existing storm drain and an Unser Storm Drain that extends into the study area without detention ponds. The second option utilizes one detention pond to reduce flows to preserve the existing storm drain. The third option also looks to use the existing system, but makes use of several detention ponds rather than one. The fourth option looks at a pressure storm drain system in Paradise and Lyon Boulevards.

II. HYDROLOGY

Hydrologic modeling for this project is performed using the 1997 version of The Arid-Lands Hydrologic Model (AHYMO) in accordance with the City of Albuquerque Development Process Manual, Section 22.2, January 1993. Pipes are sized using Manning's Equation. Hydraulic grade lines are not calculated except for Option 4. Concrete box culverts are modeled as equivalent pipes in the AHYMO model.

As mentioned above, the project area is bounded on the east, with some exceptions, by the proposed alignment for Unser Boulevard. This is because the Unser Corridor is a natural extension for the Lyon/Unser Storm Drain and is very nearly the outer limit of area that can physically be drained to the Calabacillas. There is some area east of Unser that is included because it could drain to the system and did not have another available outlet due to the Petroglyph National Monument. It is assumed that the storm drain trench at the intersection of Lyon and Paradise Boulevards should not be deeper than 30'. A hypothetical pipe line is taken from the intersection south at a 0.2% slope. The placement of the hypothetical pipe line was determined by maintaining at least two feet of cover above the soffitt in relation to the existing contours. The hypothetical pipe line is then used as the basis for the basin boundary. It is also the approximate location for the pipe lines in the three options. Other properties on the east that border the Unser alignment could be brought into the system if they are filled on the eastern portion of the property and the added flow did not overload the system. This may require the use of detention ponds on these sites. These areas were not included in this study.

The sub-basins used in this report were developed from the basins in the Molzen-Corbin report "Piedras Marcadas Drainage Management Plan Revision" (1993) for the area south of Paradise Boulevard and the Bohannan-Huston report "Conceptual Design Analysis for Lyon (Unser) Boulevard/ Paradise Boulevard Storm Drain" (2000) for the area north of Paradise Boulevard. The sub-basins on the north are not shown on exhibits 1-4, since they are the same as in the conceptual Lyon Report Plate One is a copy of the drainage basin map from the conceptual Lyon report. Plate 2 includes the exhibits from the Piedras Marcadas Report. Sub-basin 315 from the Piedras Marcadas report was the primary basin in the Lyon/Unser study area and was divided into Sub-basins 1 through 7. Sub-basins 3 and 6A are extended past the outer boundary of the Piedras Marcadas to include whole properties. This was the practice everywhere possible so that an owner would not have two separate drainage systems on the same property. Sub-basin 313 is a combination of sections from Molzen-Corbin's Sub-basins 313N and 313S. Sub-basins 311N, 311S, and 310 are located similarly to Molzen-Corbin's, except that there are changes due to the new mapping used (Bernalillo County, 1999) and the sub-basins end at the Unser alignment. Sub-basin 312 is only the very southern portion of Molzen-Corbin's original. Sub-basin 8 is within a portion of the proposed Unser Boulevard Corridor. The sub-basins can be seen in Exhibit 1.

The land treatment percentages were determined based on zoning and the intended land uses as provided by the primary land owners in the area. The intended uses and zoning are also shown in Exhibit 1 and the land treatment percentages assigned to each basin are shown in Appendix One along with the AHYMO input and summary printouts. The land treatment percentages for the sub-basins, along with the 100-yr flow rates, volumes, and CFS/acre are shown in Table 1.

Table 1 – Sub-Basin Summary

SUB-BASIN	AREA (acres)	% LAND TREATMENT *				Q (100-YR) (CFS)	VOLUME (acre-ft)	CFS/Acre
		A	B	C	D			
1	22.7	0.0	12.9	18.1	69.0	88.5	3.8	3.91
2	16.0	0.0	9.3	11.6	79.1	65.2	2.9	4.09
3	64.4	0.0	9.7	12.3	78.0	185.1	11.6	2.87
4	103.7	0.0	9.0	12.2	78.9	361.6	18.8	3.49
5	27.7	0.0	14.7	19.6	65.7	106.5	4.5	3.84
6A	176.8	0.0	13.4	17.4	69.1	451.8	29.8	2.56
6B	48.3	0.0	15.0	20.0	65.0	184.9	7.9	3.83
7	21.4	0.0	9.6	10.9	79.5	66.5	3.9	3.10
313	38.0	0.0	12.7	16.6	70.7	122.5	6.5	3.22
310	7.3	0.0	15.0	20.0	65.0	27.9	1.2	3.83
311S	18.7	0.0	14.0	19.3	66.7	72.2	3.1	3.84
311N	32.4	0.0	8.2	10.9	80.9	109.8	6.0	3.39
312	8.2	0.0	8.6	12.1	79.3	33.1	1.5	4.07
8	11.2	0.0	0.0	10.0	90.0	29.8	2.2	2.65

Obtained from Section 22.2, Hydrology of the Development Process Manual, Volume 2.

