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STUDY PHASE
LETTER REPORT
FOR
COAL AVENUE STORM DRAIN
REHABILITATION PROJECT
CITY PROJECT NO. 4522.91

July 2008

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I. INTRODUCTION AND SITE LOCATION

The Coal Avenue Storm Drain Rehabilitation Project involves the installation of underground storm drains in the following locations.

- Coal Avenue east of Yale Boulevard,
- Harvard Drive from Coal to Garfield Avenue,
- Garfield Avenue from Harvard Drive to Yale Boulevard,
- Bell Avenue from Yale Boulevard to Buena Vista Drive, and
- Buena Vista Drive from Bell Avenue to Avenida Cesar Chavez.

The original scope of the projected involved extending storm drain in Coal Avenue from the end of the existing 42" RCP storm drain near Harvard Drive east to Princeton Drive, and then replacing the existing storm drain in Coal Avenue at Tulane Drive to Carlisle Boulevard, and in Carlisle Boulevard from Coal Avenue to Garfield Avenue. Early in the project it was discovered that the capacity of the Yale Boulevard storm drain system, which drains to the Avenida Cesar Chavez storm drain, was less than originally thought. Therefore, a study was completed to examine alternatives to increase the capacity of the Yale Boulevard storm drain system and thus, allow for increasing the flow from the Coal Avenue storm drain which drains into the Yale storm drain.

II. NARRATIVE OF PROJECT REQUIREMENTS

The purpose of this project is to collect and convey storm flows from the drainage basins that drain to Coal Avenue between Yale Boulevard and Carlisle Boulevard to the storm drain in Yale Boulevard. We will determine the peak runoff by developing a hydrologic model using the AHYMO program. This project includes the preparation of preliminary and final design plans, specifications, and bid documents for the proposed storm drain system. A key to the success of the project will be providing design solutions to the utility conflicts, specifically water line conflicts.

The following issues will be addressed during the design of the project.

- Bell Avenue Diversion: The existing 36" storm drain in Bell Avenue from Yale Boulevard to Buena Vista Drive and in Buena Vista Drive from Bell Avenue to Avenida Cesar Chavez will be removed and replaced with a larger 60" storm drain to provide more capacity. These improvements will divert flows from Yale Boulevard to Avenida Cesar Chavez.

- Harvard Drive Diversion: Install a 60" storm drain in Harvard Drive from Coal Avenue to Garfield Avenue and in Garfield Avenue from Harvard Drive to Yale

Boulevard. This storm drain will divert flows from Coal Avenue to the intersection of Yale Boulevard and Garfield Avenue.

- Coal Avenue Storm Drain: The existing 42" storm drain from Harvard Avenue to the alley east of Harvard Avenue will be removed and replaced with a 60" storm drain. Install a 60" storm drain from the alley east of Harvard Avenue to Cornell Avenue. Install a 54" storm drain from Cornell Avenue to Princeton Avenue.

- Raising or lowering existing waterlines to accommodate the new storm drain alignment.

- Design of traffic control to minimize the impact on local traffic. Yale is sufficiently wide to allow for two-way traffic and still provide adequate room for construction of the proposed storm drain. Coal is sufficiently wide enough to allow one west-bound traffic lane and provide adequate room for construction of the storm drain. Bell and Buena Vista may require closing to through traffic during construction.

III. METHODOLOGY

The hydrologic and hydraulic criteria in Section 22 of the City of Albuquerque Development Process Manual (DPM), entitled "Drainage, Flood Control, and Erosion Control," was followed to perform the analyses given in this report. The design storm used for the project is the 100-year, 6-hour storm event for peak flow computations. The project is located in Zone 3, which has a 100-year, 6-hour design storm of 2.60 inches. An AHYMO model was developed for all basins draining to the intersections of San Pedro and San Francisco and San Pedro and Derickson.

The existing and proposed storm drain systems were analyzed using Haestad StormCad hydraulic analysis software. This is a one-dimensional software that allows for input of peak flows at inlets. This program allows for head loss coefficients to be input to account for head losses due to flows moving through manholes and catch basins.

Head loss coefficients were taken from XP-RatHGL nomographs for pressure flow conditions. These nomographs are from the xp-software company. These headloss coefficients are determined from pipe sizes, system configurations (e.g. 45-degree bend), and manhole shaping. However, when there is a confluence of flows to a manhole, the nomographs also take into account the in-line pipe sizes and connector pipe sizes as well as the flow rates for each of these pipes. The head losses are a function of these components. Existing and proposed flows that were input to the program are taken from the hydrology developed for the project by the design team.

Pipe sizes, invert and rim elevations, and system geometry were taken from the record drawings provided by the COA as well as survey data taken for the project by the design team.

IV. SUMMARY OF STUDY CONCLUSIONS

A. HYDROLOGY

The scope of work identified analyzing the basins along Coal Avenue between Yale Boulevard and Carlisle Boulevard and the basins that drain to the existing storm drain in Carlisle Boulevard between Coal Avenue and Garfield Avenue and the continuation of the storm drain in Garfield Avenue. Aerial mapping of the project area with 2' contours was obtained from AMAFCA to determine drainage basin delineation. The aerial mapping shows that there are a total of 15 basins that drain to Coal Avenue and the existing Coal storm drain system.

Exhibit I shows the drainage basins that were delineated using the aerial mapping. Basins 1 and 2 drain to the eastern portion of the Coal storm drain system east of Carlisle. Basin 3 drains to inlets in a sump condition located in Carlisle. Basin 4 also drains to inlets in a sump condition in Amherst Drive. The runoff from basins 5 through 8 drains to Coal and is either collected by the existing storm drain or is conveyed in the street to the intersection of Coal and Vassar. Runoff from basins 9 and 10 drains to a storm drain in Lead Avenue and Vassar Drive that drains to the Coal storm drain system. Runoff from basins 11 through 16 is conveyed in the street section until it is collected by storm inlets near Harvard Avenue.

Basin characteristics were computed for input to AHYMO. To obtain the percent of Land Treatment D, first all of the residential lots in each basin were counted and divided by the basin area to get a DU/ACRE value, next the DU/ACRE value was input to the calculation for single family residential land use in Table A-5 of the DPM Section 22.2. The remaining percentage for land treatment types was divided equally into Type B and Type C. Since all of the basins are less than 40 acres in size, it was assumed that the time to peak was the minimum allowed of 0.17 hours. See Appendix A for basin characteristics calculations.

Once the basin characteristics were calculated, an AHYMO model was developed to determine the peak flows. The peak flows for each basin were calculated and then were added without routing the flows. This was done to be conservative in the peak flow values.

Due to limitations on the capacity of the existing storm drain system, the runoff from all of the basins does not reach the intersection of Yale Boulevard and Coal Avenue. Runoff from basin 1 that is not collected in the existing storm drain will drain northeast to the storm drain in Montclaire Street. In basins 2, 3, and 4 the peak flows entering the storm drain are limited by the capacity of the storm drain since all of the storm inlets in these

basins are in a sump condition. Runoff from basin 9 that is not collected in the existing storm drain in Lead Avenue will drain west in Lead Avenue to the storm drain system in Lead Avenue and Yale Boulevard. Runoff from basin 10 that is not collected in the storm drain in Vassar Drive will drain south to Coal Avenue and then west on Coal Avenue. Runoff from basins 4 through 8 and basins 11 through 16 will be collected in the storm drain or be conveyed in the street to Yale Boulevard. If all of the basins that drain to the Coal storm drain or drain to Coal Avenue were added a total of 528.6 CFS would reach the intersection of Yale and Coal. But, because of the limitations of the existing Coal storm drain, the peak flow that can reach the intersection of Yale and Coal is 296.5 CFS. The capacity of the storm drain at Yale and Coal is 130 CFS. Therefore, The Coal storm drain needs to be increased to collect the flows that reach the Yale/Coal intersection. See Appendix A for hydrologic calculations.

Table 1 Existing Drainage Conditions

Basins	Area (acres)	DU's/Acre	100yr-6hr Peak Flow (CFS)	CFS/Acre	Land Treatment
1	7.84	2.17	25.6	3.25	36.2%B, 36.2%C, 27.6%D
2	9.08	2.53	30.1	3.31	34.7%B, 34.7%C, 30.6%D
3	12.97	3.08	44.2	3.40	32.5%B, 32.5%C, 35.0%D
4	10.32	4.07	36.6	3.55	28.7%B, 28.8%C, 42.5%D
5	12.14	4.04	43.2	3.55	28.8%B, 28.9%C, 42.3%D
6	11.27	4.26	40.4	3.58	28.0%B, 28.0%C, 44.0%D
7	11.52	4.17	41.1	3.57	28.3%B, 28.4%C, 43.3%D
8	12.46	4.41	45.0	3.60	27.4%B, 27.5%C, 45.1%D
9	38.98	3.90	137.4	3.53	29.4%B, 29.4%C, 41.2%D
10	4.75	4.21	17.0	3.58	28.2%B, 28.2%C, 43.6%D
11	3.75	3.47	13.0	3.46	31.0%B, 31.1%C, 37.9%D
12	3.19	4.08	11.3	3.56	28.7%B, 28.7%C, 42.6%D
13	3.33	3.90	11.8	3.53	29.3%B, 29.4%C, 41.3%D
14	3.33	3.60	11.6	3.49	30.5%B, 30.5%C, 39.0%D
15	2.68	4.48	9.7	3.62	27.2%B, 27.2%C, 45.6%D
16	2.49	Commercial	10.7	4.31	10.0%B, 10.0%C, 80.0%D

B. STORM DRAIN HYDRAULICS

1. DISCUSSION OF EXISTING STORM DRAIN SYSTEMS

A. INTRODUCTION

The existing storm drain system was modeled using record drawings, topographic and planimetric survey data obtained on Coal Avenue from Yale east to Vassar and from Wellesley east to Carlisle, on Carlisle from Coal Avenue south to Garfield, and on Garfield from Carlisle east to Hermosa. The area on Coal Avenue between Vassar and

Wellesley had centerline data only for the analysis. The design survey was produced in the 1988 NGVD vertical datum.

The as-builts for the project were collected from the City of Albuquerque Maps and Records Department. These record drawings are presented in the 1929 vertical datum. The City requires that all design surveys shall be provided in the 1988 vertical datum. Therefore, the elevations taken from the record elevations for the road, manhole rims, and storm drain inverts were adjusted to the 1988 datum to coincide with the design survey.

The existing storm drain system record data and survey data were input to the model and flows were input at various points in the system that are represented by catch basins and cattle guards. Two flow conditions were generated for the existing system. In one case, the flows that are published on the record drawings were input to the model to check the resulting hydraulic grade line (HGL). The second existing system model used reduced flows from the published data that would maintain an HGL below the ground at all locations with pressure flow to maximize the system capacity.

There are three parts to the existing storm drain system. These are the Yale system from Avenida de Caesar Chavez (ACC) to Coal, the Garfield system east of Yale, and the Coal system east of Yale. Each of these systems is shown on Exhibit II. These systems and the limitations of each are described below.

B. YALE STORM DRAIN SYSTEM

The Yale System was constructed in 1997 and consists of 30-inch to 72-inch diameter storm drain and catch basins. Record drawings indicate that the system was planned to convey a total of 330 CFS to the confluence of the Yale System and the Santa Clara System. The Santa Clara system delivers 350 CFS to this confluence. These two systems combine to flow into the ACC System for a total planned flow of 680 CFS at that location.

Flows to the Yale system are from two main sources: the Coal system at the north end of the Yale system and the Garfield system located south of Coal. Record drawings indicate that the Coal system will deliver 160 CFS (30 CFS is from the Yale system north of Coal and 130 CFS is from the recently constructed system in Coal east of Yale) and the Garfield system will deliver 290 CFS for a total of 450 CFS at the Yale/Garfield confluence. There are additional flow contributions to the system along the length of Yale through several catch basins.

There are two diversions in this system that remove flows from the Yale system. The first of these diversions is located at the north end of the system at Yale and an alley south of Garfield on the west side of Yale. The storm drain in this alley connects to a storm drain located in Buena Vista that drains to the University Storm Drain System. This diversion from the Yale system is referred to as the Buena Vista Diversion (BVD) in this report. A 48-inch pipe connects to the Yale system at a manhole and diverts flow to the west. This

diversion system moves flows to the storm drain system located in University Boulevard that ultimately discharges to the South Diversion Channel. Hydraulic calculations show that this pipe diverts 128 CFS from the Yale System.

The second diversion is at the south end of the system at Bell and Yale. An existing 36-inch diameter storm drain diverts flows from the Yale system west in Bell to Buena Vista, then south in Buena Vista to the ACC system. Calculations of the diversion show that there is approximately 24 CFS being diverted from Yale at this connection. There are several catch basins located in both Bell and Buena Vista that also contribute to this system. Record drawings for the ACC system show that there is 120 CFS planned to be put into the ACC system from Buena Vista. Calculations show that the current total contribution to the ACC system is approximately 70 CFS.

C. GARFIELD STORM DRAIN SYSTEM

The Garfield system is a very extensive storm drain system that encompasses a large residential area, generally east of Yale and south of Coal. The downstream end of the Garfield system begins at Yale and Garfield and proceeds east (upstream) in Garfield to an alley just east of Dartmouth. From Garfield, the system branches out to the south on Columbia, Girard, Dartmouth and Richmond. The system also branches to the north at Princeton to Coal and then continues east in Coal to Carlisle, south on Carlisle to Garfield, and then east to Hermosa. This branch line is referred to as the original Coal system in this report. Exhibit II shows the extent of the Garfield system.

This original Coal system, constructed in 1949 and the 1950's consists of 15-inch to 36-inch diameter storm drain and is undersized compared to the overland flows that reach the system. The hydrology developed for this analysis shows that the total flows reaching the older Coal system are 241 CFS at the analysis point at Princeton and Coal. The storm drain size at this location is 36-inch RCP with a full flow capacity of 55 CFS, well below the flows that reach this location. In addition to small pipe sizes, the system has a series of drop manholes located in Coal. These drop manholes result in head losses that reduce the carrying capacity of the system. The system also has some inefficient catch basins (not current DPM standards) that can only intercept small amounts of runoff from the street flows.

The controlling factor in the Garfield system is the size of the storm drain system and the cattle guard that was installed just east of Yale in 1997. This cattle guard was analyzed using culvert equations as this will act as a culvert during a storm event. This analysis shows that the cattle guard can convey approximately 160 CFS to the Yale system. Flows in excess of 160 CFS will surcharge at the cattle guard. The full flow capacity of the 48-inch storm drain just up from this cattle guard is 110 CFS. Although hydrology was not completed for this area, based on the size of the watershed area and assuming similar runoff rates from this area, the total flows generated during an event are well in excess of the capacity of either the existing pipe system or the cattle guard.

2. HYDRAULIC ANALYSES OF THE YALE STORM DRAIN SYSTEM

A. INTRODUCTION

After the Yale system model was developed, flow data from record drawings was input to the model for the initial analysis. The model allows for flows to be split at the diversions in the storm drain system. Flows for the two diversions were modeled using the stage discharge data developed by assuming that the diversions acted like culverts. The outfall of the system was modeled just upstream of the confluence of the Santa Clara and Yale systems with the beginning HGL taken from the ACC system record drawings. From this data, the hydraulic grade line (HGL) was calculated.

B. DISCUSSION OF RESULTS

The HGL of the existing Yale system is shown in Appendix B and is labeled "Yale existing storm drain with 450 CFS at Yale and Garfield". The HGL from the outfall of the model up stream to Garfield shows the HGL in a "saw tooth" pattern above the ground elevation. The model is programmed to move the HGL out of the ground until it reaches a pressure relief point in the system. These points are typically catch basins that would allow flow to move out of the system. At these points, the model assumes that there is pressure relief to the system, and the model moves the HGL back to the ground elevation for future calculations. This is the "saw tooth" pattern that is seen on the HGL plots. However, the model does not "lose" the flows at these locations. Rather, it continues to use the system flows for future HGL calculations. This does not match the reality which is, if the system HGL goes above the ground at a catch basin location flows will move out of the system and localized flooding will occur. The model does allow for bolted manhole covers when a junction is a manhole and this alternative is used in the model to run the system under pressure as much as possible.

As can be seen in the profile, the HGL is well above the rim elevation at the manhole in Yale at the intersection with Garfield. The manhole at this location was modeled as a bolted cover thereby allowing the HGL to rise to the calculated elevation. The ground at this location is at about elevation 5157.20 while the HGL is at elevation 5162.70 (approximately 5 feet higher). This is due to high head loss in the manhole located in Yale. This manhole is the confluence of an incoming 54-inch and incoming 60-inch storm drain with only a 72-inch outlet pipe. Assuming that this manhole cover is bolted, the HGL of the system will be much higher than the grate elevation of the cattle guard (approximately 5157.27) located in Garfield about 80 feet east of Yale and there will be a loss of flows from the system at that location. The planned 290 CFS of flow delivery from the cattle guard to the manhole in Yale will not occur.

The HGL of the Yale system at the manhole that receives flows from the new Coal system is approximately 3-1/2 feet above the rim elevation. This HGL continues upstream to the location of the catch basins at Sta. 10+73. At this location, the HGL is dropped to the ground level and the HGL calculation continues upstream. This drop in the HGL

indicates a location where flows would be lost from the system and, in reality; the HGL would be at a level that would not allow for flows to move into the catch basins of this system. Therefore, in this scenario, the new Coal system will not convey the anticipated 160 CFS that is referenced on the record drawings, rather a lower flow rate.

C. RE-ANALYSES OF THE YALE STORM DRAIN SYSTEM

After determining that the existing Yale system had limitations, the flows to the system model were revised to determine how much flow the system could convey that would keep the HGL under the ground (while still trying to operate the system under pressure) to optimize the carrying capacity. The flows from catch basins along Yale south of Garfield were not changed. The flows that were modified are those from Yale and Garfield at that intersection. Flows to the system along Yale between Garfield and ACC are not significant as there are only a few catch basins located along this length of storm drain. This analysis is presented in Appendix B and is labeled "Yale existing conditions with allowable flows".

The flow from Garfield was reduced to from 290 CFS to 160 CFS (based on the flow delivery calculations of the cattle guard using culvert calculations as the control), the flow from the new Coal system was reduced from 130 CFS to 80 CFS, and the flows from the Yale system north of Coal was kept at 30 CFS. Total flows to the manhole at Yale and Garfield are 270 CFS (180 CFS less than the flows shown on the record drawings). The resulting HGL of the system is in the ground at all locations and is at the ground elevation at the cattle guard located in Garfield. Flows are still diverted at the Buena Vista Diversion and at the Bell Diversion as in the original system model. However, the diversion flow rate drops from 128 CFS (with the planned 450 CFS in the system) to 98 CFS (with allowable flow in the system). The amount of flow that is diverted to the Bell system is reduced from 24 CFS to 14 CFS (resulting from less head in the system). The final flow from the Yale system to the confluence of the Yale and Santa Clara systems is reduced from a theoretical flow of 330 CFS to a flow of 180 CFS.

Additionally, the diversions depend on the head of the system to drive the amount of flow that is diverted (the higher the headwater, the more flow is moved through a culvert). The lower allowable flow rates in the Yale system result in lower flows through each of the diversions. The total flow diversion is reduced from 152 CFS to 112 CFS. Therefore, the total reduction of flow in the Yale storm drain system is 190 CFS (150 CFS plus 40 CFS).

3. PROPOSED STORM DRAIN SYSTEMS

A. INTRODUCTION

Flows through the confluence at Yale and Garfield to the Yale system to the south are reduced due to the head loss at the manhole at that location. Also, some of the storm drains (manhole to manhole) in the south leg of the system are at minimum slopes (0.005

ft/ft or less). As such, they do not have the carrying capacity as other sections of the system (same size pipe but steeper slopes).

The team developed five possible alternatives for increasing the capacity of the Yale system and, subsequently to increase the flow from the Coal system to the Yale system. This approach assumed that the existing newer Coal system located just east of Yale would be upsized along part of the existing reach (on the east end) and the system would be extended east to the existing older Coal system that currently begins at Princeton and Coal. The team also assumed that we would remove and replace the existing older Coal system from Princeton east to Carlisle, as well as upsizing the system in Carlisle from Coal to Garfield. The issue then becomes one of increasing the capacity of the Yale system such that it can convey the added flows from the Coal system. The alternatives considered were:

1) Increase the size of storm drain in Coal Avenue east of Yale Boulevard and/or construct a diversion from the Coal system to the Yale system that does not require extensive modification of the Coal system.

2) Increase the size of the Yale System or construct a parallel storm drain system in Yale Boulevard from Coal Avenue to the Santa Clara/Yale confluence.

3) Increase the capacity of the North Buena Vista Diversion by either 1) upsizing the Buena Vista Diversion pipe size or 2) running a parallel storm drain to the existing system.

4) Increase the capacity of the Bell Diversion at the south end of the project by either 1) upsizing the Bell Diversion pipe size or 2) running a parallel storm drain to the existing system.

5) Implement some combination of the above alternatives.

B. ALTERNATIVES DISCUSSION

Each of the alternatives was investigated to allow for the Coal system to convey added flows to the Yale system. Removing the existing newer Cola system and replacing it with a larger pipe was not considered as the existing system is relatively new and this alternative would require that a significant amount of storm drain be replaced in both Coal and in Yale north of Garfield. However, the team did investigate the addition of a new diversion from the Coal system at the intersection of Coal and Harvard. This would allow for additional flows to be conveyed by the planned Coal storm drain extension but these flows would be diverted from the existing newer Coal system at Harvard and conveyed in a the storm drain south in Harvard to Garfield, and then west in Garfield to the Yale system. This diversion would not be connected to the Garfield system as it is meant only to convey flows from Coal to Yale.

The team examined up-sizing the Yale System and/or constructing a parallel pipe for added capacity. After discussions with the COA Storm Drain Division staff, these two alternatives were not given additional consideration due to the cost of this system as well as the impact that this construction would have on the area.

Another alternative was to increase the flow capacity of the BVD located just south of Garfield. This would be accomplished by either 1) removing the existing storm drain and installing a larger storm drain system or, 2) installing a new storm drain parallel to the existing storm drain. Again, after discussions with the COA Storm Drain Division staff this alternative was not given further consideration for two reasons:

1) The existing 48-inch RCP is located in an alley and it would be very difficult to construct a new larger (or parallel) storm drain in this right-of-way. There are also utilities that are located in the alley that would have to be removed or replaced as part of the effort thereby increasing costs.

2) This system flows to an existing storm drain located in University Boulevard beginning at Coal and flowing south to connect to the ACC system at University and ACC. Although not modeled, we reviewed the size and slope of the storm drain system in University and concluded that there is not significant capacity that the system could carry any added flows. There is the real possibility that if the flow to the University Boulevard system was increased significantly, it might result in surcharging of the University Boulevard system and subsequent flooding. Therefore, a decision was made to keep the diversion system flow at around the same rate as is currently delivered to the University system from the by-pass on Yale Boulevard.

The team looked at up-sizing the Bell Diversion and this appeared to be a good alternative. By observation it appeared that, if the Bell Diversion by-pass flow at Yale and Bell could be increased and moved to the ACC system at the intersection of ACC and Buena Vista, this would serve two purposes. The HGL at the confluence of the Yale system and Santa Clara would be lowered, and the flows in the Yale system that reach the Santa Clara confluence would be reduced. By lowering the HGL at the confluence of Yale and Santa Clara, this would allow for additional flows to be added to the Yale system while keeping the HGL below the ground elevation.

After review and discussion with COA Storm Drain Division staff, the alternatives of the Harvard by-pass and the increased Bell Diversion These alternatives were further developed and then input to the storm drain model for hydraulic analysis. This analysis is presented in Appendix C and is labeled "Yale from ADC to north end of Yale system: Proposed SD".

The scenario that was chosen for detailed analysis is presented in Exhibits III, IV and V. Beginning at the upstream end of the system, this proposed system includes the following items:

- New RCP storm drain will be installed in Coal from Harvard to Carlisle. This system will consist of 42-inch to 54-inch RCP storm drain and will convey added flows from the Coal drainage basin that currently by-pass the existing storm drain system due to inadequate capacity. The conveyance capacity of the Coal system (including the diversion at Harvard) will be increased from 80 CFS to 226 CFS.

- A new 6' x 8' reinforced Portland cement concrete (RPCC) cast-in-place junction box will be constructed in Coal at Harvard for the planned diversion.

- The Harvard Diversion, a new 60-inch RCP storm drain, will be constructed from the Coal storm drain system at Coal and Harvard south on Harvard to Garfield. This system will then be routed west in Garfield (parallel to the existing Garfield storm drain) and will connect to the proposed 6' tall by 8' wide box culvert in Yale (see discussion below). This effort will include re-constructing the existing cattle guard on Garfield to accommodate the new 60-inch Harvard Diversion. The Harvard Diversion storm drain will pass through the cattle guard (not be connected to the cattle guard) and is meant only to convey the Coal flow by-pass, not to intercept added flows at the cattle guard. The Harvard system will divert 125 CFS from the Coal system.

- Approximately 50 linear feet of 72-inch storm drain will be removed in Yale from Garfield to the north Buena Vista Diversion. This length of pipe will be replaced by a 25 foot long, 6'-tall by 8'-wide reinforced concrete box culvert (CBC). This CBC will be designed to convey 417 CFS to the current location of the Yale system and the North Buena Vista diversion. This CBC will connect to the existing 72-inch RCP storm drain in Yale and the 48-inch North Buena Vista Diversion. The entrance conditions for the outlet pipe will be improved to reduce the head losses and optimize the out flow from the box. The discharge to the north Buena Vista Diversion will be 124 CFS (approximate historic rate) and the discharge to the existing Yale system will be 294 CFS. This is an increase of 147 CFS over the existing system capacity at this location.

- The existing Bell Diversion at Bell and Yale and the downstream storm drain located in Buena Vista will be removed and replaced by a new diversion that will connect into the ACC system at Buena Vista and ACC. This new diversion will divert 147 CFS from the Yale system. By diverting this flow, the HGL at the confluence of Yale and Santa Clara will be lowered approximately 2.7 feet. This will lower the HGL in the Yale system allowing for more flows to be conveyed by the Yale system operating under pressure while keeping the HGL from coming out of the ground.

The following table provides a synopsis of flows conveyed through the existing system versus the proposed system.

Table 2 Existing and Proposed Storm Drain Capacities

Analysis Point	Existing Allowable Flows, CFS	Proposed System Flows, CFS	Increase in Flows, CFS
Coal at Harvard	80	194	114
Harvard Diversion	*	125	125
Garfield just east of Yale (from cattle guard)	160	161	1
Yale just north of Yale and Garfield	110	131	21
Yale at the intersection of Yale and Garfield	270	417	147
Buena Vista Diversion	98	124	26
South of Buena Vista Diversion	172	294	122
Just north of Yale/Bell diversion**	182	304	122
Bell Diversion**	14	147	133
Yale at the Yale/Santa Clara confluence	180	175	-5

* Harvard Diversion is planned improvements for the proposed system and is not currently part of the existing system.
** Flows to these points include flows form catch basins.

These proposed improvements will provide for an additional 147 CFS to be conveyed through the Yale system to the diversions and to the ACC system. The system will be under pressure to optimize the carrying capacity, however the HGL will remain below the street elevation at all locations.

C. POTENTIAL CONFLICTS

1. BELL DIVERSION STORM DRAIN

In Bell and Buena Vista, the new 60" RCP will be constructed in the same corridor as the existing 36" RCP, thereby minimizing utility conflicts. In Bell, at the location where the 60" RCP crosses the 6" water line from Wilmoore Avenue, the waterline will be lowered. There may also be other "dry" utility lines that need relocation.

2. HARVARD DIVERSION STORM DRAIN

In Yale Boulevard there is a 10" water line in the southbound lanes. In Garfield there is a 10" waterline in the street with a connection to a 6" waterline in the alley between Yale and Harvard. At this time it is anticipated that the 6" waterline at the alley will be lowered to allow for construction of the 60" RCP. In Yale Boulevard there is a 12" sanitary sewer line in the street. In Garfield there is an 18" sanitary sewer line in the street and an 8" sanitary sewer line in the alley that connects to the 18" line in Garfield. At this time there are no sanitary sewer relocation anticipated. There may also be other "dry" utility lines that need relocation.

3. DOWNSTREAM COAL STORM DRAIN

In Coal between Harvard and Princeton there are no water lines, but at each alley a 6" water line crosses Coal. The 6" water lines that cross Coal will be lowered to allow for the construction of the 54" RCP and the 60" RCP. In Coal there is a 48" interceptor sanitary sewer line that was constructed in 1949. It should be noted that although the storm drain will be constructed parallel to the sanitary sewer line, there may be damage to the 48" sanitary sewer line during construction due to its condition. At each alley there are 8" sanitary sewer lines crossing Coal. The proposed storm drain will be constructed on top of these sanitary sewer lines so that they do not have to be relocated. Between Columbia and Princeton there is an 8" sanitary sewer line that may need to be replaced according to the ABCWUA. There may also be other "dry" utility lines that need relocation.

D. NEED FOR SPECIALTY SERVICES

At this time it is not apparent that there is a need for specialty services for this project. As the design proceeds, there may be a need for specialty services.

V. LIST OF SHEETS

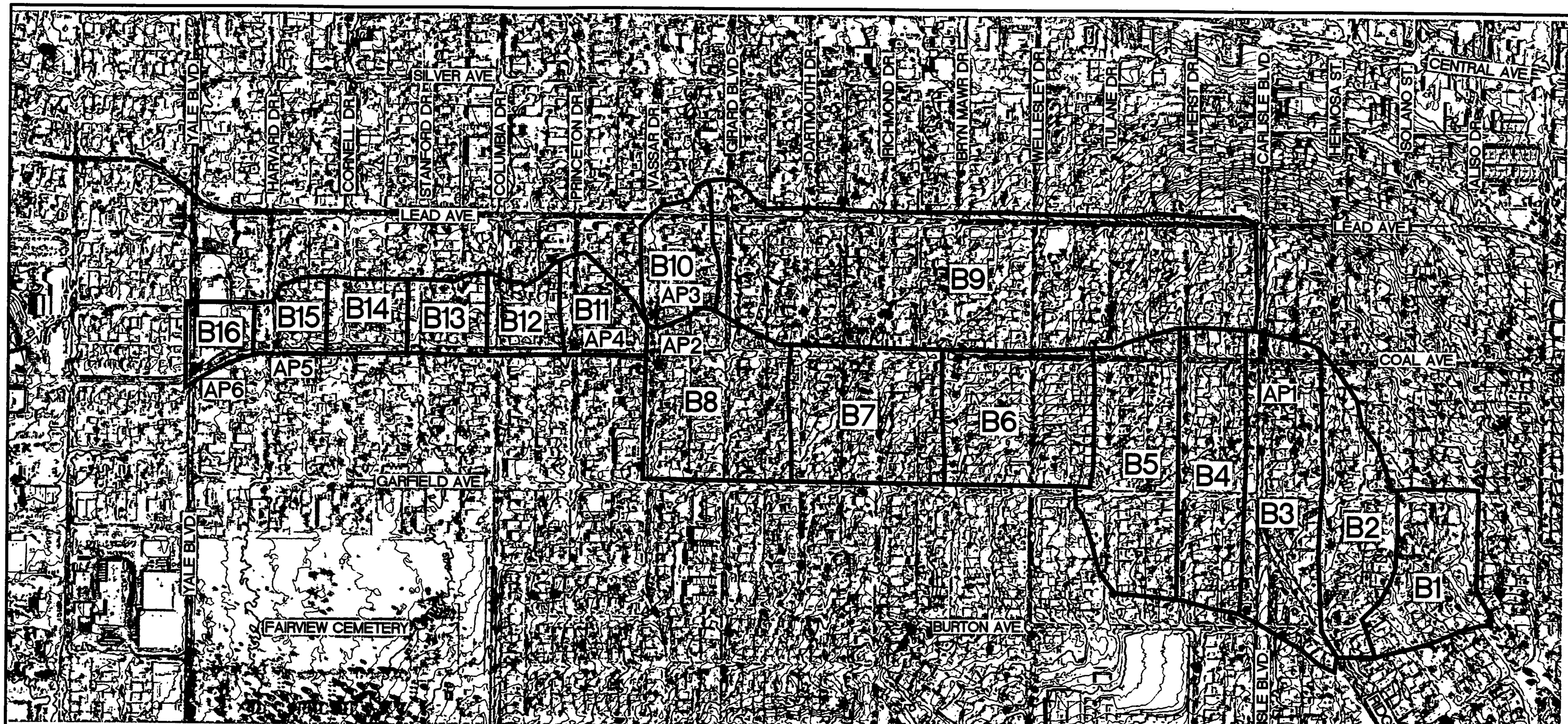
The following is a preliminary list of sheets in the plans for the San Pedro Collectors Project.

Sheet 1:	Title Sheet
Sheet 2:	General Notes
Sheet 3:	Overall Storm Drain Plan and Water Shut-off Plan
Sheets 4-15:	Storm Drain Plan & Profile Sheets
Sheets 16-19:	Utility Relocation Plan & Profile Sheets
Sheets 19-30:	Paving Remove & Replace Sheets
Sheet 31-32:	Typical Street Sections
Sheet 33-35:	Miscellaneous Details
Sheets 36-40:	Traffic Control Plans

VI. CONCEPTUAL CONSTRUCTION COST ESTIMATE

Conceptual construction cost estimates were developed for the Bell Diversion storm drain system, the Harvard Diversion storm drain system, and the Downstream Coal storm drain system. The total cost of the storm drainage improvements for the Bell Diversion storm drain system including NMGRT and utility relocation allowance is $767,410. The total cost of the storm drainage improvements for the Harvard Diversion storm drain system including NMGRT and utility relocation allowance is $931,940. The total cost of the storm drainage improvements for the Downstream Coal storm drain system including

NMGRT and utility relocation allowance is $928,450. The total cost of the project is $2,627,800. Please see Appendix D for detailed cost items.



BASIN ID	AC.	Q_{100}
B1	7.84	25.6 CFS
B2	9.08	30.1 CFS
B3	12.97	44.2 CFS
B4	10.32	36.6 CFS
B5	43.20	43.0 CFS
B6	11.27	40.4 CFS
B7	11.52	41.1 CFS
B8	12.46	45.0 CFS

BASIN ID	AC.	Q_{100}
B9	38.98	137.4 CFS
B10	4.75	16.9 CFS
B11	3.75	13.0 CFS
B12	3.19	11.3 CFS
B13	3.33	11.8 CFS
B14	3.33	11.6CFS
B15	2.68	9.7 CFS
B16	2.49	10.7 CFS

* AP ID	EXISTING FLOW	CAPACITY OF EXISTING SD
AP1	44.0 CFS	11
AP2	189.5 CFS	27
AP3	38.9 CFS	22
AP4	241.4 CFS	33
AP5	285.8 CFS	120
AP6	296.5 CFS	130

GRAPHIC SCALE

(IN FEET)
1 inch = 250 ft.

N

Thompson Engineering Consultants, Inc.
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P.O. BOX 65760
ALBUQUERQUE, NM 87193
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FAX: (505) 630-9248

COAL AVENUE STORM DRAIN REHABILITATION PROJECT

COA PROJECT #4522.91

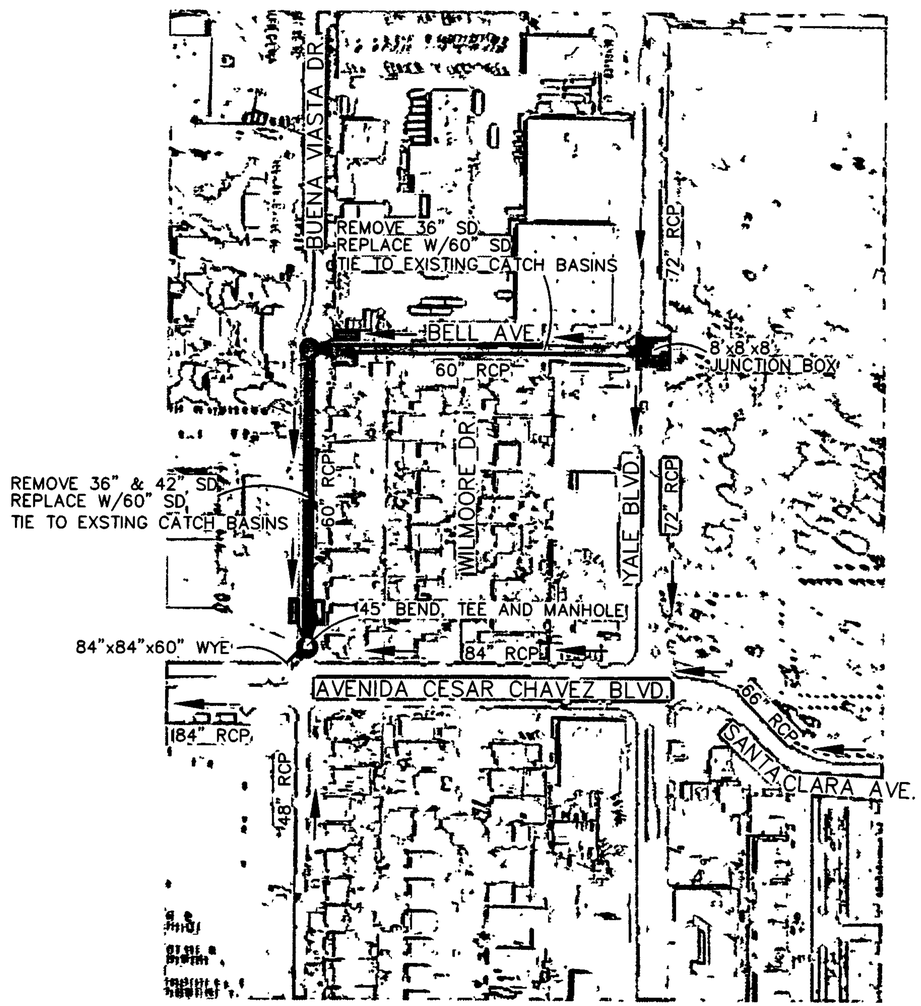
DRAINAGE BASINS EXHIBIT I

O:\projects\COA Coal Storm Drain\BASINS-AMAFCA-MACE.dwg 5/29/2008 10:50:34 AM MST

COAL AVENUE STORM DRAIN REHABILITATION PROJECT

COA PROJECT #4522.91

PROPOSED BELL DIVERSION STORM DRAIN EXHIBIT IV



N

GRAPHIC SCALE

0 125 250

(IN FEET)
1 inch = 250 ft.