Shown in Table 2 are Molzen-Corbin's sub-basins within this area, and the area and CFS/Acre for each. Only the CFS/Acre are shown, since the sub-basins' areas have changed, due to being cut off at the Unser Alignment, inclusion of whole properties, and changes due to new mapping.

Table 2 - Molzen-Corbin's Sub-Basins Within Study Area

SUB-BASIN	AREA (acres)	CFS/Acre
315W	128.0	3.50
315S	44.8	3.50
315N	115.2	3.50
313S	60.0	3.15
311S	30.7	3.50
310	9.6	3.50
311N	41.6	2.78
312	135.04	2.26

Part of the scope of this study is to examine the preliminary layout of the Paradise Boulevard Storm Drain from Chamisa Ridge to Lyon/Unser Boulevard and to determine if the area south of Paradise Boulevard that was to go to this system still does; then to determine if the area reduction can lead to a reduction in pipe size for the preliminary layout. There is a reduction in area since an area east of The Westside North Middle School that is included in the new Sub-basin 313 was originally in a sub-basin contributing to the Paradise Boulevard Storm Drain according to the 2000 Lyon Report. Also, some of the other area south of Paradise Boulevard has been developed at a lower density than was predicted by the 2000 Lyon Report. However, even with the area reduction and less impervious area, there is only a small reduction in flow rates, which is not enough to require a smaller storm drain system. The majority of flow into the system is from the north side of Paradise Boulevard

III. OPTION 1

Option 1 is a storm drain only option without detention, and consequently includes expansion of the existing storm drain. This option requires concrete box culverts (CBC) as large as 12' X 12'. The entire network including flow rates can be seen on Exhibit 2. The flow rate in the pipe network coming into the intersection of Paradise and Lyon is 1,453 cfs and the box culvert size is 12' X 12' with a slope of 0.2%. Under this option the storm drain on the north side of the intersection must be an 11' X 10' CBC and the replacement of the existing storm drain must be 96" pipe. The total flow at the outfall to the Calabacillas is 1,983 cfs.

IV. OPTION 2

Option 2 maintains the existing storm drain as is and has one large detention pond to attenuate flows to its capacity. Option 2 is shown in Exhibit 3. A possible location for the pond was found to be near the intersection of Paradise and Lyon. This site is chosen because it can collect runoff from all of the basins in the study area. This is important since even the smaller sub-basins adjacent to the chosen pond site (311N&S, 312, 310, and 8) could overwhelm the existing storm drain if their flows are not attenuated. The pond would need to have storage of 65.4 ac-ft and would cover an area of approximately 8-9 acres. This option would also require very large concrete box culverts (12' X 12')upstream of the pond. The peak flow rate entering the pond is 1509 cfs, and the peak outflow is 147 cfs. The pipes north of the intersection to the existing storm drain would need to be 84" and 78".

V. OPTION 3

There is more flexibility in Option 3, which is shown in Exhibit 4. Four detention ponds are used to attenuate flows in this option. The ponds are sized to reduce pipe sizes to 66". The largest pipe in the system prior to the intersection of Lyon and Paradise is 66" and the largest pipe north of the intersection is 84". The total amount of storage provided by the ponds is 113.6 ac-ft and the approximate area needed for all of the ponds is 15 acres. The peak outflow from the final pond, which enters the Lyon Boulevard storm drain is 131 cfs.

VI. OPTION 4

As mentioned in the introduction, Option 4 is exclusively for the Paradise and Lyon Boulevard Storm Drains. It included a hydraulic grade line (HGL) analysis to determine the maximum flow rate that can be allowed from the south at the intersection of Paradise and Lyon, while tying to the existing storm drain. The maximum flow rate is 212 cfs. The largest pipe size required is 90". Larger sizes were tried just north of the intersection, but the ultimate control of the system is the existing storm drain. So the 90" gave as much capacity with a smaller size. Exhibit 5 contains a plan and profile sheet showing Option 4.

VII. COST ESTIMATE

There are four design parameters that strongly impact the cost of the options; storm drain size, trench depth, detention pond size, and land costs. The first three are especially important because they affect the amount of basalt rock removal that will be necessary. In the areas where basalt rock removal is determined to be necessary there are no trenching costs, but there is a backfill cost since the basalt rock can not be used as backfill. Where trenching is specified it is based on the 1998 Unit Cost used by the City of Albuquerque with a 30% increase to make them comparable to recent contractor's estimates for storm drain construction. The pond cost was determined based on the costs of recent AMAFCA dams and recently constructed ponds designed by Bohannan-Huston. The dams and ponds were placed in an Excel spreadsheet based on size and cost per acre-foot. An equation was derived for a fitted curve and that equation was used to determine the cost per acre-foot for the ponds used in the estimate. A chart showing the points and fitted curve is shown in Appendix 2. The reinforced concrete pipe / concrete box culverts costs are determined by using the 1998 Unit Cost, recent contractor bids, and information provided by a local supplier and local contractor. The 20% contingency used for the cost estimates in the preliminary report has been reduced to 10% for the cost estimates presented here. The cost of the land is roughly estimated at $50,000 per acre.

The most important aspect of the cost of any of the options is the presence of basalt rock. One area that is proven to have basalt, is the area from the intersection of Paradise and Lyon Boulevards to the outfall. Basalt removal calculations are done in this area based on information in the Conceptual Lyon Report (2000), which is based on borehole data. However it is assumed that all the trenches south of Paradise Boulevard will also require basalt removal. This assumption is based on visual appraisal of the surface and borehole data provided in the "Unser Middle Transportation Corridor Study" done by Leedshill-Herkenhoff in 1992. Two boreholes that fall within the study area near the Proposed Paseo Del Norte alignment show basalt rock from 2-5 feet below the surface through 31-38 feet below the surface. The basalt removal greatly increases the costs of all options. The basalt rock removal volumes are calculated assuming typical trench prisms with side slopes of 1 to 1 after the first four feet, which are vertical. It is also assumed that basalt rock removal will be necessary for the ponds unless they are located in a valley where a berm could be placed above ground to gain storage. The pond in Option 2 therefore requires basalt rock removal, as do Ponds 1 and 3 in Option 3. The cost of basalt rock removal is based on current projects near the study area.

The estimated costs of the three options, is shown below in Table 3. The estimated construction cost for the Paradise Boulevard portion of the storm drain system is $1,279,000, assuming that there is no basalt rock removal. For detailed estimates see Appendix 3.

Table 3 – Estimated Construction Cost

OPTION	ESTIMATED CONSTRUCTION COST ($)		
	Study Area	PARADISE/LYON BLVDS.	TOTAL
OPTION 1	16,957,000	9,153,000	26,110,000.00
OPTION 2	21,668,000	6,040,000	27,708,000.00
OPTION 3	14,203,000	4,435,000	18,638,000.00
OPTION 4	NA	4,690,000	NA

VIII. CONCLUSION

The estimated construction costs show that Option 3 is a lower cost complete option than the other two. There are also other advantages to Option 3. The biggest is constructability. All of the items in Option 3 are commonly constructed in the Albuquerque area, whereas the large box culverts required in the other options are not. This could lead to more problems in design and construction. Having such large box culverts also increases the possibility for conflicts with existing utilities and will make the design and construction of future utilities in the area much more difficult. Due to the constructability and cost issues, Option 3 is the recommended complete option. However, it is recommended to use Option 4 in place of the Lyon Boulevard storm drain proposed in Option 3. Although the Option 4 configuration is more costly by $255,000, it allows approximately 80 cfs more than Option 3 into the Lyon Boulevard storm drain. This increased flow rate means that less ponding would be required south of Paradise Boulevard, which would reduce the pond costs. It is also recommended that more information be acquired concerning the basalt in the area as this is the most expensive element of any plan.

ZONE/USE	LAND TREATMENT PERCENTAGES			
	A	B	C	D
O-1	0	20	20	60
C-1	0	5	5	90
R-T	0	15	20	65
Roadway	0	0	10	90
Apartments	0	15	15	70
Town Homes	0	15	20	65
R-D	0	13.5	13.5	73
R-LT	0	15	25	60
Chamisa	48	10	25	17
School	0	15	25	60

Design Log

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=======================================================================
Storm & Sanitary SelectCAD Design Log

Drainage File:  P:\00280\Hydro\Design\Control\NewSelectCad\John.sdb

Design File:  P:\00280\HYDRO\DESIGN\CONTROL\AMAFCA_BOARD03.DWG

Display Log:  P:\00280\HYDRO\DESIGN\CONTROL\design.log

Date:  Thursday, May 09, 2002 07:35:[illegible]8 AM
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Designing pipe P6
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    107.0000 cfs              Flow From: Injected Storm

             Status:       Fixed                      Slope:     0.0097 ft/ft
         Pipe Width:     48.0000 in             Pipe Height:    48.0000 in
      Depth of Flow:      2.5990 ft             Flow Status:    Partial
     Critical Depth:      3.1300 ft                Capacity:   141.4722 cfs
           Velocity:     12.3747 ft/s
      Froude Number:      1.4497                Flow Regime: SuperCritical


Designing manhole MH17

  Results:
         Total Flow:    107.0000 cfs              Flow From:   Upstream

             Status:       Fixed
      Chamber Width:      8.0000 ft          Chamber Length:     8.0000 ft


Designing pipe P7
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    107.0000 cfs              Flow From:   Upstream