LEGEND

- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- FLOW DIRECTION

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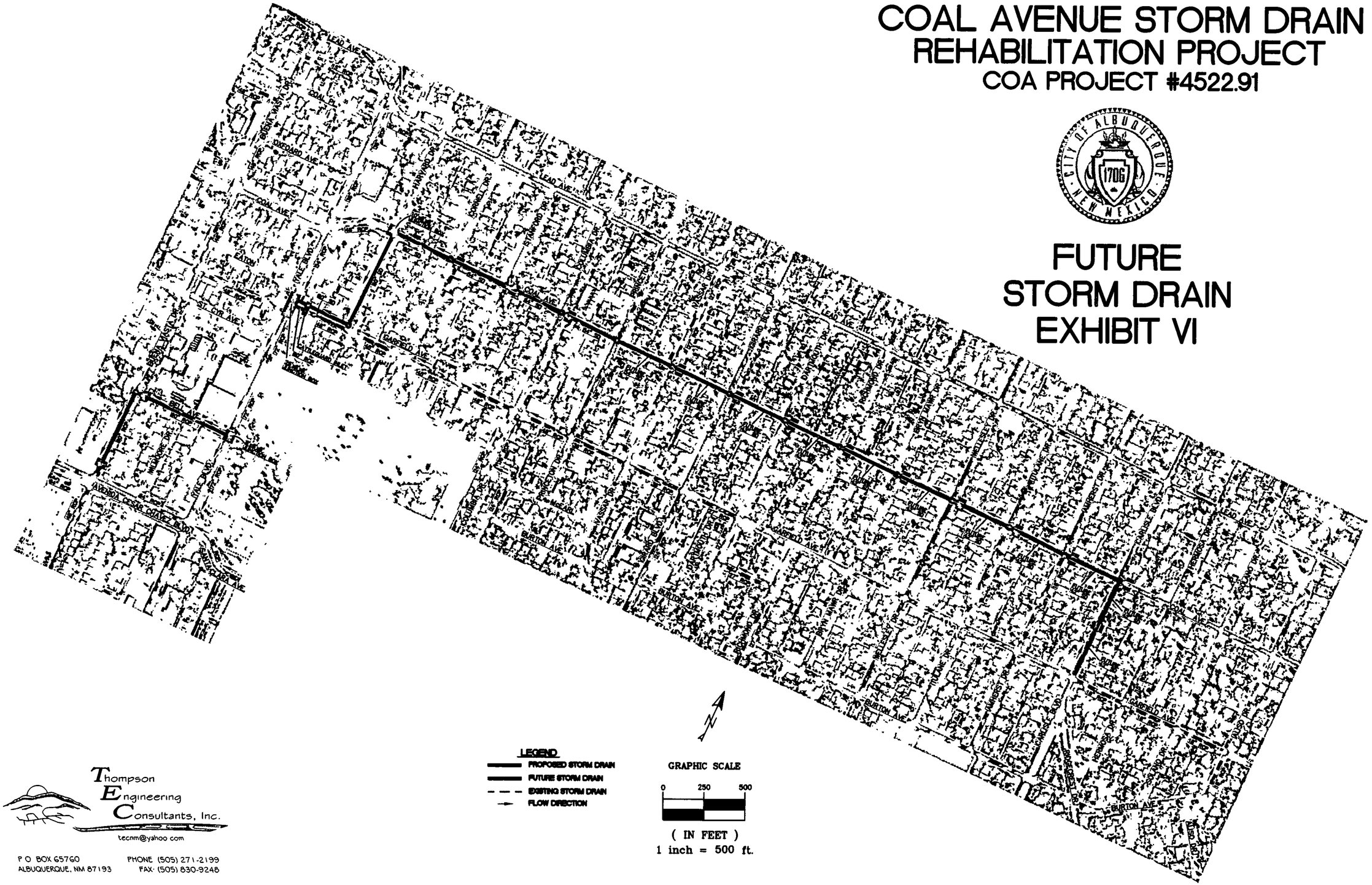
FAX: (505) 830-9248

D:\projects\COA Coal Storm Drain\EXHIBITS\BELL_DIVERSION.dwg 5/30/2008 7:05:06 AM MST

COAL AVENUE STORM DRAIN REHABILITATION PROJECT

COA PROJECT #4522.91

FUTURE STORM DRAIN EXHIBIT VI


LEAD AVE
COAL AVE
GRANTHAM DR
HARVARD DR
BORDEN DR
GRANTHAM DR
GARFIELD AVE
BURTON AVE
BRIDGE BLVD
ROSE DR
ROSE PL
ROSE DR
ROSE PL
ROSE DR
ROSE PL

APPENDIX A
HYDROLOGIC CALCULATIONS

```
*
*                    COAL AVENUE - YALE TO CARLISLE
*              HYDROLOGIC MODEL--EXISTING CONDITIONS
*                          21 MARCH 2008
*
*
*************************************************************************
*
*       HYDROLOGIC MODEL FOR OFFSITE AND ONSITE BASINS
*       100-YEAR, 6-HOUR STORM:
*
*
*
*       PRECIPITATION:
*               P60 =   2.01"
*               P360 =  2.35"
*               P1440 = 2.75"
*
*
*
************************************************************************
*
START                TIME=0.0 HR  PUNCH CODE=0
*
*
*
RAINFALL             TYPE=1   RAIN QUARTER=0.0 IN
                     RAIN ONE=2.01 IN  RAIN SIX=2.35 IN
                     RAIN DAY=2.75 IN  DT=0.033333 HRS
*
*
*
SEDIMENT BULK           CODE=1   BULK FACTOR=1.00
*
*S***********************************************************************
*
*
*
*S**********
*S BASIN B1
*S**********
*
*
COMPUTE NM HYD       ID=1  HYD NO=B1  DA=0.0123 SQ MI
                          %A=0  %B=36.2  %C=36.2 %D=27.6
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=1 CODE=1
*
*
*S**********
*S BASIN B2
*S**********
*
*
COMPUTE NM HYD       ID=2  HYD NO=B2  DA=0.0142 SQ MI
                          %A=0  %B=34.7  %C=34.7 %D=30.6
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=2 CODE=1
*
*
*
*
*
*S**********
*S BASIN B3
*S**********
*
*
COMPUTE NM HYD       ID=3  HYD NO=B3  DA=0.0203 SQ MI
                          %A=0  %B=32.5  %C=32.5 %D=35.0
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=3 CODE=1
*
*
*
*
*S**********
*S BASIN B4
*S**********
*
*
```

```
COMPUTE NM HYD       ID=4  HYD NO=B4  DA=0.0161 SQ MI
                          %A=0  %B=28.7  %C=28.8 %D=42.5
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=4 CODE=1
*
*
*S**********
*S BASIN B5
*S**********
*
*
COMPUTE NM HYD       ID=5  HYD NO=B5  DA=0.0190 SQ MI
                          %A=0  %B=28.8  %C=28.9 %D=42.3
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=5 CODE=1
*
*
*
*
*S**********
*S BASIN B6
*S**********
*
*
COMPUTE NM HYD       ID=6  HYD NO=B6  DA=0.0176 SQ MI
                          %A=0  %B=28  %C=28 %D=44
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=6 CODE=1
*
*
*
*S**********
*S BASIN B7
*S**********
*
*
COMPUTE NM HYD       ID=7  HYD NO=B7  DA=0.0180 SQ MI
                          %A=0  %B=28.3  %C=28.4 %D=43.3
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=7 CODE=1
*
*
*
*
*S**********
*S BASIN B8
*S**********
*
*
COMPUTE NM HYD       ID=8  HYD NO=B8  DA=0.0195 SQ MI
                          %A=0  %B=27.5  %C=27.4 %D=45.1
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=8 CODE=1
*
*
*
*
*S**********
*S BASIN B9
*S**********
*
*
COMPUTE NM HYD       ID=9  HYD NO=B9  DA=0.0609 SQ MI
                          %A=0  %B=29.4  %C=29.4 %D=41.2
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=9 CODE=1
*
*
*S**********
*S BASIN B10
*S**********
*
*
COMPUTE NM HYD       ID=10  HYD NO=B10  DA=0.00742 SQ MI
                          %A=0  %B=28.2  %C=28.2 %D=43.6
                        TP=0.133 HR
                        MASS RAINFALL=-1
PRINT HYD            ID=10 CODE=1
```

```
*
*
*
*
*S**********
*S BASIN B11
*S**********
*
*
COMPUTE NM HYD       ID=11  HYD NO=B11  DA=0.00586 SQ MI
                         %A=0  %B=31.1  %C=31 %D=37.9
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=11 CODE=1
*
*
*
*
*S**********
*S BASIN B12
*S**********
*
*
COMPUTE NM HYD       ID=12  HYD NO=B12  DA=0.00498 SQ MI
                         %A=0  %B=28.7  %C=28.7 %D=42.6
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=12 CODE=1
*
*
*S**********
*S BASIN B13
*S**********
*
*
COMPUTE NM HYD       ID=13  HYD NO=B13  DA=0.00520 SQ MI
                         %A=0  %B=29.4  %C=29.3 %D=41.3
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=13 CODE=1
*
*
*
*
*S**********
*S BASIN B14
*S**********
*
*
COMPUTE NM HYD       ID=14  HYD NO=B14  DA=0.00520 SQ MI
                         %A=0  %B=30.5  %C=30.5 %D=39
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=14 CODE=1
*
*
*
*
*S**********
*S BASIN B15
*S**********
*
*
COMPUTE NM HYD       ID=15  HYD NO=B15  DA=0.00419 SQ MI
                         %A=0  %B=27.2  %C=27.2 %D=45.6
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=15 CODE=1
*
*
*
*
*S**********
*S BASIN B16
*S**********
*
*
COMPUTE NM HYD       ID=16  HYD NO=B16  DA=0.00389 SQ MI
                         %A=0  %B=10  %C=10 %D=80
                       TP=0.133 HR
                       MASS RAINFALL=-1
PRINT HYD            ID=16 CODE=1
*
*
```

```
*
*
*
*
PRINT HYD            ID=90   CODE=1
*S
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*
FINISH
```

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =05/28/2008
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.350
SEDIMENT BULK										PK BF = 1.00
*S**********										
*S BASIN B1										
*S**********										
COMPUTE NM HYD	B1	-	1	.01230	25.61	.828	1.26199	1.500	3.253	PER IMP= 27.60
*S**********										
*S BASIN B2										
*S**********										
COMPUTE NM HYD	B2	-	2	.01420	30.11	.983	1.29735	1.500	3.313	PER IMP= 30.60
*S**********										
*S BASIN B3										
*S**********										
COMPUTE NM HYD	B3	-	3	.02030	44.19	1.461	1.34921	1.500	3.401	PER IMP= 35.00
*S**********										
*S BASIN B4										
*S**********										
COMPUTE NM HYD	B4	-	4	.01610	36.60	1.235	1.43778	1.500	3.552	PER IMP= 42.50
*S**********										
*S BASIN B5										
*S**********										
COMPUTE NM HYD	B5	-	5	.01900	43.15	1.455	1.43543	1.500	3.548	PER IMP= 42.30
*S**********										
*S BASIN B6										
*S**********										
COMPUTE NM HYD	B6	-	6	.01760	40.35	1.366	1.45529	1.500	3.582	PER IMP= 44.00
*S**********										
*S BASIN B7										
*S**********										
COMPUTE NM HYD	B7	-	7	.01800	41.11	1.389	1.44721	1.500	3.568	PER IMP= 43.30
*S**********										
*S BASIN B8										
*S**********										
COMPUTE NM HYD	B8	-	8	.01950	44.97	1.527	1.46808	1.500	3.603	PER IMP= 45.10
*S**********										
*S BASIN B9										
*S**********										
COMPUTE NM HYD	B9	-	9	.06090	137.37	4.620	1.42229	1.500	3.525	PER IMP= 41.20
*S**********										
*S BASIN B10										
*S**********										
COMPUTE NM HYD	B10	-	10	.00742	16.98	.574	1.45057	1.500	3.576	PER IMP= 43.60
*S**********										
*S BASIN B11										
*S**********										
COMPUTE NM HYD	B11	-	11	.00586	12.98	.432	1.38322	1.500	3.462	PER IMP= 37.90
*S**********										
*S BASIN B12										

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S**********										
COMPUTE NM HYD	B12	-	12	.00498	11.34	.382	1.43879	1.500	3.558	PER IMP= 42.60
*S**********										
*S BASIN B13										
*S**********										
COMPUTE NM HYD	B13	-	13	.00520	11.75	.395	1.42329	1.500	3.531	PER IMP= 41.30
*S**********										
*S BASIN B14										
*S**********										
COMPUTE NM HYD	B14	-	14	.00520	11.60	.387	1.39636	1.500	3.485	PER IMP= 39.00
*S**********										
*S BASIN B15										
*S**********										
COMPUTE NM HYD	B15	-	15	.00419	9.70	.329	1.47415	1.500	3.619	PER IMP= 45.60
*S**********										
*S BASIN B16										
*S**********										
COMPUTE NM HYD	B16	-	16	.00389	10.73	.390	1.87962	1.500	4.310	PER IMP= 80.00
*S										
FINISH										

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*
*                       COAL AVENUE - YALE TO CARLISLE
*                 HYDROLOGIC MODEL--EXISTING CONDITIONS
*                              21 MARCH 2008
*
*
*****************************************************************************
*
*       HYDROLOGIC MODEL FOR OFFSITE AND ONSITE BASINS
*       100-YEAR, 6-HOUR STORM:
*
*
*
*       PRECIPITATION:
*               P60 =   2.01"
*               P360 =  2.35"
*               P1440 = 2.75"
*
*
*
*****************************************************************************
*
START                TIME=0.0 HR  PUNCH CODE=0
*
*
*
RAINFALL             TYPE=1   RAIN QUARTER=0.0 IN
                              RAIN ONE=2.01 IN  RAIN SIX=2.35 IN
                              RAIN DAY=2.75 IN  DT=0.033333 HRS

                 COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                 DT =     .033333 HOURS        END TIME =     5.999940 HOURS
                    .0000   .0016   .0033   .0049   .0066   .0084   .0102
                    .0120   .0139   .0158   .0178   .0199   .0219   .0241
                    .0263   .0286   .0309   .0333   .0358   .0384   .0411
                    .0439   .0467   .0497   .0529   .0561   .0596   .0631
                    .0669   .0709   .0751   .0807   .0866   .0930   .1066
                    .1372   .1842   .2517   .3438   .4648   .6192   .8114
                   1.0459  1.2628  1.3536  1.4303  1.4985  1.5605  1.6176
                   1.6706  1.7202  1.7667  1.8104  1.8516  1.8906  1.9274
                   1.9624  1.9955  2.0269  2.0568  2.0851  2.0915  2.0976
                   2.1034  2.1088  2.1141  2.1191  2.1239  2.1285  2.1330
                   2.1373  2.1414  2.1455  2.1494  2.1532  2.1569  2.1604
                   2.1639  2.1673  2.1707  2.1739  2.1771  2.1802  2.1832
                   2.1862  2.1891  2.1920  2.1948  2.1975  2.2002  2.2028
                   2.2054  2.2080  2.2105  2.2130  2.2154  2.2178  2.2202
                   2.2225  2.2248  2.2271  2.2293  2.2315  2.2336  2.2358
                   2.2379  2.2400  2.2420  2.2440  2.2460  2.2480  2.2500
                   2.2519  2.2538  2.2557  2.2576  2.2594  2.2613  2.2631
                   2.2649  2.2666  2.2684  2.2701  2.2718  2.2736  2.2752
                   2.2769  2.2786  2.2802  2.2818  2.2834  2.2850  2.2866
                   2.2882  2.2897  2.2913  2.2928  2.2943  2.2958  2.2973
                   2.2988  2.3002  2.3017  2.3031  2.3046  2.3060  2.3074
                   2.3088  2.3102  2.3116  2.3129  2.3143  2.3156  2.3170
                   2.3183  2.3196  2.3209  2.3222  2.3235  2.3248  2.3261
                   2.3273  2.3286  2.3299  2.3311  2.3323  2.3336  2.3348
                   2.3360  2.3372  2.3384  2.3396  2.3408  2.3420  2.3431
                   2.3443  2.3454  2.3466  2.3477  2.3489  2.3500

*
*
*
SEDIMENT BULK          CODE=1   BULK FACTOR=1.00
*
*S****************************************************************************
*
*
*
*S**********
*S BASIN B1
*S**********
*
*
COMPUTE NM HYD       ID=1  HYD NO=B1  DA=0.0123 SQ MI
                                %A=0  %B=36.2  %C=36.2 %D=27.6
                              TP=0.133 HR
                              MASS RAINFALL=-1
```

```
     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   13.433    CFS   UNIT VOLUME =    .9986       B =   526.28      P60 = 2.0100
     AREA =      .003395 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   23.534    CFS   UNIT VOLUME =    .9999       B =   351.48      P60 = 2.0100
     AREA =      .008905 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=1 CODE=1

                                    HYDROGRAPH FROM AREA B1

    RUNOFF VOLUME =     1.26199 INCHES     =        .8279 ACRE-FEET
    PEAK DISCHARGE RATE =      25.61 CFS  AT   1.500 HOURS   BASIN AREA =   .0123 SQ. MI.


*
*
*S**********
*S BASIN B2
*S**********
*
*
COMPUTE NM HYD      ID=2  HYD NO=B2  DA=0.0142 SQ MI
                                %A=0  %B=34.7  %C=34.7 %D=30.6
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   17.194    CFS   UNIT VOLUME =    .9987       B =   526.28      P60 = 2.0100
     AREA =      .004345 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   26.044    CFS   UNIT VOLUME =    .9999       B =   351.48      P60 = 2.0100
     AREA =      .009855 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=2 CODE=1

                                    HYDROGRAPH FROM AREA B2

    RUNOFF VOLUME =     1.29735 INCHES     =        .9825 ACRE-FEET
    PEAK DISCHARGE RATE =      30.11 CFS  AT   1.500 HOURS   BASIN AREA =   .0142 SQ. MI.


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*S**********
*S BASIN B3
*S**********
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COMPUTE NM HYD      ID=3  HYD NO=B3  DA=0.0203 SQ MI
                                %A=0  %B=32.5  %C=32.5 %D=35.0
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   28.114    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 2.0100
     AREA =      .007105 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   34.871    CFS   UNIT VOLUME =    1.000       B =   351.48      P60 = 2.0100
     AREA =      .013195 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=3 CODE=1

                                    HYDROGRAPH FROM AREA B3
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    RUNOFF VOLUME =      1.34921 INCHES      =        1.4607 ACRE-FEET
    PEAK DISCHARGE RATE =       44.19 CFS  AT   1.500 HOURS   BASIN AREA =   .0203 SQ. MI.


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*S**********
*S BASIN B4
*S**********
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COMPUTE NM HYD       ID=4  HYD NO=B4  DA=0.0161 SQ MI
                                %A=0  %B=28.7  %C=28.8 %D=42.5
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   27.075    CFS   UNIT VOLUME =    .9990       B =   526.28      P60 = 2.0100
     AREA =       .006843 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .119476HR    TP =   .133000HR    K/TP RATIO =   .898315     SHAPE CONSTANT, N =  3.945701
     UNIT PEAK =   24.469    CFS   UNIT VOLUME =    .9999       B =   351.53      P60 = 2.0100
     AREA =       .009258 SQ MI    IA =    .42487 INCHES    INF =   1.03963 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD            ID=4 CODE=1

                                     HYDROGRAPH FROM AREA B4


    RUNOFF VOLUME =      1.43778 INCHES      =        1.2346 ACRE-FEET
    PEAK DISCHARGE RATE =       36.60 CFS  AT   1.500 HOURS   BASIN AREA =   .0161 SQ. MI.


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*S**********
*S BASIN B5
*S**********
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COMPUTE NM HYD       ID=5  HYD NO=B5  DA=0.0190 SQ MI
                                %A=0  %B=28.8  %C=28.9 %D=42.3
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   31.802    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 2.0100
     AREA =       .008037 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

     K =   .119476HR    TP =   .133000HR    K/TP RATIO =   .898315     SHAPE CONSTANT, N =  3.945695
     UNIT PEAK =   28.976    CFS   UNIT VOLUME =    1.000       B =   351.53      P60 = 2.0100
     AREA =       .010963 SQ MI    IA =    .42487 INCHES    INF =   1.03964 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD            ID=5 CODE=1

                                     HYDROGRAPH FROM AREA B5


    RUNOFF VOLUME =      1.43543 INCHES      =        1.4546 ACRE-FEET
    PEAK DISCHARGE RATE =       43.15 CFS  AT   1.500 HOURS   BASIN AREA =   .0190 SQ. MI.


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*S**********
*S BASIN B6
*S**********
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COMPUTE NM HYD       ID=6  HYD NO=B6  DA=0.0176 SQ MI
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                                %A=0  %B=28  %C=28 %D=44
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   30.643    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 2.0100
     AREA =      .007744 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   26.047    CFS   UNIT VOLUME =    .9999       B =   351.48      P60 = 2.0100
     AREA =      .009856 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=6 CODE=1

                                HYDROGRAPH FROM AREA B6


    RUNOFF VOLUME =     1.45529 INCHES     =       1.3660 ACRE-FEET
    PEAK DISCHARGE RATE =      40.35 CFS  AT   1.500 HOURS   BASIN AREA =   .0176 SQ. MI.


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*S**********
*S BASIN B7
*S**********
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COMPUTE NM HYD      ID=7  HYD NO=B7  DA=0.0180 SQ MI
                                %A=0  %B=28.3  %C=28.4 %D=43.3
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   30.841    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 2.0100
     AREA =      .007794 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119476HR    TP =   .133000HR    K/TP RATIO =   .898313     SHAPE CONSTANT, N =  3.945711
     UNIT PEAK =   26.976    CFS   UNIT VOLUME =    1.000       B =   351.53      P60 = 2.0100
     AREA =      .010206 SQ MI    IA =    .42487 INCHES    INF =   1.03963 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=7 CODE=1

                                HYDROGRAPH FROM AREA B7


    RUNOFF VOLUME =     1.44721 INCHES     =       1.3893 ACRE-FEET
    PEAK DISCHARGE RATE =      41.11 CFS  AT   1.500 HOURS   BASIN AREA =   .0180 SQ. MI.


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*S**********
*S BASIN B8
*S**********
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COMPUTE NM HYD      ID=8  HYD NO=B8  DA=0.0195 SQ MI
                                %A=0  %B=27.5  %C=27.4 %D=45.1
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   34.799    CFS   UNIT VOLUME =    .9991       B =   526.28      P60 = 2.0100
     AREA =      .008794 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119520HR    TP =   .133000HR    K/TP RATIO =   .898644     SHAPE CONSTANT, N =  3.944166
     UNIT PEAK =   28.287    CFS   UNIT VOLUME =    1.000       B =   351.43      P60 = 2.0100
     AREA =      .010706 SQ MI    IA =    .42514 INCHES    INF =   1.04038 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333
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PRINT HYD            ID=8 CODE=1

                                        HYDROGRAPH FROM AREA B8


    RUNOFF VOLUME =      1.46808 INCHES      =        1.5268 ACRE-FEET
    PEAK DISCHARGE RATE =       44.97 CFS  AT   1.500 HOURS   BASIN AREA =   .0195 SQ. MI.