             Status:       Fixed                      Slope:     0.0307 ft/ft
         Pipe Width:     48.0000 in             Pipe Height:    48.0000 in
      Depth of Flow:      1.8200 ft             Flow Status:    Partial
     Critical Depth:      3.1300 ft                Capacity:   251.7065 cfs
           Velocity:     19.2165 ft/s
      Froude Number:      2.8666                Flow Regime: SuperCritical
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Designing pipe P26

  Results:
         Total Flow:    169.8000 cfs              Flow From: Injected Storm

             Status:       Fixed                      Slope:     0.0050 ft/ft
         Pipe Width:     54.0000 in            Pipe Height:    54.0000 in
      Depth of Flow:      4.5000 ft            Flow Status:       Full
   Critical Depth:        3.7900 ft               Capacity:   139.0519 cfs
           Velocity:     10.6763 ft/s
      Froude Number:      0.0000               Flow Regime: Subcritical


Designing pipe P8
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    276.8000 cfs              Flow From:   Upstream

             Status:       Fixed                      Slope:     0.0095 ft/ft
         Pipe Width:     66.0000 in            Pipe Height:    66.0000 in
      Depth of Flow:      3.8790 ft            Flow Status:    Partial
   Critical Depth:        4.6100 ft               Capacity:   327.3063 cfs
           Velocity:     15.4511 ft/s
      Froude Number:      1.4415               Flow Regime: SuperCritical


Designing manhole MH15

  Results:
         Total Flow:    276.8000 cfs              Flow From:   Upstream

             Status:       Fixed
      Chamber Width:      8.0000 ft         Chamber Length:      8.0000 ft


Designing pipe P9
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    276.8000 cfs              Flow From:   Upstream

             Status:       Fixed                      Slope:     0.0045 ft/ft
         Pipe Width:     72.0000 in            Pipe Height:    72.0000 in
      Depth of Flow:      4.7990 ft            Flow Status:    Partial
   Critical Depth:        4.5500 ft               Capacity:   283.1984 cfs
           Velocity:     11.4151 ft/s
      Froude Number:      0.8956               Flow Regime: Subcritical
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```
Designing pipe P30
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:   121.2000 cfs             Flow From: Injected Storm

             Status:      Fixed                     Slope:    0.0200 ft/ft
         Pipe Width:    48.0000 in            Pipe Height:   48.0000 in
      Depth of Flow:     2.2250 ft            Flow Status:   Partial
     Critical Depth:     3.3100 ft               Capacity:  203.1423 cfs
           Velocity:    16.8679 ft/s
      Froude Number:     2.2123               Flow Regime: SuperCritical


Designing manhole MH14

  Results:
         Total Flow:   398.0000 cfs             Flow From:  Upstream

             Status:      Fixed
      Chamber Width:     8.0000 ft         Chamber Length:    8.0000 ft


Designing pipe P10
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:   398.0000 cfs             Flow From:  Upstream

             Status:      Fixed                     Slope:    0.0181 ft/ft
         Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
      Depth of Flow:     3.6930 ft            Flow Status:   Partial
     Critical Depth:     5.3200 ft               Capacity:  569.7723 cfs
           Velocity:    21.7918 ft/s
      Froude Number:     2.1724               Flow Regime: SuperCritical


Designing pipe P0
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:   212.0000 cfs             Flow From: Injected Storm

             Status:      Fixed                     Slope:    0.0200 ft/ft
         Pipe Width:    72.0000 in            Pipe Height:   72.0000 in
      Depth of Flow:     2.4650 ft            Flow Status:   Partial
     Critical Depth:     3.9800 ft               Capacity:  598.9313 cfs
           Velocity:    19.3604 ft/s
      Froude Number:     2.5069               Flow Regime: SuperCritical
```

Designing manhole MH13

Results:

Total Flow:	610.0000 cfs	Flow From:	Upstream
Status:	Fixed		
Chamber Width:	10.0000 ft	Chamber Length:	10.0000 ft

Designing pipe P11
WARNING: Full flow velocity is greater than maximum (10.00)

Results:

Total Flow:	610.0000 cfs	Flow From:	Upstream
Status:	Fixed	Slope:	0.0064 ft/ft
Pipe Width:	90.0000 in	Pipe Height:	90.0000 in
Depth of Flow:	6.1000 ft	Flow Status:	Partial
Critical Depth:	6.3200 ft	Capacity:	614.2974 cfs
Velocity:	15.8496 ft/s		
Froude Number:	1.0890	Flow Regime:	SuperCritical

Designing pipe P12
WARNING: Full flow velocity is greater than maximum (10.00)

Results:

Total Flow:	610.0000 cfs	Flow From:	Upstream
Status:	Fixed	Slope:	0.0064 ft/ft
Pipe Width:	90.0000 in	Pipe Height:	90.0000 in
Depth of Flow:	6.1000 ft	Flow Status:	Partial
Critical Depth:	6.3200 ft	Capacity:	614.2974 cfs
Velocity:	15.8496 ft/s		
Froude Number:	1.0890	Flow Regime:	SuperCritical

Designing pipe P31
WARNING: Full flow velocity is greater than maximum (10.00)

Results:

Total Flow:	31.4000 cfs	Flow From:	Injected Storm
Status:	Fixed	Slope:	0.0200 ft/ft
Pipe Width:	24.0000 in	Pipe Height:	24.0000 in
Depth of Flow:	1.6060 ft	Flow Status:	Partial
Critical Depth:	1.8800 ft	Capacity:	31.9929 cfs
Velocity:	11.6062 ft/s		
Froude Number:	1.5695	Flow Regime:	SuperCritical