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*S**********
*S BASIN B9
*S**********
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COMPUTE NM HYD       ID=9  HYD NO=B9  DA=0.0609 SQ MI
                                %A=0  %B=29.4  %C=29.4 %D=41.2
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   99.283    CFS   UNIT VOLUME =    .9993       B =   526.28      P60 = 2.0100
     AREA =       .025091 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   94.634    CFS   UNIT VOLUME =    1.000       B =   351.48      P60 = 2.0100
     AREA =       .035809 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD            ID=9 CODE=1

                                        HYDROGRAPH FROM AREA B9


    RUNOFF VOLUME =      1.42229 INCHES      =        4.6196 ACRE-FEET
    PEAK DISCHARGE RATE =      137.37 CFS  AT   1.500 HOURS   BASIN AREA =   .0609 SQ. MI.


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*S**********
*S BASIN B10
*S**********
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COMPUTE NM HYD       ID=10  HYD NO=B10  DA=0.00742 SQ MI
                                %A=0  %B=28.2  %C=28.2 %D=43.6
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   12.801    CFS   UNIT VOLUME =    .9985       B =   526.28      P60 = 2.0100
     AREA =       .003235 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   11.059    CFS   UNIT VOLUME =    .9993       B =   351.48      P60 = 2.0100
     AREA =       .004185 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD            ID=10 CODE=1

                                        HYDROGRAPH FROM AREA B10


    RUNOFF VOLUME =      1.45057 INCHES      =         .5740 ACRE-FEET
    PEAK DISCHARGE RATE =       16.98 CFS  AT   1.500 HOURS   BASIN AREA =   .0074 SQ. MI.


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*S**********
*S BASIN B11
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*S**********
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COMPUTE NM HYD      ID=11  HYD NO=B11  DA=0.00586 SQ MI
                                %A=0  %B=31.1  %C=31 %D=37.9
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   8.7882    CFS   UNIT VOLUME =    .9981       B =   526.28      P60 = 2.0100
     AREA =      .002221 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119517HR    TP =   .133000HR    K/TP RATIO =   .898624     SHAPE CONSTANT, N =  3.944248
     UNIT PEAK =   9.6157    CFS   UNIT VOLUME =    .9990       B =   351.44      P60 = 2.0100
     AREA =      .003639 SQ MI    IA =    .42512 INCHES    INF =   1.04034 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=11 CODE=1

                                HYDROGRAPH FROM AREA B11


    RUNOFF VOLUME =     1.38322 INCHES     =        .4323 ACRE-FEET
    PEAK DISCHARGE RATE =      12.98 CFS  AT   1.500 HOURS   BASIN AREA =   .0059 SQ. MI.


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*S**********
*S BASIN B12
*S**********
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COMPUTE NM HYD      ID=12  HYD NO=B12  DA=0.00498 SQ MI
                                %A=0  %B=28.7  %C=28.7 %D=42.6
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   8.3946    CFS   UNIT VOLUME =    .9981       B =   526.28      P60 = 2.0100
     AREA =      .002121 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   7.5543    CFS   UNIT VOLUME =    .9987       B =   351.48      P60 = 2.0100
     AREA =      .002859 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=12 CODE=1

                                HYDROGRAPH FROM AREA B12

    RUNOFF VOLUME =     1.43879 INCHES     =        .3821 ACRE-FEET
    PEAK DISCHARGE RATE =      11.34 CFS  AT   1.500 HOURS   BASIN AREA =   .0050 SQ. MI.


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*S**********
*S BASIN B13
*S**********
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COMPUTE NM HYD      ID=13  HYD NO=B13  DA=0.00520 SQ MI
                                %A=0  %B=29.4  %C=29.3 %D=41.3
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   8.4980    CFS   UNIT VOLUME =    .9981       B =   526.28      P60 = 2.0100
     AREA =      .002148 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119518HR    TP =   .133000HR    K/TP RATIO =   .898633     SHAPE CONSTANT, N =  3.944209
     UNIT PEAK =   8.0655    CFS   UNIT VOLUME =    .9989       B =   351.43      P60 = 2.0100
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     AREA =       .003052 SQ MI    IA =    .42513 INCHES    INF =   1.04036 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=13 CODE=1

                                        HYDROGRAPH FROM AREA B13


    RUNOFF VOLUME =     1.42329 INCHES     =        .3947 ACRE-FEET
    PEAK DISCHARGE RATE =      11.75 CFS  AT   1.500 HOURS   BASIN AREA =   .0052 SQ. MI.


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*S**********
*S BASIN B14
*S**********
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COMPUTE NM HYD      ID=14  HYD NO=B14  DA=0.00520 SQ MI
                                %A=0  %B=30.5  %C=30.5 %D=39
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   8.0247    CFS   UNIT VOLUME =    .9979       B =   526.28      P60 = 2.0100
     AREA =       .002028 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   8.3827    CFS   UNIT VOLUME =    .9989       B =   351.48      P60 = 2.0100
     AREA =       .003172 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=14 CODE=1

                                        HYDROGRAPH FROM AREA B14


    RUNOFF VOLUME =     1.39636 INCHES     =        .3873 ACRE-FEET
    PEAK DISCHARGE RATE =      11.60 CFS  AT   1.500 HOURS   BASIN AREA =   .0052 SQ. MI.


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*S**********
*S BASIN B15
*S**********
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COMPUTE NM HYD      ID=15  HYD NO=B15  DA=0.00419 SQ MI
                                %A=0  %B=27.2  %C=27.2 %D=45.6
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   7.5603    CFS   UNIT VOLUME =    .9979       B =   526.28      P60 = 2.0100
     AREA =       .001911 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   6.0237    CFS   UNIT VOLUME =    .9982       B =   351.48      P60 = 2.0100
     AREA =       .002279 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD           ID=15 CODE=1

                                        HYDROGRAPH FROM AREA B15


    RUNOFF VOLUME =     1.47415 INCHES     =        .3294 ACRE-FEET
    PEAK DISCHARGE RATE =       9.70 CFS  AT   1.500 HOURS   BASIN AREA =   .0042 SQ. MI.


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*S**********
*S BASIN B16
*S**********
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COMPUTE NM HYD       ID=16  HYD NO=B16  DA=0.00389 SQ MI
                                %A=0  %B=10  %C=10 %D=80
                              TP=0.133 HR
                              MASS RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   12.314    CFS   UNIT VOLUME =    .9985       B =   526.28      P60 = 2.0100
     AREA =      .003112 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


     K =   .119497HR    TP =   .133000HR    K/TP RATIO =   .898476     SHAPE CONSTANT, N =  3.944947
     UNIT PEAK =   2.0560    CFS   UNIT VOLUME =    .9941       B =   351.48      P60 = 2.0100
     AREA =      .000778 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

PRINT HYD            ID=16 CODE=1

                                    HYDROGRAPH FROM AREA B16

    RUNOFF VOLUME =     1.87962 INCHES     =        .3900 ACRE-FEET
    PEAK DISCHARGE RATE =      10.73 CFS  AT   1.500 HOURS   BASIN AREA =   .0039 SQ. MI.


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PRINT HYD            ID=90   CODE=1

                                  OUTFLOW HYDROGRAPH REACH      .00

    RUNOFF VOLUME =      .00000 INCHES     =        .0000 ACRE-FEET
    PEAK DISCHARGE RATE =        .00 CFS  AT    .000 HOURS   BASIN AREA =   .0000 SQ. MI.


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FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 15:57:10
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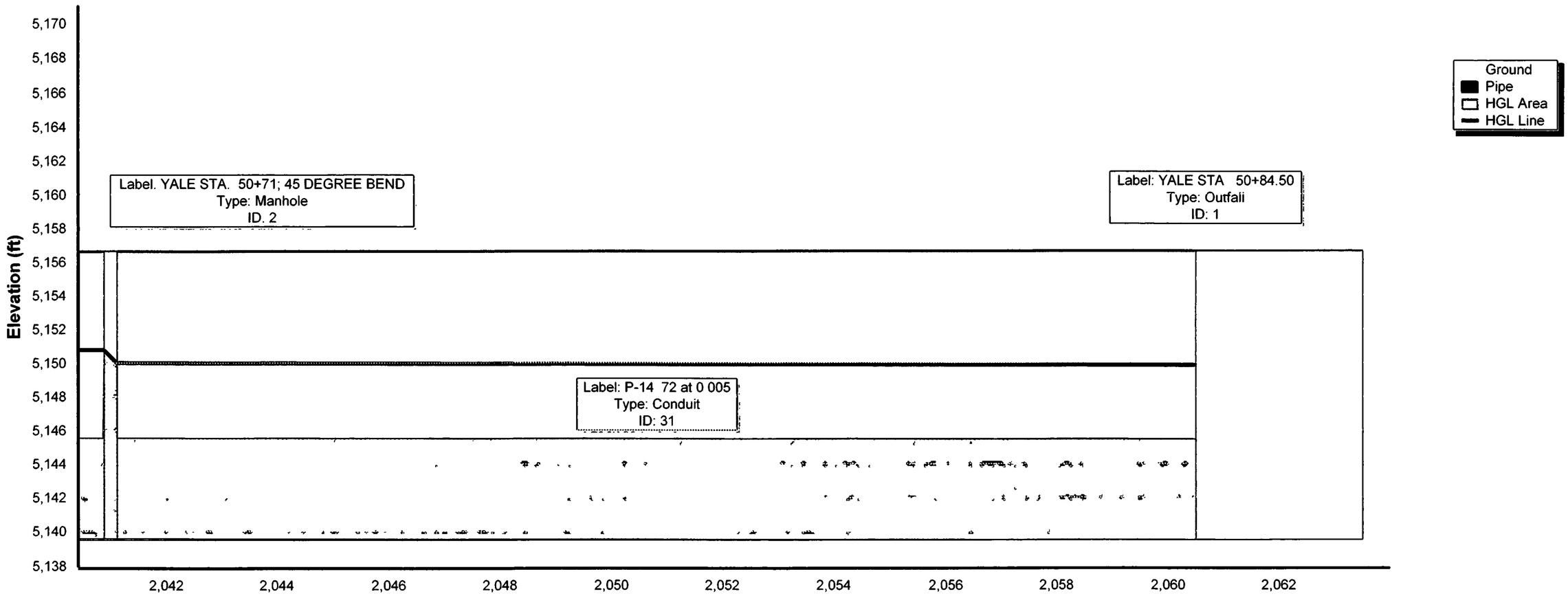
LAND TREATMENT CALCULATION

BASIN	AREA (AC)	AREA (SM)	LOTS	DUS/AC	D	B & C
B1	7.84	0.01225	17	2.17	27.6	36.2
B2	9.08	0.0141875	23	2.53	30.6	34.7
B3	12.97	0.02026563	40	3.08	35.0	32.5
B4	10.32	0.016125	42	4.07	42.5	28.7
B5	12.14	0.01896875	49	4.04	42.3	28.9
B6	11.27	0.01760938	48	4.26	44.0	28.0
B7	11.52	0.018	48	4.17	43.3	28.4
B8	12.46	0.01946875	55	4.41	45.1	27.4
B9	38.98	0.06090625	152	3.90	41.2	29.4
B10	4.75	0.00742188	20	4.21	43.6	28.2
B11	3.75	0.00585938	13	3.47	37.9	31.0
B12	3.19	0.00498438	13	4.08	42.6	28.7
B13	3.33	0.00520313	13	3.90	41.3	29.4
B14	3.33	0.00520313	12	3.60	39.0	30.5
B15	2.68	0.0041875	12	4.48	45.6	27.2
B16	2.49	0.00389063			80.0	10.0

APPENDIX B
HYDRAULIC ANALYSES OF
EXISTING STORM DRAIN SYSTEM

Yale existing storm drain with 450 cfs at Yale and Garfield - Base



31 \ P-14 72 at 0.005

19.4

6 \ Concrete

329.69

0.005

2 \ YALE STA. 50+71; 45 DEGREE BEND

5156.58

5139.57

2041

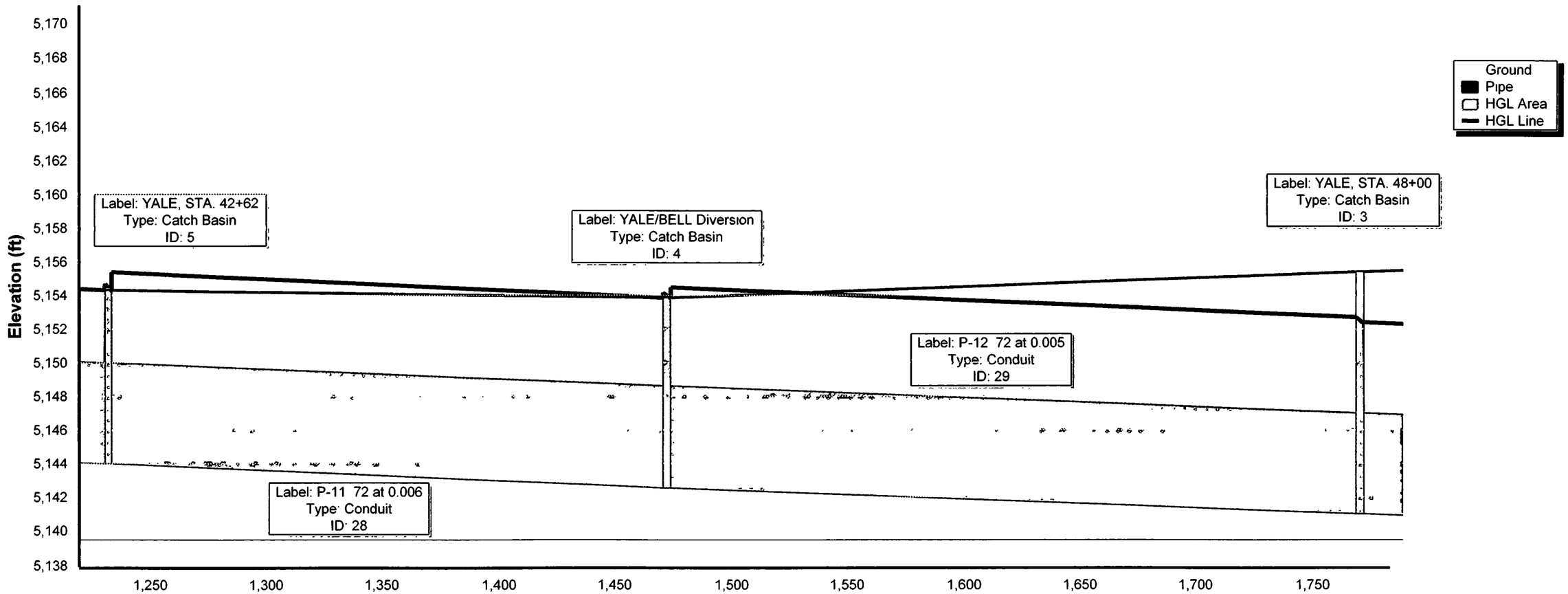
1 \ YALE STA. 50+84.50

5156.58

5139.46

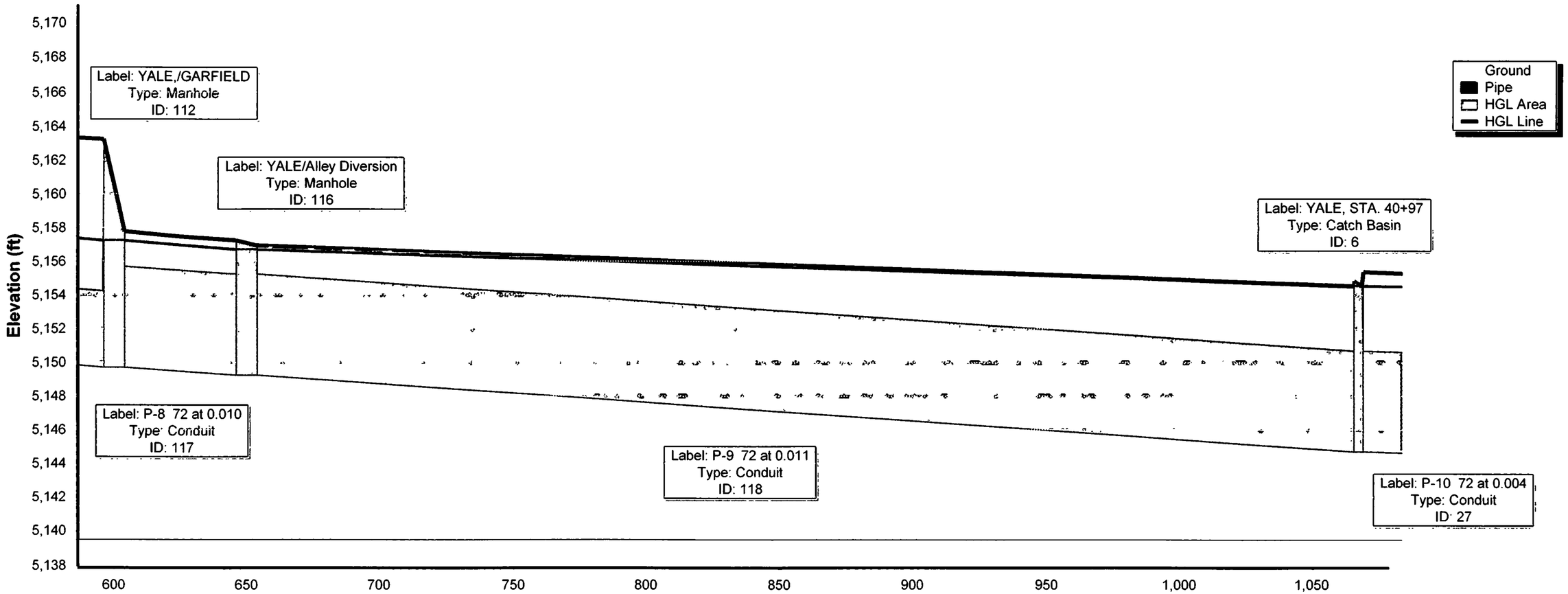
2062

Yale existing storm drain with 450 cfs at Yale and Garfield - Base



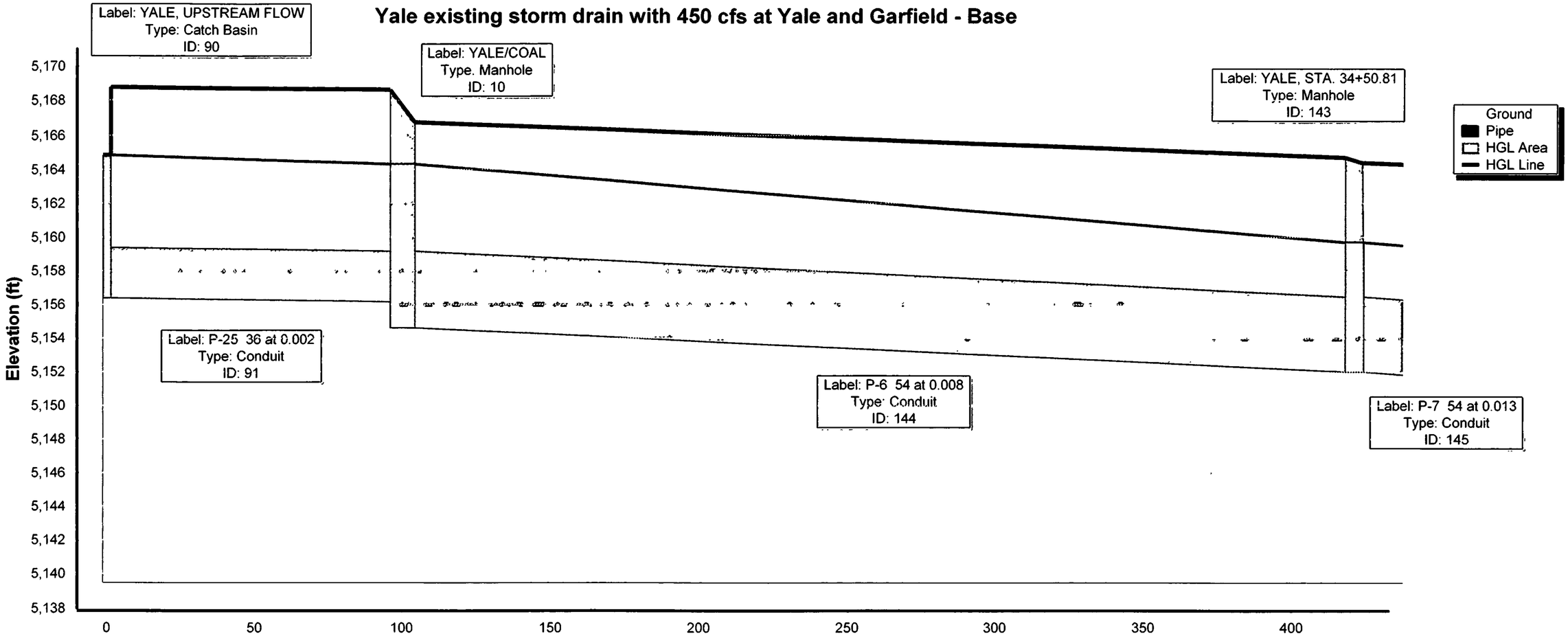
	28 \ P-11 72 at 0.006	29 \ P-12 72 at 0.005	
	236.7	294.7	
	6 \ Concrete	6 \ Concrete	
	343.67	319.69	
	0.006	0.005	
5 \ YALE, STA. 42+62		4 \ YALE/BELL Diversion	3 \ YALE, STA. 48+00
5154.34		5153.83	5155.4
5144.01		5142.59	5141.01
1232		1472	1770