```
Designing pipe P13
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    641.4000 cfs             Flow From:   Upstream

             Status:      Fixed                      Slope:     0.0064 ft/ft
         Pipe Width:    90.0000 in            Pipe Height:    90.0000 in
      Depth of Flow:     6.4960 ft            Flow Status:    Partial
     Critical Depth:     6.4500 ft               Capacity:   614.2974 cfs
           Velocity:    15.7741 ft/s
      Froude Number:     0.9857               Flow Regime:   Critical


Designing pipe P14
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    641.4000 cfs             Flow From:   Upstream

             Status:      Fixed                      Slope:     0.0064 ft/ft
         Pipe Width:    90.0000 in            Pipe Height:    90.0000 in
      Depth of Flow:     6.4960 ft            Flow Status:    Partial
     Critical Depth:     6.4500 ft               Capacity:   614.2974 cfs
           Velocity:    15.7741 ft/s
      Froude Number:     0.9857               Flow Regime:   Critical


Designing pipe P32
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:      6.1000 cfs             Flow From: Injected Storm

             Status:      Fixed                      Slope:     0.0200 ft/ft
         Pipe Width:    24.0000 in            Pipe Height:    24.0000 in
      Depth of Flow:     0.5910 ft            Flow Status:    Partial
     Critical Depth:     0.8700 ft               Capacity:    31.9929 cfs
           Velocity:     7.8402 ft/s
      Froude Number:     2.1195               Flow Regime: SuperCritical


Designing pipe P15
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:    647.5000 cfs             Flow From:   Upstream

             Status:      Fixed                      Slope:     0.0114 ft/ft
         Pipe Width:    90.0000 in            Pipe Height:    90.0000 in
      Depth of Flow:     5.0270 ft            Flow Status:    Partial
```

```
     Critical Depth:     6.4800 ft              Capacity:   819.8627 cfs
           Velocity:    20.5651 ft/s
      Froude Number:     1.7160            Flow Regime: SuperCritical


Designing pipe P33
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:   100.2000 cfs          Flow From: Injected Storm

             Status:      Fixed                  Slope:     0.0200 ft/ft
         Pipe Width:    42.0000 in         Pipe Height:    42.0000 in
      Depth of Flow:     2.1660 ft         Flow Status:    Partial
     Critical Depth:     3.0700 ft            Capacity:   142.2837 cfs
           Velocity:    16.0163 ft/s
      Froude Number:     2.0821            Flow Regime: SuperCritical


Designing pipe P16
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
         Total Flow:   747.7000 cfs          Flow From:   Upstream

             Status:      Fixed                  Slope:     0.0114 ft/ft
         Pipe Width:    90.0000 in         Pipe Height:    90.0000 in
      Depth of Flow:     5.6250 ft         Flow Status:    Partial
     Critical Depth:     6.8100 ft            Capacity:   819.8627 cfs
           Velocity:    21.0334 ft/s
      Froude Number:     1.5852            Flow Regime: SuperCritical


Designing pipe P34

  Results:
         Total Flow:    12.2000 cfs          Flow From: Injected Storm

             Status:      Fixed                  Slope:     0.0050 ft/ft
         Pipe Width:    24.0000 in         Pipe Height:    24.0000 in
      Depth of Flow:     1.3070 ft         Flow Status:    Partial
     Critical Depth:     1.2500 ft            Capacity:    15.9965 cfs
           Velocity:     5.6043 ft/s
      Froude Number:     0.9243            Flow Regime: Subcritical


Designing manhole MH7

  Results:
         Total Flow:   759.9000 cfs          Flow From:   Upstream
```

```
        Status:       Fixed
  Chamber Width:      8.0000 ft           Chamber Length:     8.0000 ft


Designing pipe P17
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    759.9000 cfs            Flow From:   Upstream

          Status:       Fixed                    Slope:     0.0301 ft/ft
      Pipe Width:     72.0000 in           Pipe Height:    72.0000 in
   Depth of Flow:      5.1300 ft           Flow Status:    Partial
  Critical Depth:      5.9300 ft              Capacity:   734.2267 cfs
        Velocity:     29.5144 ft/s
   Froude Number:      2.1080              Flow Regime: SuperCritical


Designing manhole MH6

  Results:
      Total Flow:    759.9000 cfs            Flow From:   Upstream

          Status:       Fixed
   Chamber Width:      8.0000 ft        Chamber Length:     8.0000 ft


Designing pipe P18
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
      Total Flow:    759.9000 cfs            Flow From:   Upstream

          Status:       Fixed                    Slope:     0.0278 ft/ft
      Pipe Width:     72.0000 in           Pipe Height:    72.0000 in
   Depth of Flow:      5.5880 ft           Flow Status:    Partial
  Critical Depth:      5.9300 ft              Capacity:   706.6490 cfs
        Velocity:     27.7015 ft/s
   Froude Number:      1.6244              Flow Regime: SuperCritical


Designing manhole MH5

  Results:
      Total Flow:    759.9000 cfs            Flow From:   Upstream

          Status:       Fixed
   Chamber Width:      8.0000 ft        Chamber Length:     8.0000 ft


Designing pipe P19
```

```
WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
        Total Flow:    759.9000 cfs              Flow From:   Upstream

            Status:      Fixed                       Slope:     0.0622 ft/ft
        Pipe Width:     72.0000 in            Pipe Height:     72.0000 in
     Depth of Flow:      3.7680 ft            Flow Status:     Partial
    Critical Depth:      5.9300 ft               Capacity:  1055.9190 cfs
          Velocity:     40.6361 ft/s
     Froude Number:      3.9904               Flow Regime: SuperCritical


Designing manhole MH4

 Results:
        Total Flow:    759.9000 cfs              Flow From:   Upstream

            Status:      Fixed
     Chamber Width:      8.0000 ft         Chamber Length:      8.0000 ft


Designing pipe P20
  WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
        Total Flow:    759.9000 cfs              Flow From:   Upstream

            Status:      Fixed                       Slope:     0.0543 ft/ft
        Pipe Width:     72.0000 in            Pipe Height:     72.0000 in
     Depth of Flow:      3.9480 ft            Flow Status:     Partial
    Critical Depth:      5.9300 ft               Capacity:   987.1497 cfs
          Velocity:     38.5057 ft/s
     Froude Number:      3.6465               Flow Regime: SuperCritical


Designing manhole MH3

 Results:
        Total Flow:    759.9000 cfs              Flow From:   Upstream

            Status:      Fixed
     Chamber Width:      8.0000 ft         Chamber Length:      8.0000 ft


Designing pipe P21
  WARNING:  Full flow velocity is greater than maximum (10.00)

 Results:
        Total Flow:    759.9000 cfs              Flow From:   Upstream
```

```
         Status:      Fixed                     Slope:     0.0840 ft/ft
     Pipe Width:    72.0000 in            Pipe Height:    72.0000 in
  Depth of Flow:     3.4150 ft            Flow Status:    Partial
 Critical Depth:     5.9300 ft               Capacity:  1227.7918 cfs
       Velocity:    45.7079 ft/s
  Froude Number:     4.8185               Flow Regime: SuperCritical


Designing manhole MH2

  Results:
     Total Flow:   759.9000 cfs              Flow From:   Upstream

         Status:      Fixed
  Chamber Width:     8.0000 ft         Chamber Length:     8.0000 ft


Designing pipe P22
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
     Total Flow:   759.9000 cfs              Flow From:   Upstream

         Status:      Fixed                     Slope:     0.0967 ft/ft
     Pipe Width:    72.0000 in            Pipe Height:    72.0000 in
  Depth of Flow:     3.2700 ft            Flow Status:    Partial
 Critical Depth:     5.9300 ft               Capacity:  1316.7411 cfs
       Velocity:    48.2141 ft/s
  Froude Number:     5.2349               Flow Regime: SuperCritical


Designing manhole MH1

  Results:
     Total Flow:   759.9000 cfs              Flow From:   Upstream

         Status:      Fixed
  Chamber Width:     8.0000 ft         Chamber Length:     8.0000 ft


Designing pipe P23
   WARNING:  Full flow velocity is greater than maximum (10.00)