Yale existing storm drain with 450 cfs at Yale and Garfield - Base



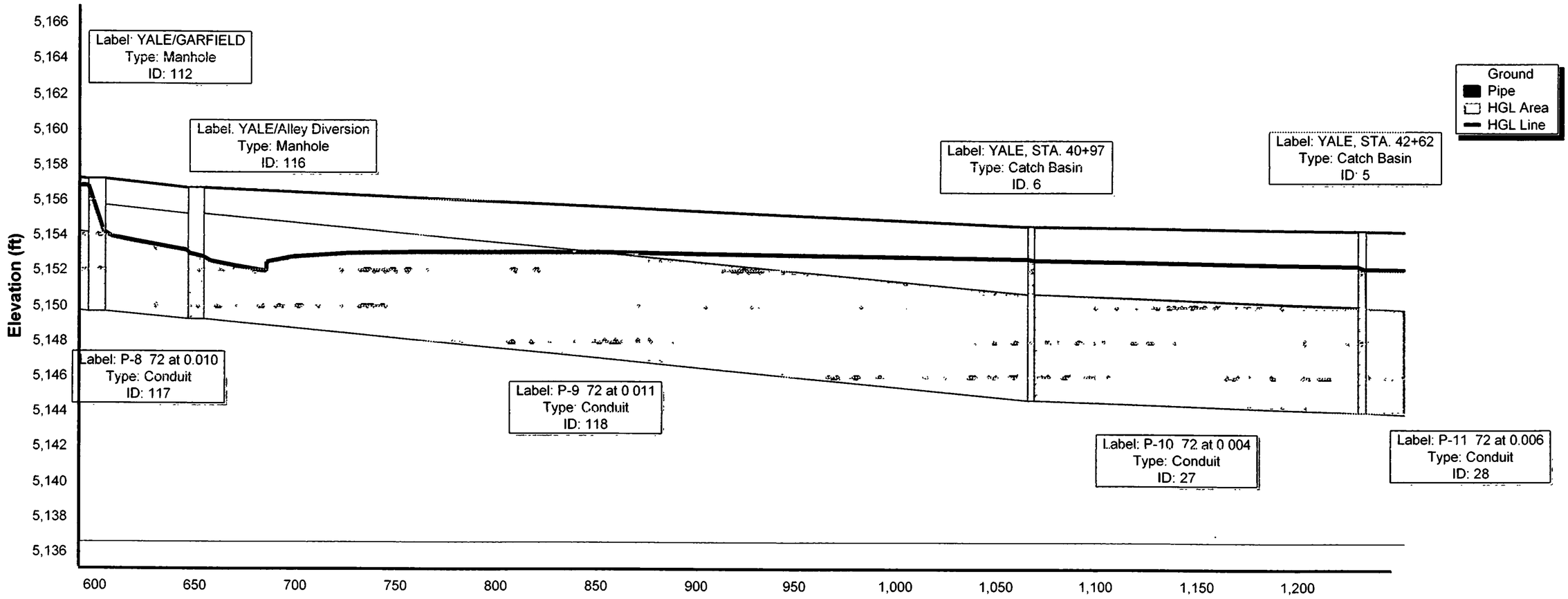
	117 \ P-8 72 at 0.010	118 \ P-9 72 at 0.011	27 \ P-10 72 at (
	42	411.4	
	6 \ Concrete	6 \ Concrete	
	450	321.67	
	0.01	0.011	
112 \ YALE,/GARFIELD	116 \ YALE/Alley Diversion		6 \ YALE, STA. 40+97
5157.2	5156.65		5154.52
5149.7	5149.22		5144.69
600	650		1067

Yale existing storm drain with 450 cfs at Yale and Garfield - Base



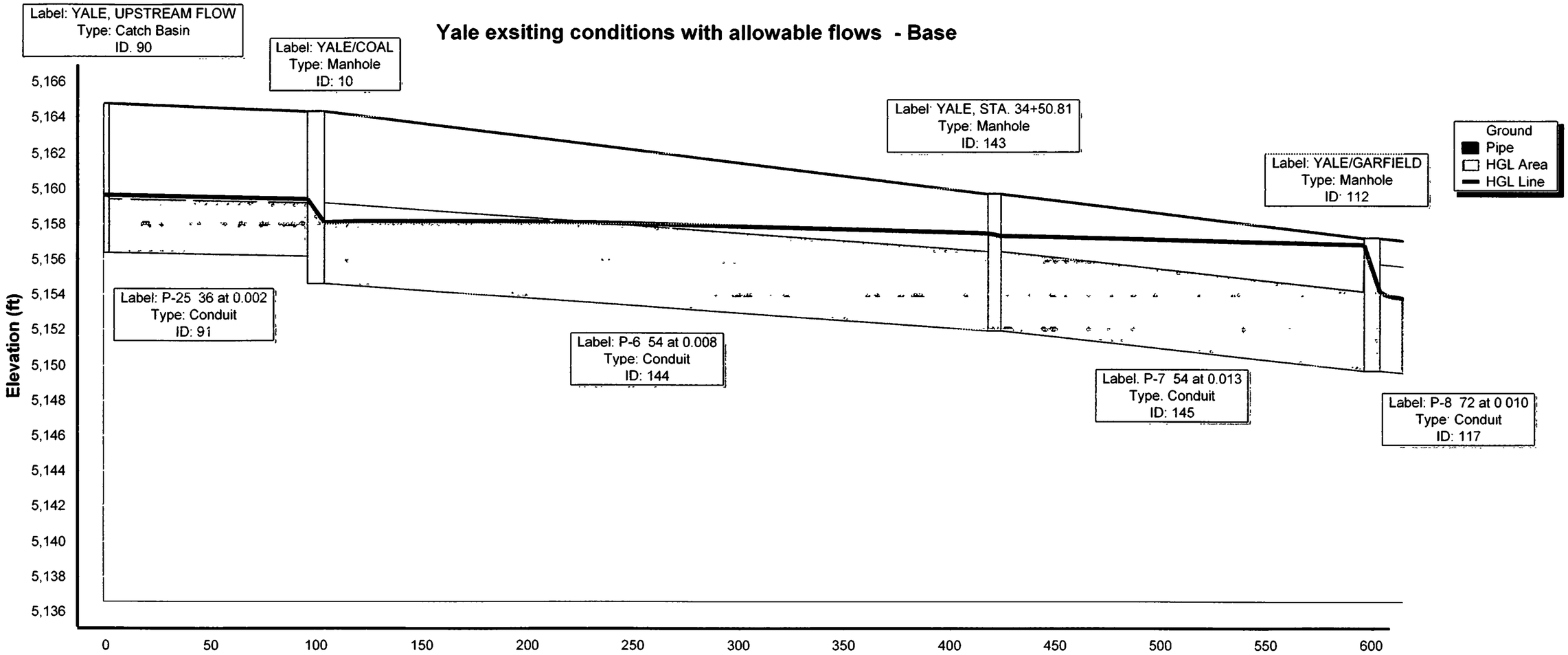
	91 \ P-25 36 at 0.002		144 \ P-6 54 at 0.008	145 \ P-7
	94.5		314	
	3 \ Concrete		4.5 \ Concrete	
	30		160	
	0.002		0.008	
90 \ YALE, UPSTREAM FLOW		10 \ YALE/COAL		143 \ YALE, STA. 34+50.81
5164.8		5164.3		5159.71
5156.36		5154.64		5151.97
0		100		421

Yale exsiting conditions with allowable flows - Base



117 \ P-8 72 at 0.010	118 \ P-9 72 at 0 011	27 \ P-10 72 at 0.004	28 \ P-11 72	
42	411.4	161 7		
6 \ Concrete	6 \ Concrete	6 \ Concrete		
1270	171.67	181.67		
0.01	0 011	0.004		
112 \ YALE/GARFIELD	116 \ YALE/Alley Diversion	6 \ YALE, STA. 40+97	5 \ YALE, STA. 42+62	
5157.2	5156.65	5154.52	5154.34	
5149.7	5149.22	5144.69	5144.01	
600	650	1067	1232	

Yale exsiting conditions with allowable flows - Base

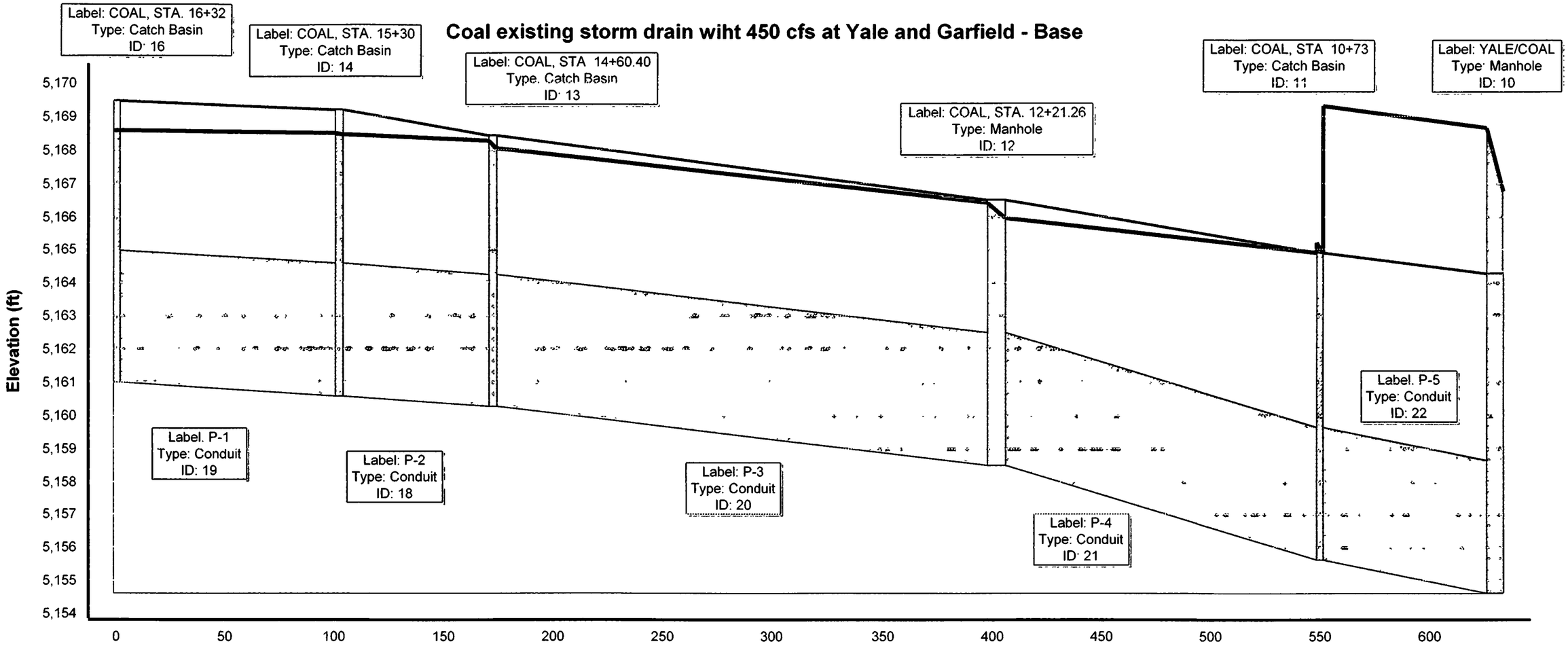


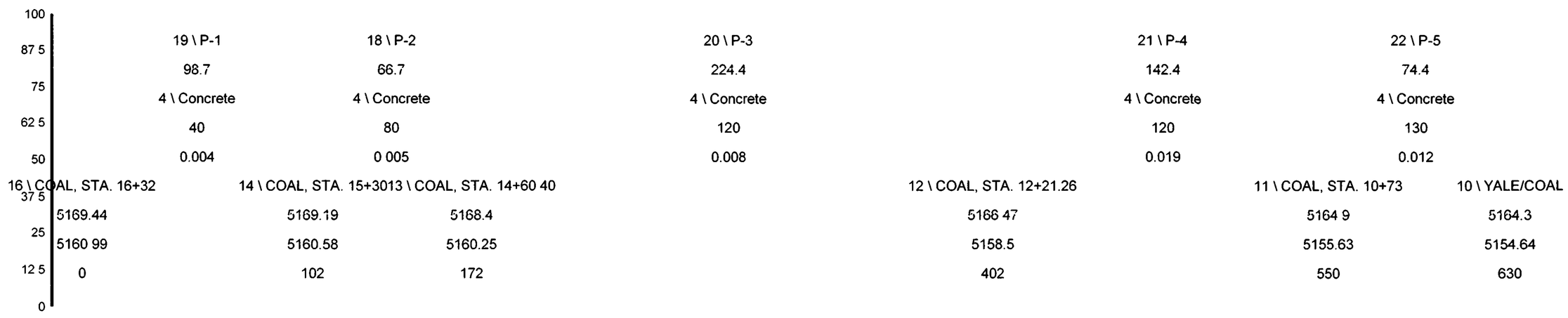
	91 \ P-25 36 at 0.002	144 \ P-6 54 at 0.008	145 \ P-7 54 at 0.013	117 \ P-8 72 at 0.010
	94.5	314	172	
	3 \ Concrete	4.5 \ Concrete	4.5 \ Concrete	
	30	110	110	
	0 002	0.008	0.013	

	90 \ YALE, UPSTREAM FLOW	10 \ YALE/COAL	143 \ YALE, STA. 34+50 81	112 \ YALE/GARFIELD
	5164.8	5164.3	5159 71	5157.2
	5156.36	5154.64	5151.97	5149.7
	0	100	421	600

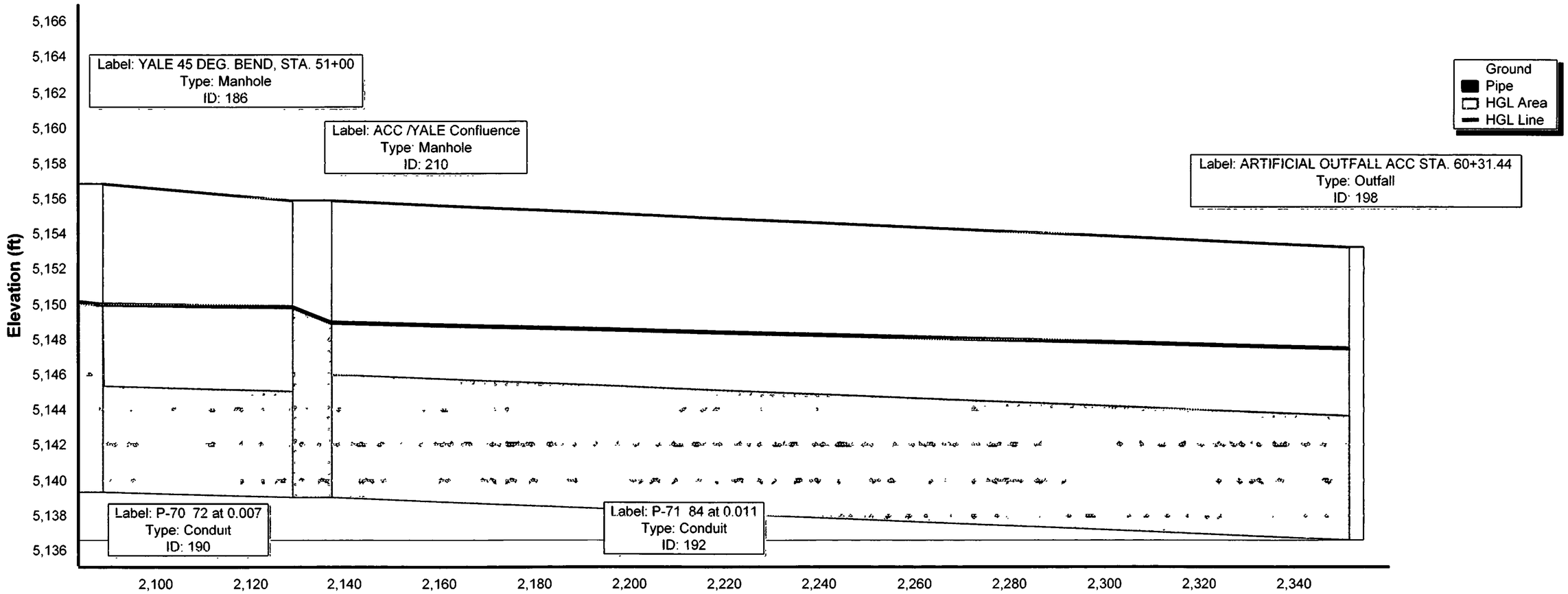
100
87.5
75
62.5
50
37.5
25
12.5
0

Coal existing storm drain wiht 450 cfs at Yale and Garfield - Base



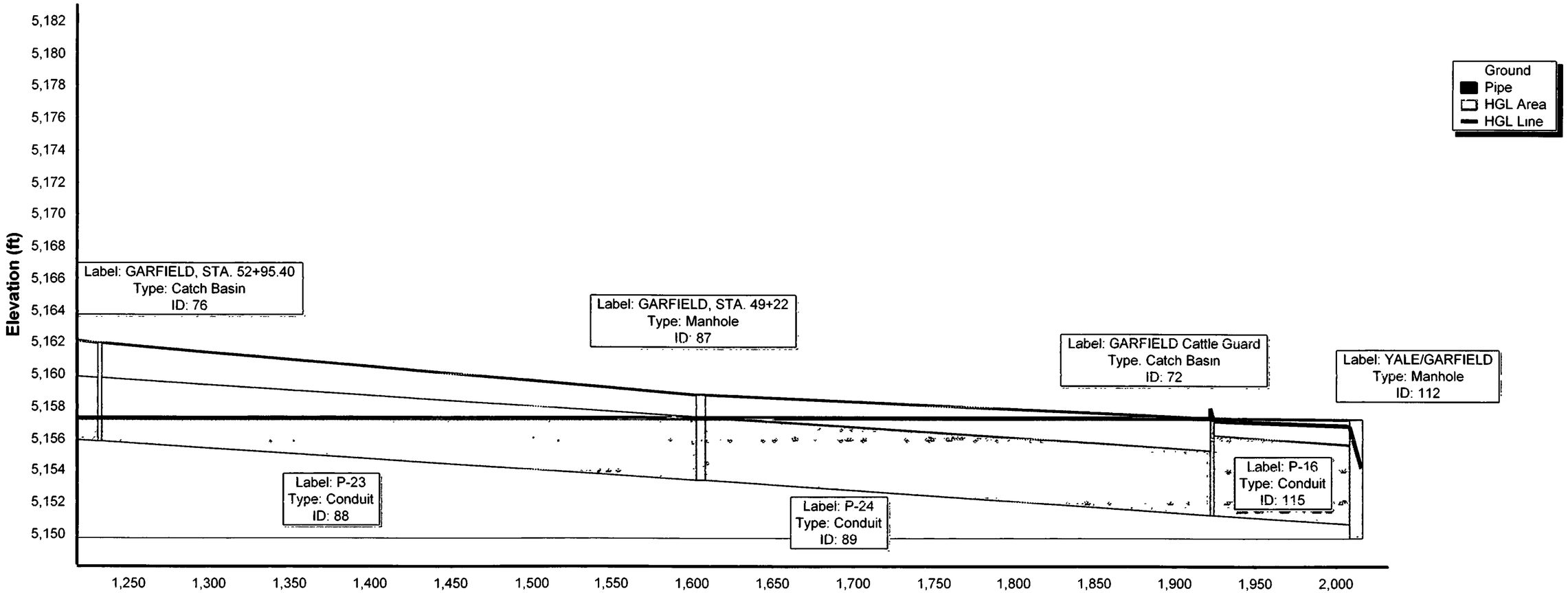


Yale exsiting conditions with allowable flows - Base



190 \ P-70 72 at 0.007		192 \ P-71 84 at 0.011
40		214.5
6 \ Concrete		7 \ Concrete
179.7		529.7
0.007		0.011
186 \ YALE 45 DEG. BEND, STA. 51+00	210 \ ACC /YALE Confluence	198 \ ARTIFICIAL OUTFALL ACC STA. 60+31.44
5156.8	5155.87	5153.24
5139.34	5139.02	5136.62
2085	2133	2353