  Results:
     Total Flow:   759.9000 cfs              Flow From:   Upstream

         Status:      Fixed                     Slope:     0.0808 ft/ft
     Pipe Width:    72.0000 in            Pipe Height:    72.0000 in
  Depth of Flow:     3.4580 ft            Flow Status:    Partial
 Critical Depth:     5.9300 ft               Capacity:  1203.5279 cfs
       Velocity:    45.0167 ft/s
```

Froude Number: 4.7046 Flow Regime: SuperCritical

HGL/EGL Computations:

Table A:

Struct ID	D (in)	Q (cfs)	L (ft)	V (ft/s)	d (ft)	dc (ft)	$V^2/2g$ (ft)	Sf (ft/ft)	Dnstrm Soffit (ft)	EGLdn (ft)	HGLdn (ft)	Tot Loss (ft)	EGLup (ft)	HGLup (ft)	Rim Elev. (ft)
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	5259.50	-
P23	72	759.90	92.95	45.02	-	-	31.49	0.0322	5259.25	-	5259.50	-	-	5263.87	-
MH1	-	-	-	-	-	-	-	-	-	-	5263.87	-	-	5263.87	5273.00
P22	72	759.90	25.12	48.21	3.27	5.93	36.13	-	5267.08	-	5264.35	-	-	5265.99	-
MH2	-	-	-	-	-	-	-	-	-	-	5265.99	-	-	5265.99	5272.50
P21	72	759.90	50.18	45.71	3.41	5.93	32.47	-	5268.83	-	5266.24	-	-	5269.77	-
MH3	-	-	-	-	-	-	-	-	-	-	5269.77	-	-	5269.77	5274.00
P20	72	759.90	63.86	38.51	3.95	5.93	23.04	-	5272.66	-	5270.61	-	-	5273.64	-
MH4	-	-	-	-	-	-	-	-	-	-	5273.64	-	-	5273.64	5278.00
P19	72	759.90	350.68	40.64	3.77	5.93	25.66	-	5275.99	-	5273.76	-	-	5295.02	-
MH5	-	-	-	-	-	-	-	-	-	-	5295.02	-	-	5295.02	5300.50
P18	72	759.90	96.04	27.70	5.59	5.93	11.93	-	5297.55	-	5297.14	-	-	5299.59	-
MH6	-	-	-	-	-	-	-	-	-	-	5299.59	-	5310.81	5299.59	5311.50
P17	72	759.90	231.68	26.88	-	-	11.23	0.0322	5300.00	5310.81	5299.59	7.46	5318.27	5307.05	-
MH7	-	-	-	-	-	-	-	-	-	5318.27	5307.05	1.52	5319.79	5308.57	5312.00
P16	90	747.70	498.71	16.92	-	-	4.45	0.0095	5308.52	5319.79	5308.57	4.73	5324.52	5320.07	-
Junction	-	-	-	-	-	-	-	-	-	5324.52	5320.07	0.61	5325.13		

5320.68	-												
P15	90	617.50	500.03	14.66	-	-	3.34	0.0071	5314.16	5325.13	5320.68	3.56	5328.69
5325.35	-												
Junction	-	-	-	-	-	-	-	-	-	5328.69	5325.35	0.05	5328.74
5325.40	-												
P14	90	641.40	500.01	14.52	-	-	3.28	0.0070	5319.86	5328.74	5325.40	3.49	5332.23
5328.96	-												
Junction	-	-	-	-	-	-	-	-	-	5332.23	5328.96	0.00	5332.23
5328.96	-												
P13	90	641.40	120.00	14.52	-	-	3.28	0.0070	5323.06	5332.23	5328.96	0.84	5333.07
5329.79	-												
Junction	-	-	-	-	-	-	-	-	-	5333.07	5329.79	0.12	5333.19
5329.91	-												
P12	90	610.00	380.01	13.81	-	-	2.96	0.0063	5323.83	5333.19	5329.91	2.40	5335.59
5332.63	-												
Junction	-	-	-	-	-	-	-	-	-	5335.59	5332.63	0.00	5335.59
5332.63	-												
P11	90	610.00	351.24	13.81	-	-	2.96	0.0063	5326.26	5335.59	5332.63	2.22	5337.80
5334.84	-												
MH13	-	-	-	-	-	-	-	-	-	5337.80	5334.84	1.87	5339.67
5336.71	5340.00												
P10	72	398.00	61.79	14.08	-	-	3.08	0.0088	5336.48	5339.67	5336.71	0.55	5340.22
5337.14	-												
MH14	-	-	-	-	-	-	-	-	-	5340.22	5337.14	1.32	5341.54
5338.46	5340.00												
P9	72	276.80	500.00	9.79	-	-	1.49	0.0043	5337.80	5341.54	5338.46	2.14	5343.67
5342.19	-												
MH15	-	-	-	-	-	-	-	-	-	5343.67	5342.19	0.36	5344.03
5342.55	5343.00												
P8	66	276.80	500.02	11.65	-	-	2.11	0.0068	5339.56	5344.03	5342.55	3.40	5347.43
5345.32	-												
Junction	-	-	-	-	-	-	-	-	-	5347.43	5345.32	0.36	5347.79
5345.68	-												
P26	54	169.80	26.85	10.68	-	-	1.77	0.0075	5343.29	5347.79	5345.68	0.20	5347.99
5346.22	-												
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5318.27
5307.05	-												
MH7	-	-	-	-	-	-	-	-	-	5318.27	5307.05	3.49	5321.76
5310.54	5312.00												
P34	24	12.20	21.05	3.88	-	-	0.23	0.0029	5303.02	5321.76	5310.54	0.06	5321.82
5321.59	-												
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5324.52
5320.07	-												
P33	42	100.20	22.65	10.41	-	-	1.69	0.0099	5310.16	5324.52	5320.07	0.22	5324.75
5323.06	-												
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5328.69
5325.35	-												
P32	24	6.10	27.65	1.94	-	-	0.06	0.0007	5314.36	5328.69	5325.35	0.02	5328.71

														5328.65	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5333.07	5329.79	-
P31	24	31.40	32.68	9.99	-	-	1.55	0.0193	5318.33	5333.07	5329.79	0.63	5333.70	5332.15	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5337.80	5334.84	-
MH13	-	-	-	-	-	-	-	-	-	5337.80	5334.84	0.50	5338.30	5335.34	5340.00
P0	72	212.00	45.11	7.50	-	-	0.87	0.0025	5326.98	5338.30	5335.34	0.11	5338.42	5337.54	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5340.22	5337.14	-
MH14	-	-	-	-	-	-	-	-	-	5340.22	5337.14	0.57	5340.79	5337.71	5340.00
P30	48	121.20	24.13	9.64	-	-	1.45	0.0071	5335.80	5340.79	5337.71	0.17	5340.96	5339.52	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	5347.43	5345.32	-
P7	48	107.00	500.24	19.22	-	-	5.74	0.0055	5342.77	-	5345.32	-	-	5355.82	-
MH17	-	-	-	-	-	-	-	-	-	-	5355.82	-	-	5355.82	5361.00
P6	48	107.00	583.44	12.37	2.60	3.13	2.38	-	5358.00	-	5356.60	-	-	5362.22	-

Table B:

	Losses							Loss Coefficients							
Str ID	Hf	Hb	Hstr	Hc	He	Hj	Total	Dstr	Ko	CD	Cd	Cq	Cp	Cb	K
Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P23	2.99	-	-	-	-	-	2.99	-	-	-	-	-	-	-	-
MH1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P22	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-
MH2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P21	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-
MH3	-	-	-	-	-	-	-	-	-	-	-	-	-		

														-	-
P20	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-
MH4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P19	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-
MH5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P18	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-
MH6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P17	7.46	-	-	-	-	-	7.46	-	-	-	-	-	-	-	-
MH7	-	-	1.52	-	-	-	1.52	6.33	0.253	1.000	0.516	1.037	1.000	1.000	0.135
P16	4.73	-	-	-	-	-	4.73	-	-	-	-	-	-	-	-
Junction	-	0.08	-	-	-	0.53	0.61	-	-	-	-	-	-	-	-
P15	3.56	-	-	-	-	-	3.56	-	-	-	-	-	-	-	-
Junction	-	-	-	-	-	0.05	0.05	-	-	-	-	-	-	-	-
P14	3.49	-	-	-	-	-	3.49	-	-	-	-	-	-	-	-
Junction	-	0.00	-	-	-	-	0.00	-	-	-	-	-	-	-	-
P13	0.84	-	-	-	-	-	0.84	-	-	-	-	-	-	-	-
Junction	-	0.00	-	-	-	0.12	0.12	-	-	-	-	-	-	-	-
P12	2.40	-	-	-	-	-	2.40	-	-	-	-	-	-	-	-
Junction	-	0.00	-	-	-	-	0.00	-	-	-	-	-	-	-	-
P11	2.22	-	-	-	-	-	2.22	-	-	-	-	-	-	-	-
MH13	-	-	1.87	-	-	-	1.87	13.87	1.074	1.000	0.723	0.812	1.000	1.000	0.630
P10	0.55	-	-	-	-	-	0.55	-	-	-	-	-	-	-	-
MH14	-	-	1.32	-	-	-	1.32	5.70	1.045	1.000	0.485	0.847	1.000	1.000	0.429
P9	2.14	-	-	-	-	-	2.14	-	-	-	-	-	-	-	-
MH15	-	-	0.36	-	-	-	0.36	8.19	0.401	1.000	0.602	1.000	1.000	1.000	0.242
P8	3.40	-	[illegible]	-	-	-	3.40	-	-	-	-	-	-	-	-

Junction	-	0.17	-	-	0.19	Neg	0.36	-	-	-	-	-	-	-	-
P26	0.20	-	-	-	-	-	0.20	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MH7	-	-	3.49	-	-	-	3.49	6.33	1.103	1.000	0.516	0.546	1.000	1.000	0.311
P34	0.06	-	-	-	-	-	0.06	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P33	0.22	-	-	-	-	-	0.22	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P32	0.02	-	-	-	-	-	0.02	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P31	0.63	-	-	-	-	-	0.63	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MH13	-	-	0.50	-	-	-	0.50	13.87	0.135	1.000	0.723	1.724	1.000	1.000	0.169
P0	0.11	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MH14	-	-	0.57	-	-	-	0.57	5.70	1.436	1.000	0.485	0.267	1.000	1.000	0.186
P30	0.17	-	-	-	-	-	0.17	-	-	-	-	-	-	-	-
New Branch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P7	2.78	-	-	-	-	-	2.78	-	-	-	-	-	-	-	-
MH17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P6	-	-	-	-	-	-	SuperCrt	-	-	-	-	-	-	-	-