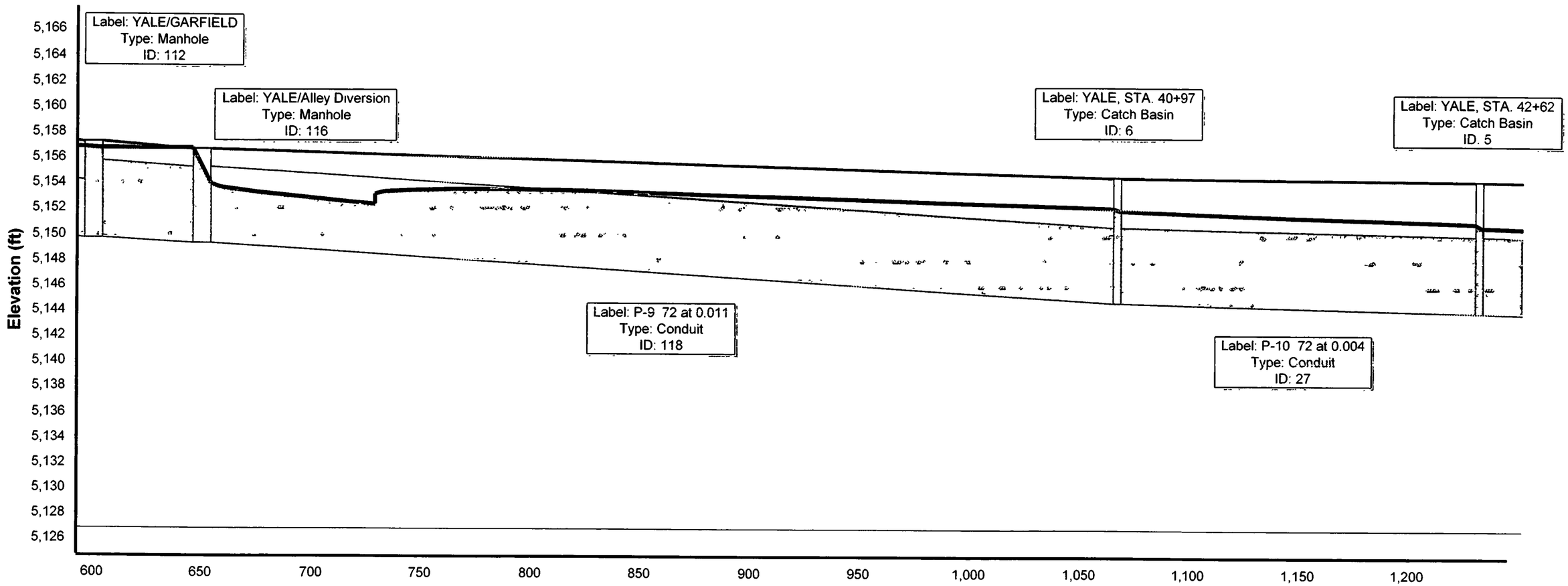
Garfield existing conditions with allowable flows - Base



	88 \ P-23		89 \ P-24	115 \ P-16	
	368.9		313.5	83.5	
	4 \ Concrete		4 \ Concrete	5 \ Concrete	
	0		0	160	
	0.007		0.007	0.007	
76 \ GARFIELD, STA. 52+95.40		87 \ GARFIELD, STA. 49+22		72 \ GARFIELD Cattle Guard	112 \ YALE/GARFIELD
5161.91		5158.71		5157.27	5157.2
5155.79		5153.35		5151.21	5149.7
1231.6		1605		1923	2012

APPENDIX C
HYDRAULIC ANALYSES OF
PROPOSED STORM DRAIN SYSTEM

Yale from ADC to north end of Yale system: Proposed SD - Base



117 \ P-8 Proposed 8' x 6' J-Box at 0.010
42
6 \ Concrete
417
0.01

118 \ P-9 72 at 0.011
411.4
6 \ Concrete
294.17
0.011

27 \ P-10 72 at 0.004
161.7
6 \ Concrete
304.17
0.004

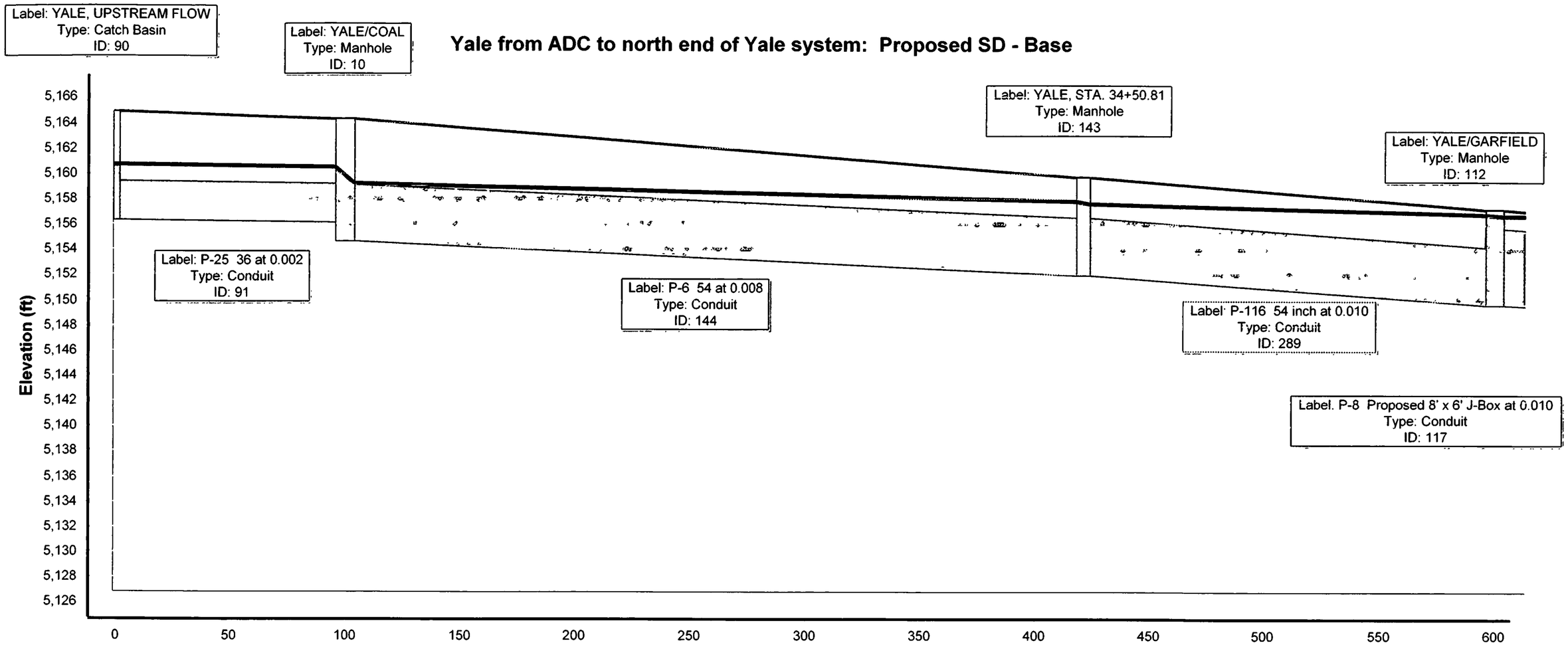
112 \ YALE/GARFIELD
5157.2
5149.7
600

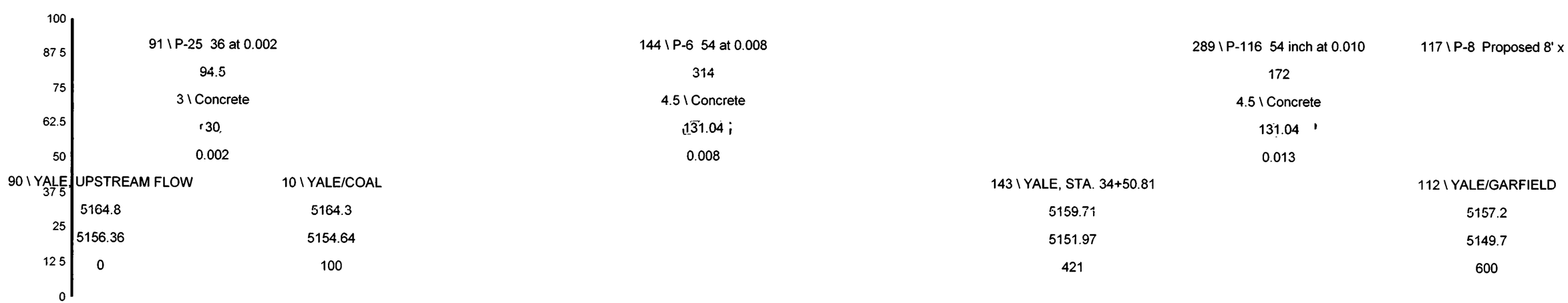
116 \ YALE/Alley Diversion
5156.65
5149.22
650

6 \ YALE, STA. 40+97
5154.52
5144.69
1067

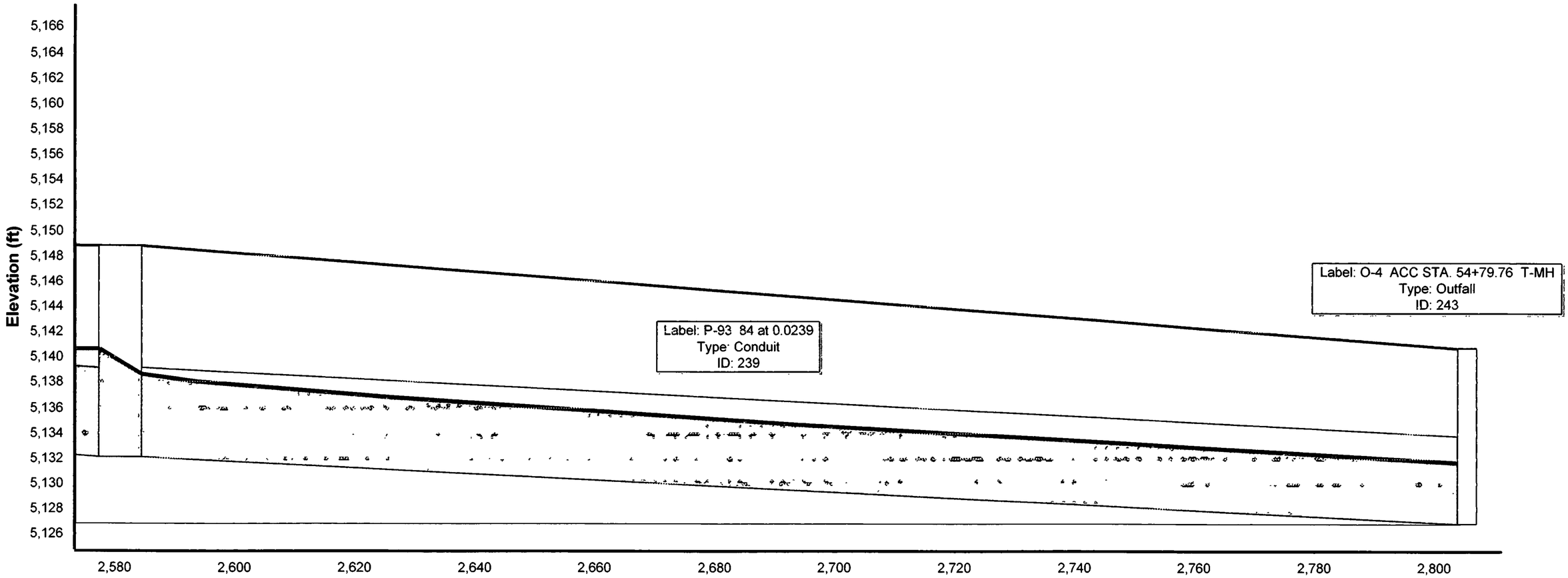
5 \ YALE, STA. 42+62
5154.34
5144.01
1232

Yale from ADC to north end of Yale system: Proposed SD - Base





Yale from ADC to north end of Yale system: Proposed SD - Base



239 \ P-93 84 at 0.0239

219.3

7 \ Concrete

702.17

0 024

237 \ J-27 ACC 45 DEG. BEND STA. 56+78.50

5148.75

5132.14

2580.94

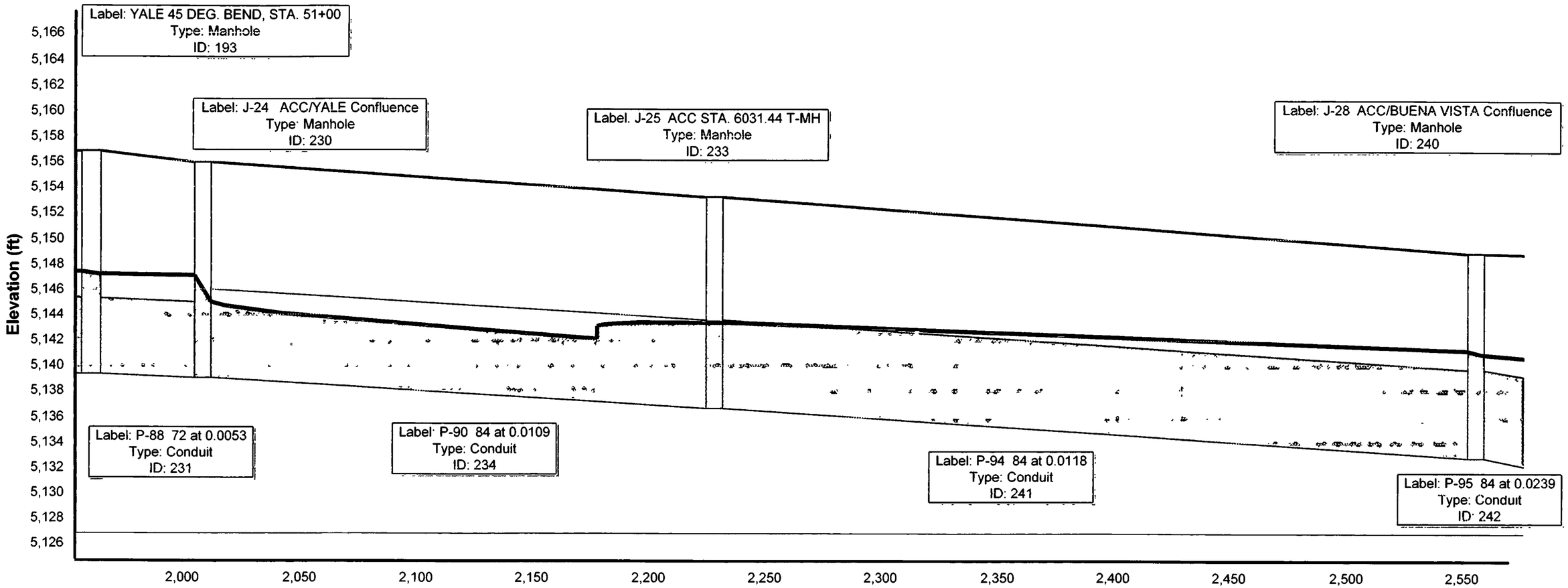
243 \ O-4 ACC STA. 54+79.76 T-M

5140 75

5126.78

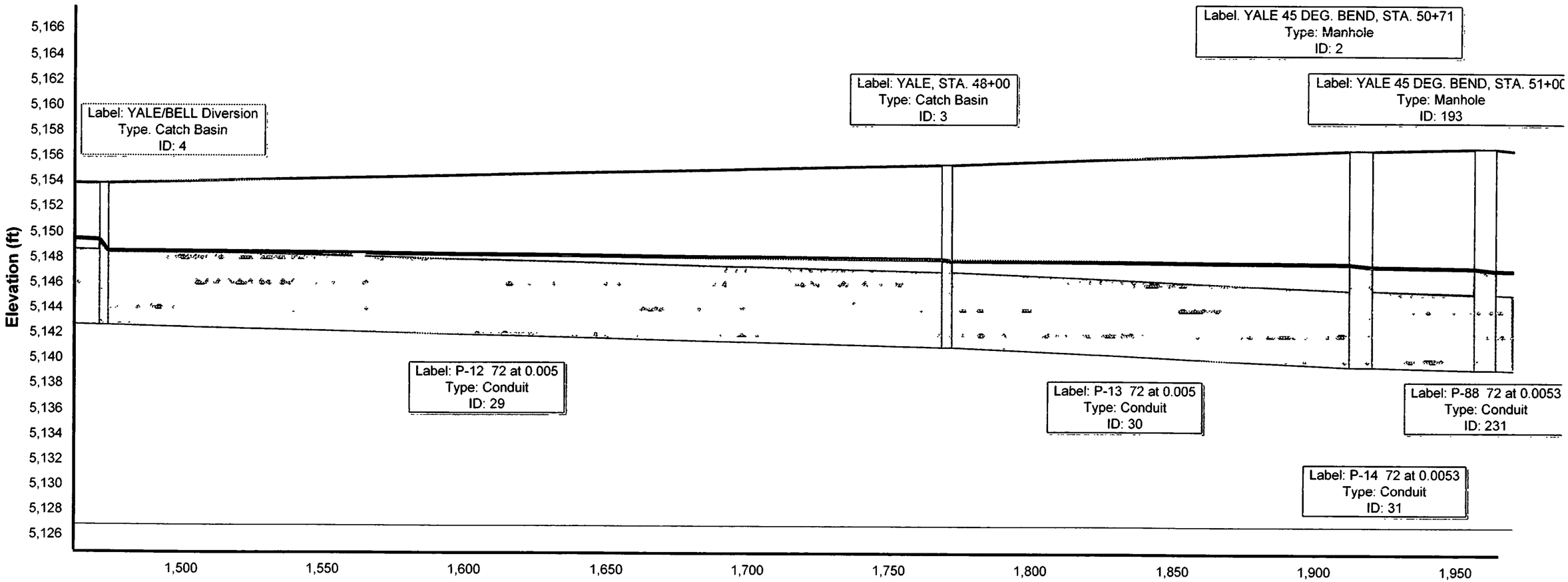
2805.27

Yale from ADC to north end of Yale system: Proposed SD - Base



	231 \ P-88 72 at 0.0053				234 \ P-90 84 at 0.0109								241 \ P-94 84 at 0.0118				242 \ P-95 84 at 0.023
	40.5				213								320.4				18.6
	6 \ Concrete				7 \ Concrete								7 \ Concrete				7 \ Concrete
	174.9				524.9								524.9				702.17
	0.007				0.011								0.012				0.024
193 \ YALE 45 DEG									233 \ J-25 ACC STA. 6031.44 T-MH								240 \ J-28 ACC/BUENA VISTA
	5156.8	5155.87							5153.24								5148.84
	5139.34	5139.02							5136.62								5132.75
	1960	2008							2228								2555.35

Yale from ADC to north end of Yale system: Proposed SD - Base



29 \ P-12 72 at 0.005
294.7
6 \ Concrete
174.9
0.005

30 \ P-13 72 at 0.005
140.4
6 \ Concrete
174.9
0.01

31 \ P-14 72 at 0.005
36
6 \ Concrete
174.9
0.005

231 \ P-88 7:

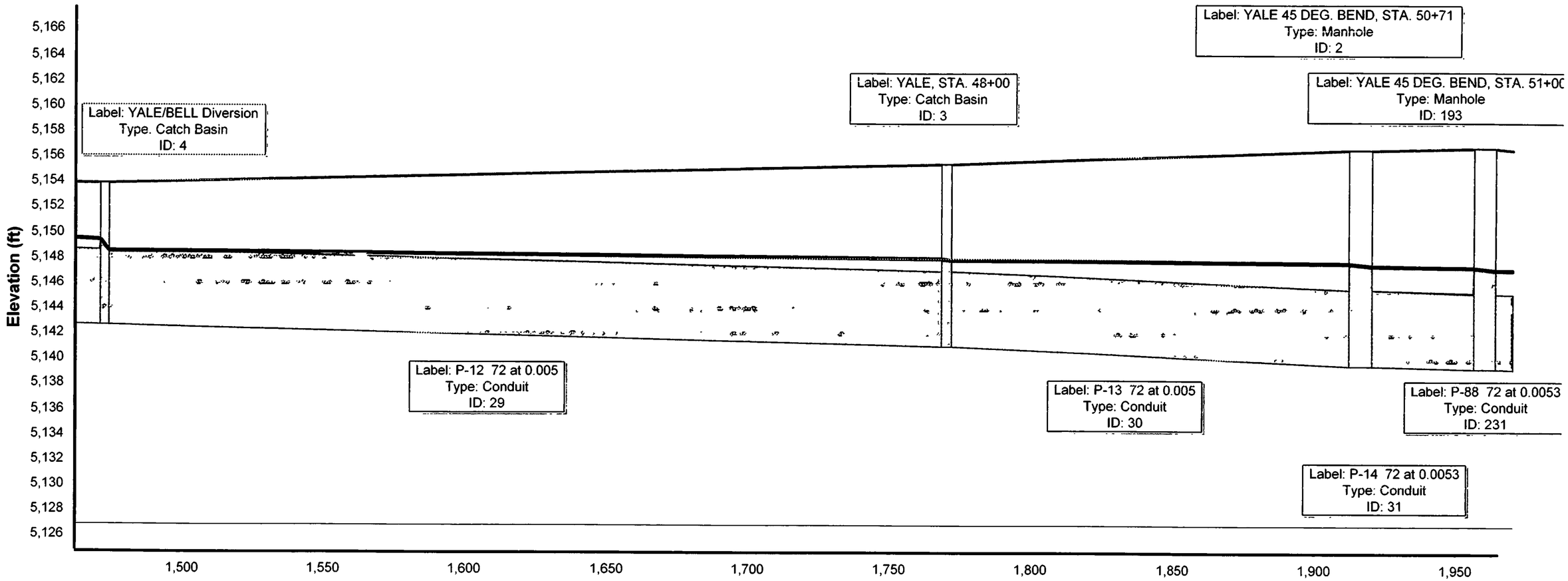
4 \ YALE/BELL Diversion
5153.83
5142.59
1472

3 \ YALE, STA. 48+00
5155.4
5141 01
1770

2 \ YALE 45 DEG. BEND, STA
5156.58
5139.57
1916

YALE 45 DEG. BEND, STA
5156.8
5139.34
1960

Yale from ADC to north end of Yale system: Proposed SD - Base



29 \ P-12 72 at 0 005
294 7
6 \ Concrete
174.9
0.005

30 \ P-13 72 at 0.005
140.4
6 \ Concrete
174.9
0.01

31 \ P-14 72 at 0.0052
36
6 \ Concrete
174.9
0.005

231 \ P-88 7:

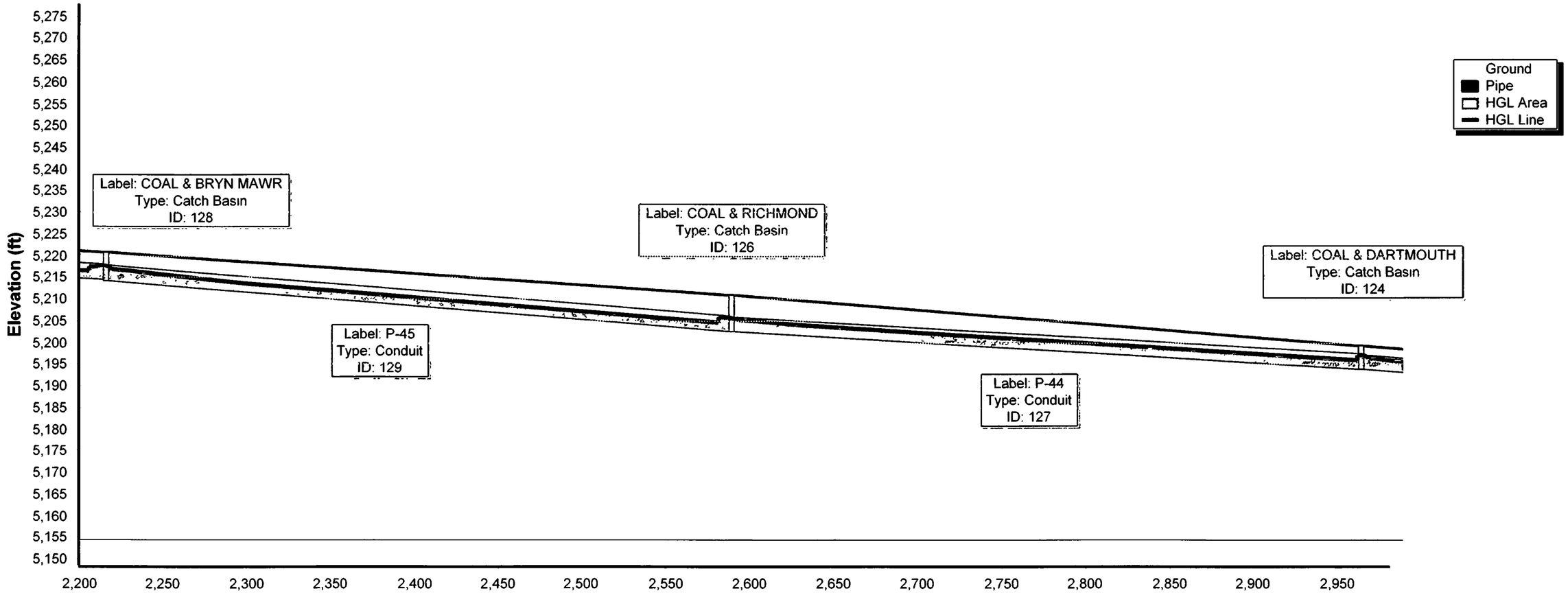
4 \ YALE/BELL Diversion
5153.83
5142 59
1472

3 \ YALE, STA. 48+00
5155.4
5141.01
1770

2 \ YALE 45 DEG BEND, STA. 50+71
5156.58
5139.57
1916

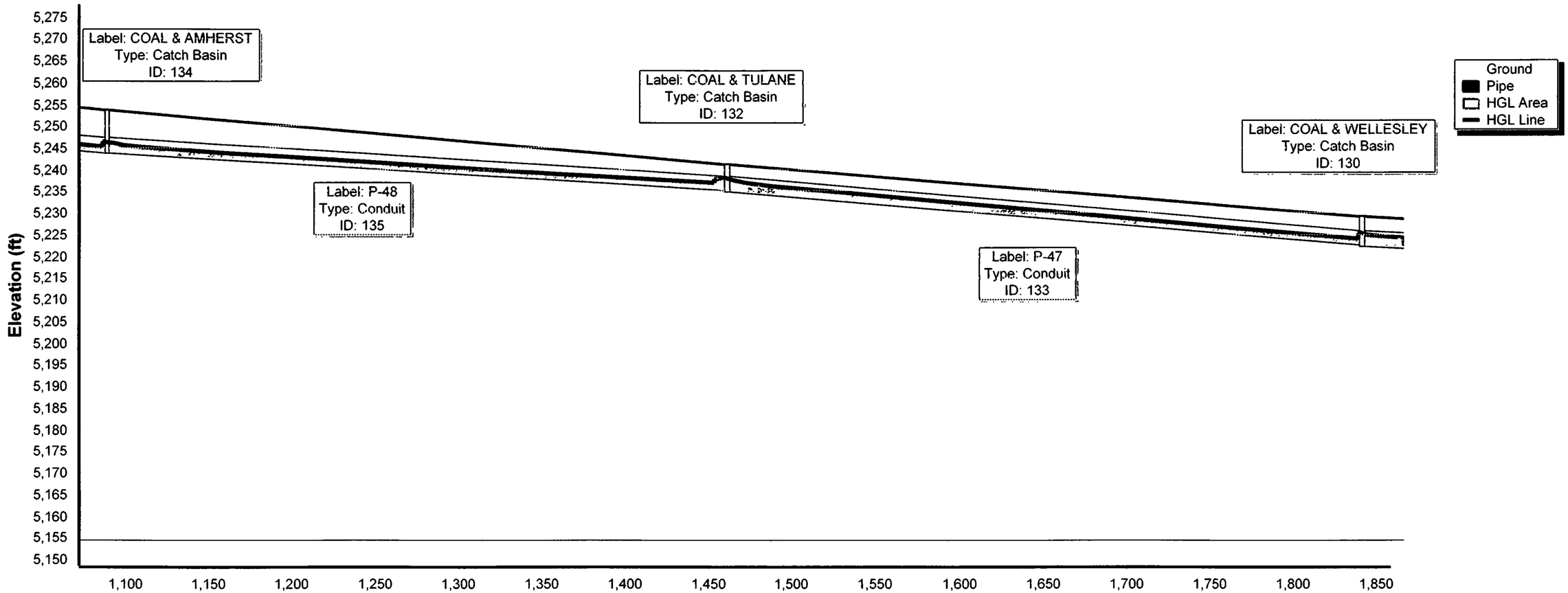
YALE 45 DEG. BEND, STA
5156.8
5139.34
1960

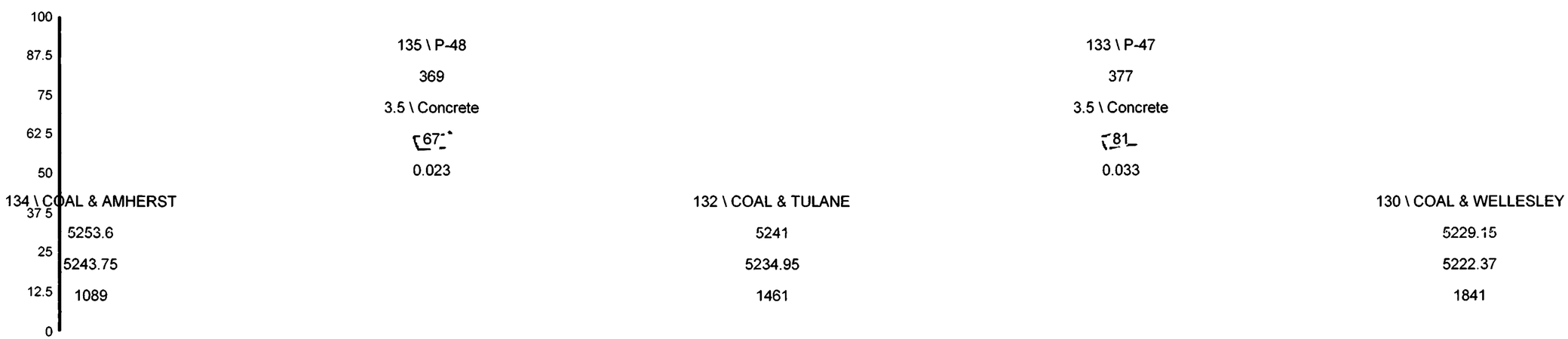
Coal: Proposed SD - Base

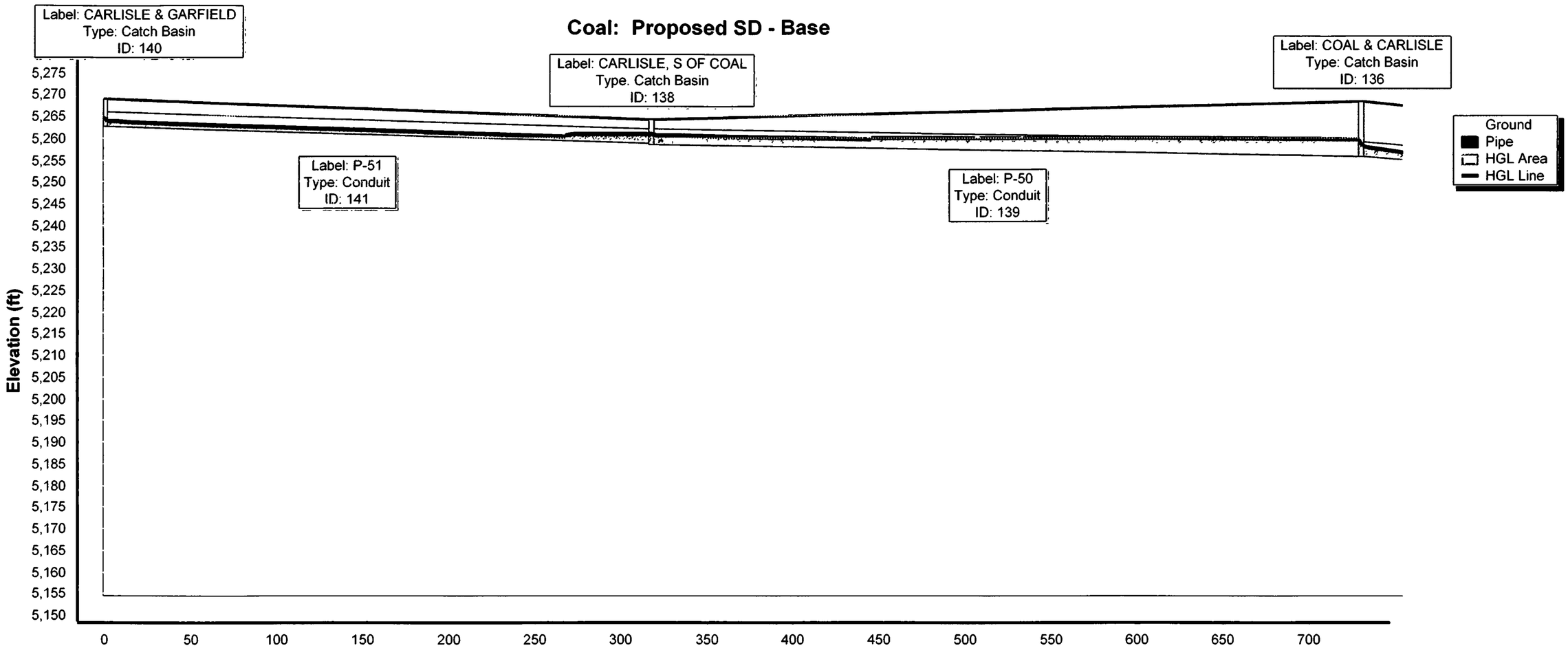


	129 \ P-45	127 \ P-44	
	370	372	
	3.5 \ Concrete	3.5 \ Concrete	
	95	107	
	0.032	0.023	
128 \ COAL & BRYN MAWR		126 \ COAL & RICHMOND	124 \ COAL & DARTMOUTH
5220.92		5210.88	5199.42
5214.37		5202.45	5193.8
2216		2589	2964

Coal: Proposed SD - Base

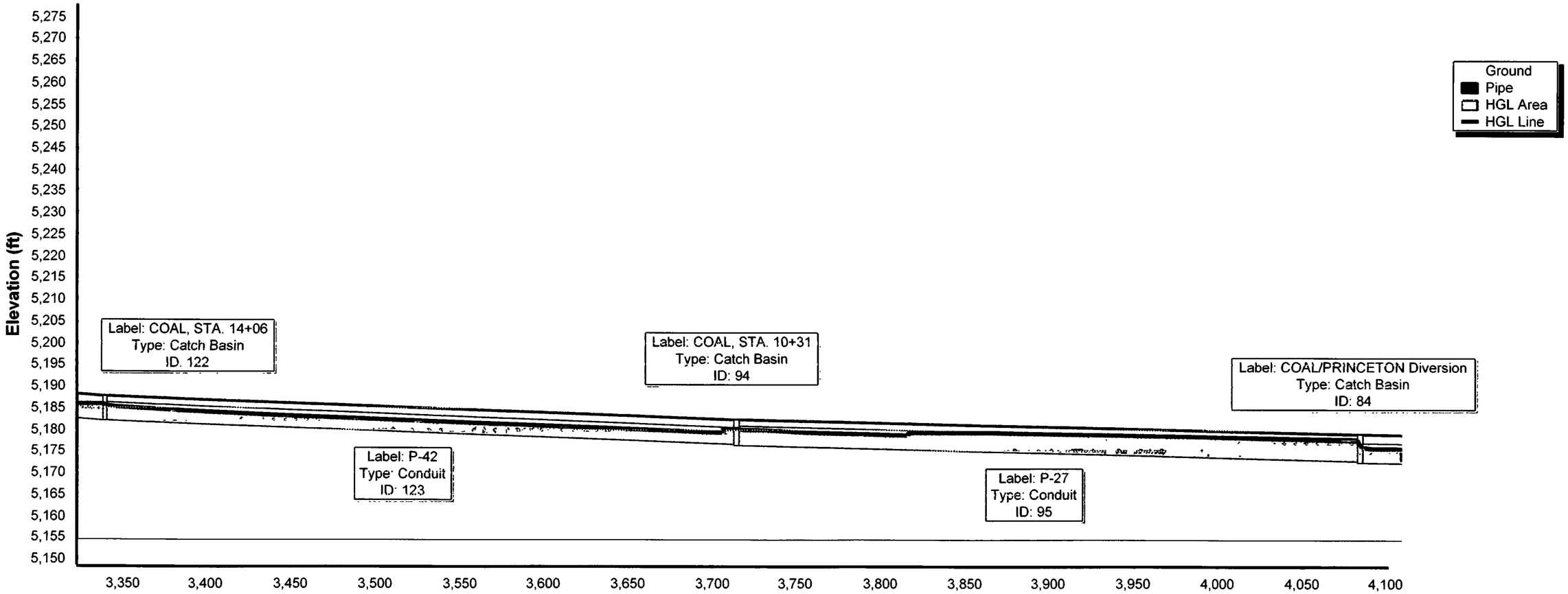






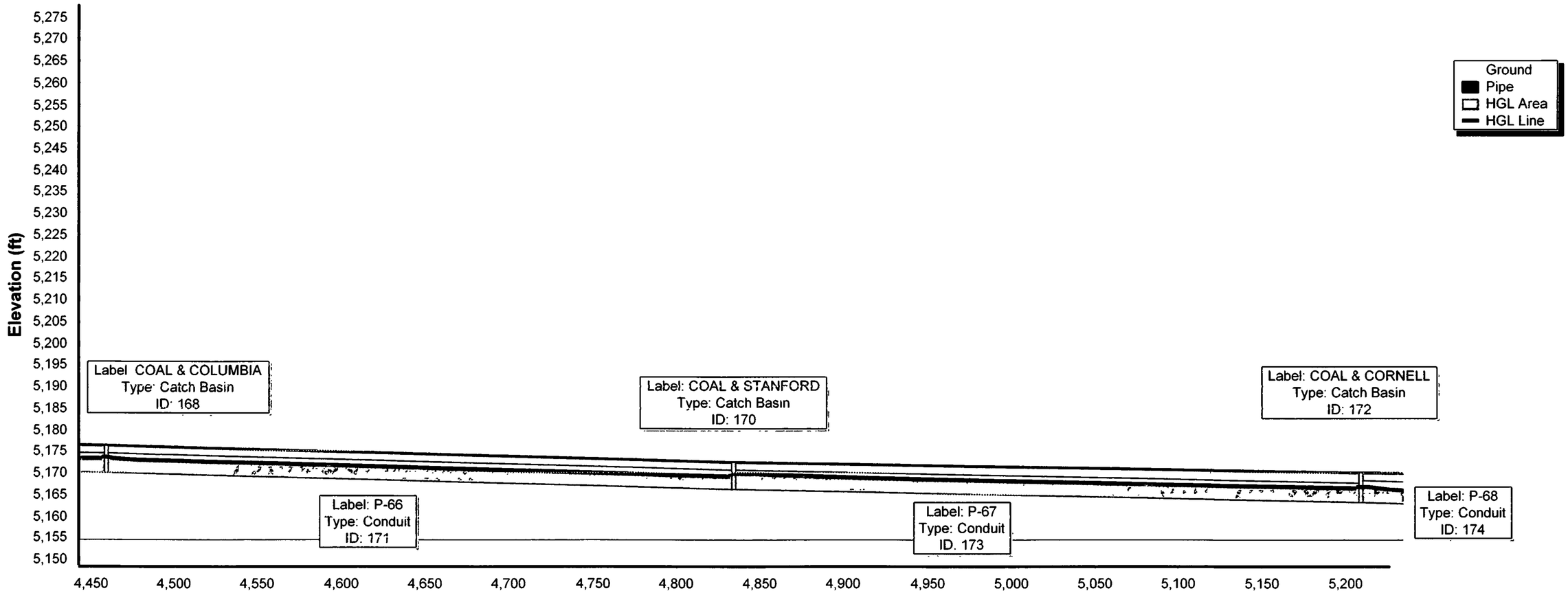
	140 \ CARLISLE & GARFIELD	141 \ P-51	138 \ CARLISLE, S OF COAL	139 \ P-50	136 \ COAL & CARLISLE
		315		409	
		3.5 \ Concrete		3.5 \	
		20		50	
		0.012		0.007	
100					
87 5					
75					
62 5					
50					
37 5	5269.04		5264.12		5268.32
25	5262.54		5258.52		5255.63
12 5	0		318		730
0					

Coal: Proposed SD - Base



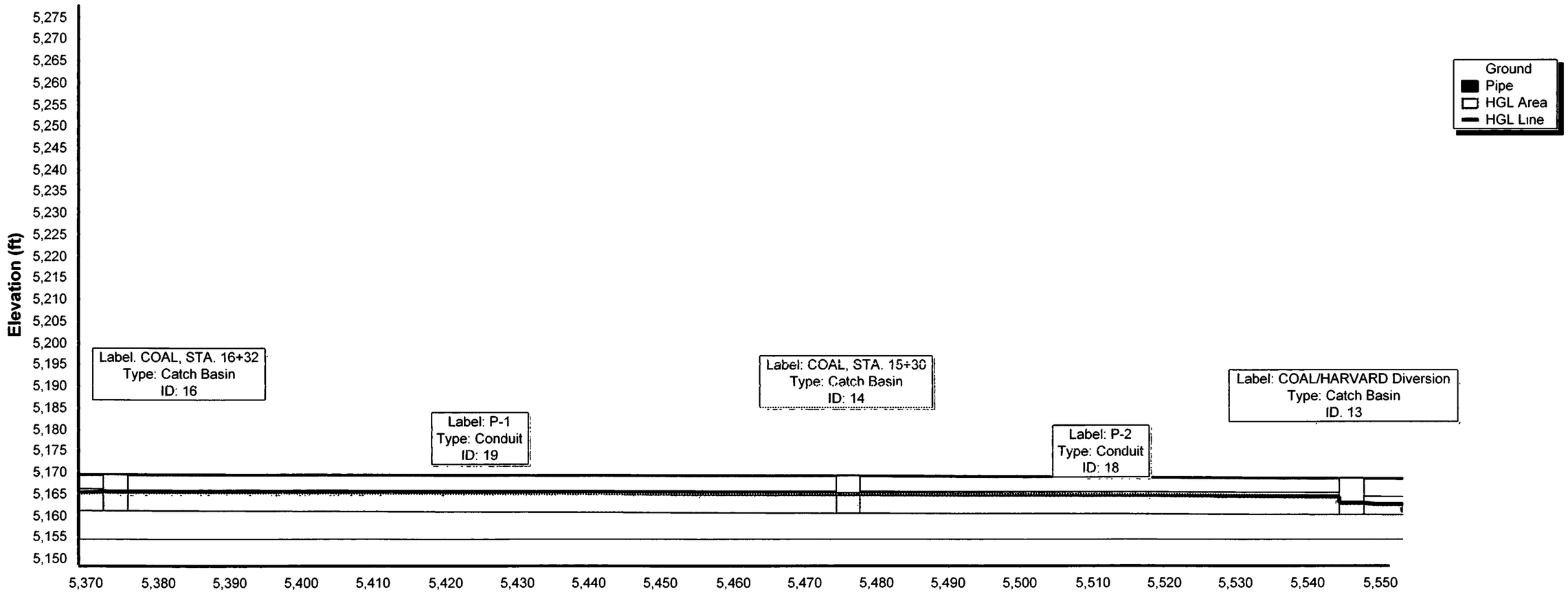
	123 \ P-42	95 \ P-27	
	372	367	
	4 \ Concrete	4.5 \ Concrete	
	133	167	
	0.015	0.01	
122 \ COAL, STA. 14+06		94 \ COAL, STA. 10+31	84 \ COAL/PRINCETON Diversion
5187.51		5182.41	5179.01
5182.01		5176.38	5172.53
3339		3714	4084

Coal: Proposed SD - Base



	171 \ P-66	173 \ P-67	174 \ P-68
	372	372	
	4.5 \ Concrete	4.5 \ Concrete	
	146.25	158.25	
	0.01	0.008	
168 \ COAL & COLUMBIA		170 \ COAL & STANFORD	172 \ COAL & CORNELL
5176.4		5172.3	5170
5170		5166.14	5163.1
4459		4834	5209

Coal: Proposed SD - Base



19 \ P-1
98.7
5 \ Concrete
182.25
0.004

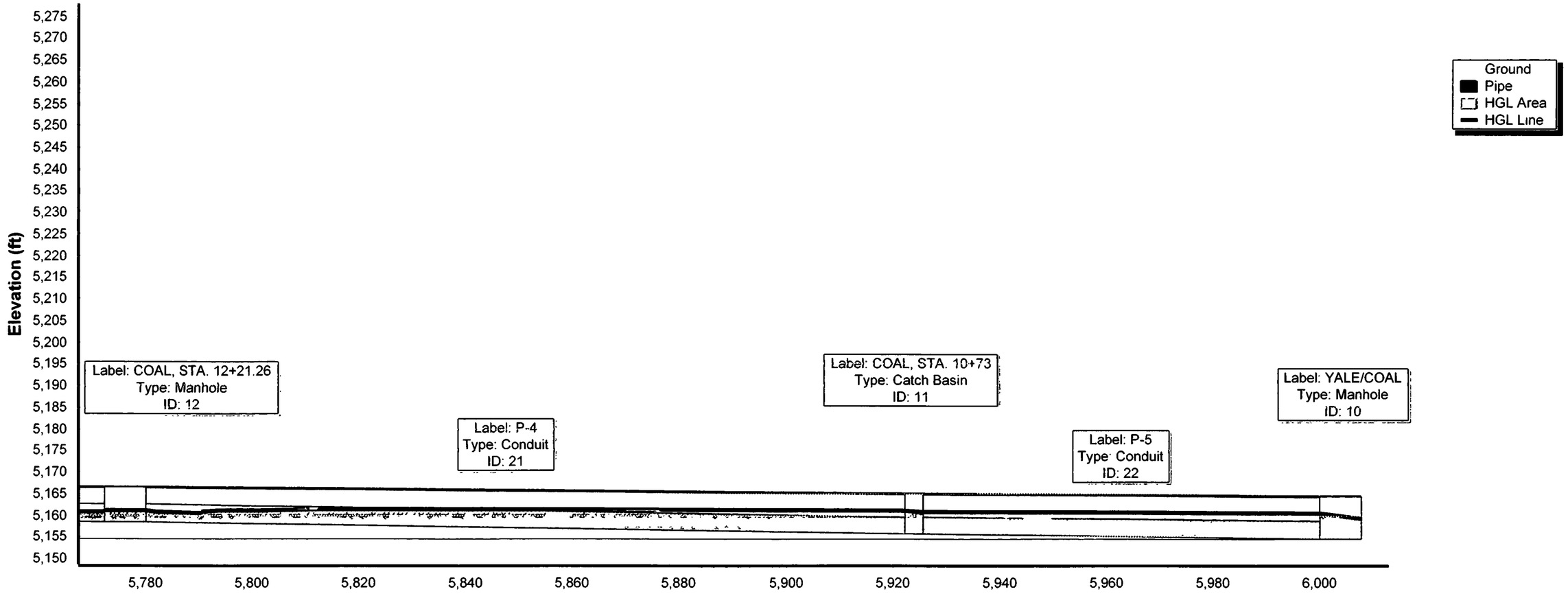
18 \ P-2
66.7
5 \ Concrete
194.25
0.005

16 \ COAL, STA. 16+32
5169.44
5160.99
5374

14 \ COAL, STA. 15+30
5169.19
5160.58
5476

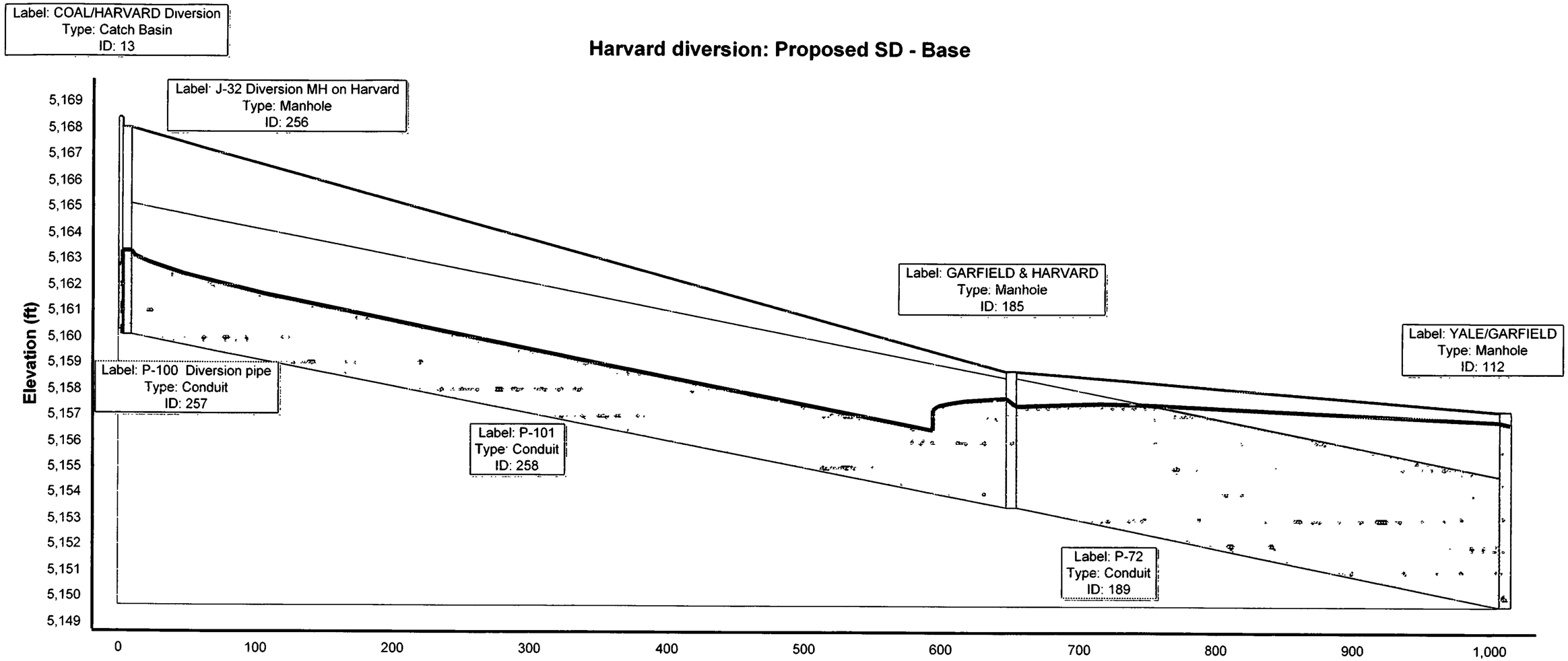
13 \ COAL/HARVARD Diversion
5168.4
5160.25
5546

Coal: Proposed SD - Base



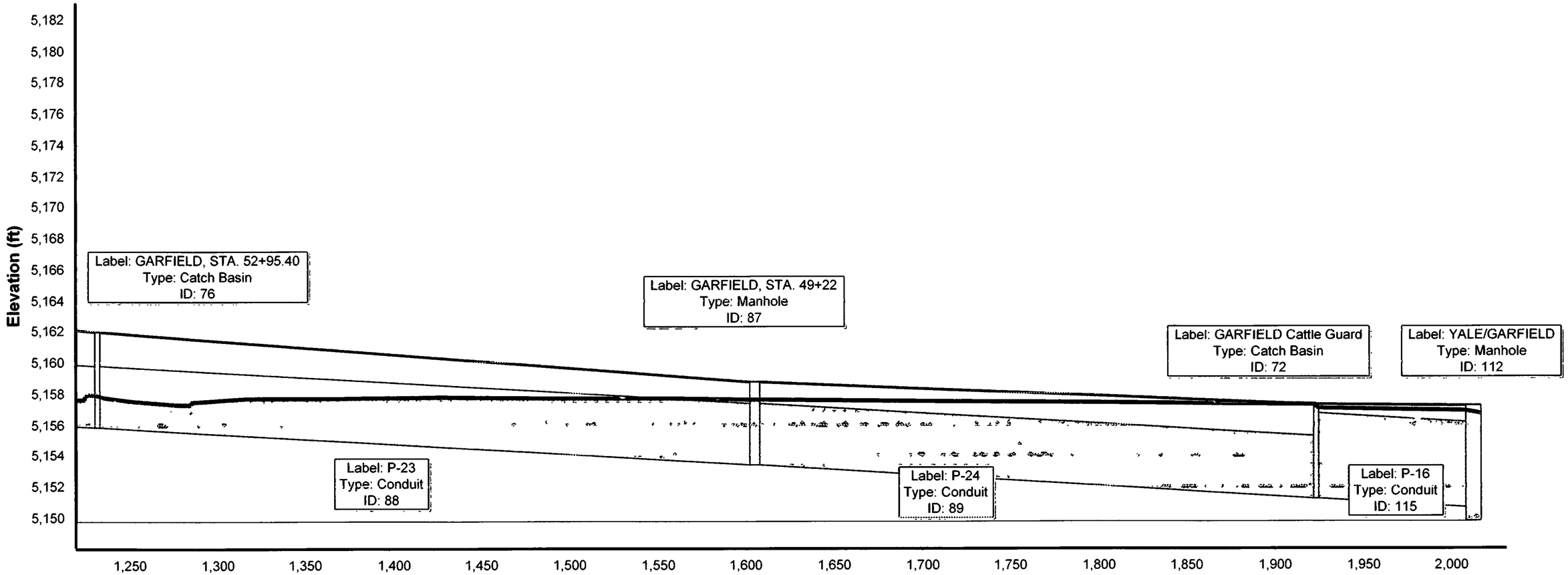
	21 \ P-4		22 \ P-5	
	142.4		74.4	
	4 \ Concrete		4 \ Concrete	
	69.04*		101.04*	
	0.019		0.012	
12 \ COAL, STA. 12+21.26		11 \ COAL, STA. 10+73		10 \ YALE/COAL
5166.47		5164.9		5164.3
5158.5		5155.63		5154.64
5776		5924		6004

Harvard diversion: Proposed SD - Base



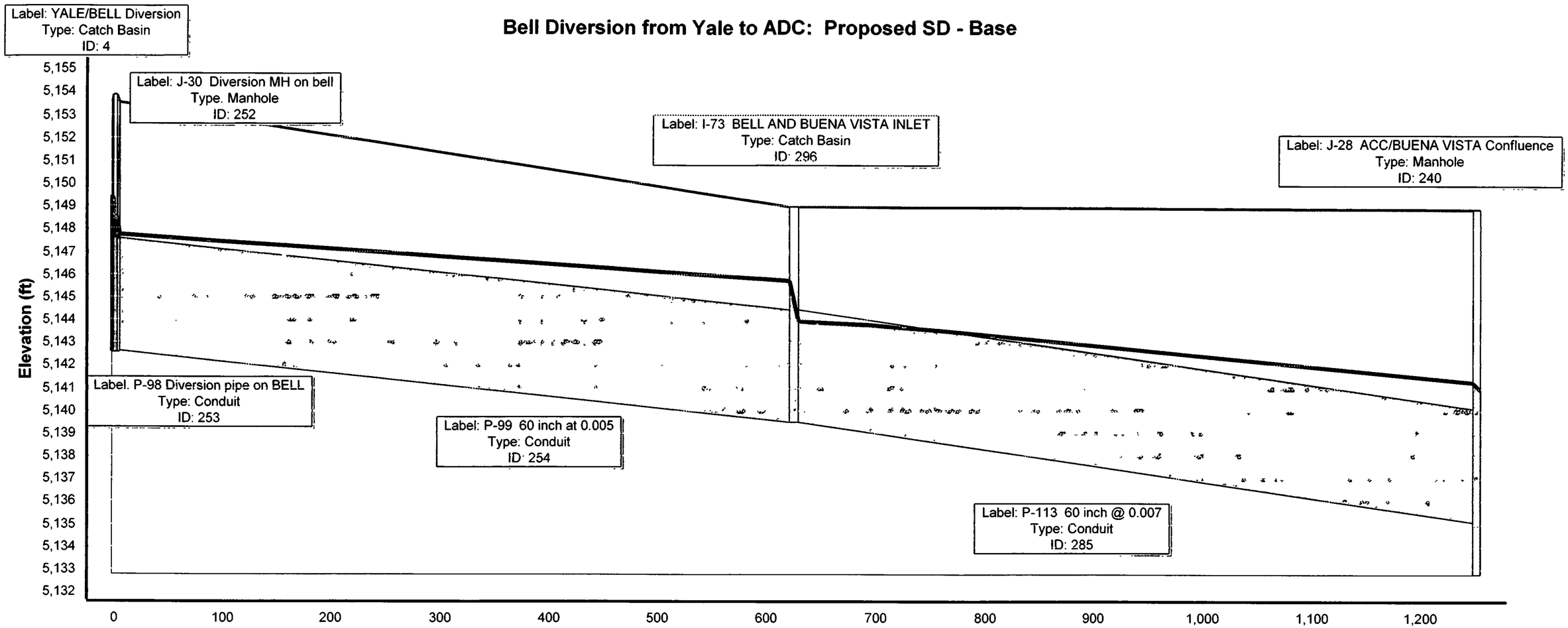
100				
87 5	257 \ P-100 Diversion pipe	258 \ P-101	189 \ P-72	
	0.4	638	352	
75	5 \ Concrete	5 \ Concrete	5 \ Concrete	
62 5	125.21	125.21	125.21	
50	0.03	0.01	0.011	
37 5	256 \ COAL/HARVARD Diversion Harvard	185 \ GARFIELD & HARVARD	112 \ YALE/GARFIELD	
	5168	5158.71	5157.2	
25	5160.51	5153.49	5149.7	
12 5	05	650	1010	
0				

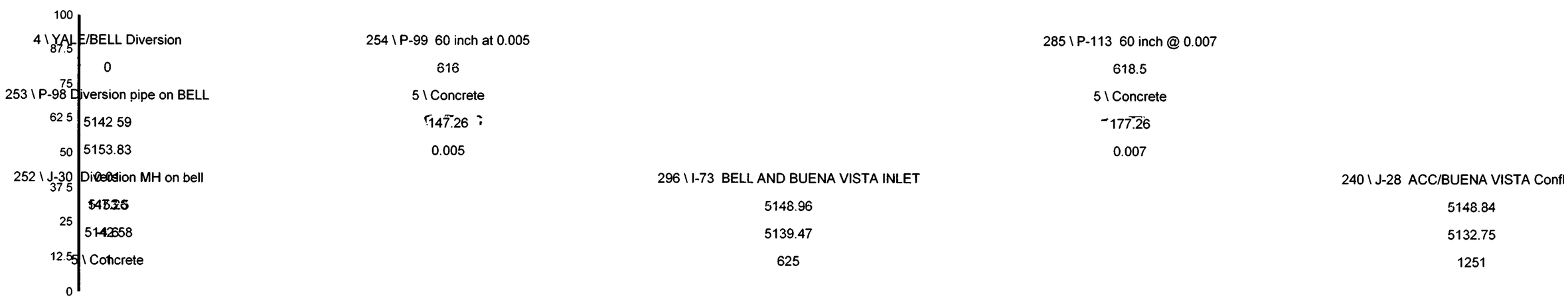
Garfield: Proposed SD - Base



	88 \ P-23		89 \ P-24	115 \ P-16	
	368.9		313.5	83.5	
	4 \ Concrete		4 \ Concrete	5.5 \ Concrete	
	44.75		44.75	160.75	
	0.007		0.007	0.007	
76 \ GARFIELD, STA. 52+95.40		87 \ GARFIELD, STA. 49+22		72 \ GARFIELD Cattle Guard	112 \ YALE/GARFIELD
5161.91		5158.71		5157.27	5157.2
5155.79		5153.35		5151.21	5149.7
1231.6		1605		1923	2012

Bell Diversion from Yale to ADC: Proposed SD - Base





APPENDIX D
CONCEPTUAL CONSTRUCTION
COST ESTIMATE

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - DOWNSTREAM STORM DRAIN PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 1,500.00	$ 1,500.00
2	6.01	Construction Project Sign, complete-in-place	EA	2	$ 700.00	$ 1,400.00
3	6.05	Construction mobilization, Complete	LS	1	$ 37,500.00	$ 37,500.00
4	6.06	Construction De-mobilization, Complete	LS	1	$ 15,000.00	$ 15,000.00
5	19.01	Construction Traffic Control & Barricading, complete	LS	1	$ 20,000.00	$ 20,000.00
6	20.01X	Control of Storm and Nuisance Flows	LS	1	$ 5,000.00	$ 5,000.00
7	21.01x	NPDES Compliance	LS	1	$ 5,000.00	$ 5,000.00
8	116.XXB	Asphalt Concrete Pavement, Superpave, SP-II, complete	TON	1,520	$ 85.00	$ 129,200.00
9	202.010X	Remove and Dispose of Excess Excavation, complete	CY	500	$ 6.00	$ 3,000.00
10	301.020	Subgrade Preparation, 12" at 95% compaction, complete-in-place	SY	3,360	$ 1.75	$ 5,880.00
11	336.XXA	Placement superpave asphalt concrete, 2" lift, SP-II, cip.	SY	13,440	$ 2.00	$ 26,880.00
12	336.120	Tack Coat, cationic emulsified asphalt, complete-in-place	SY	13,440	$ 0.50	$ 6,720.00
13	340.050	Curb & Gutter, Standard, Portland Cement Concrete, including subgrade preparation, complete-in-place, SD 2415	LF	200	$ 21.00	$ 4,200.00
14	343.030	Existing Pavement, Asphalt Concrete, more than 4" thick, sawcut, remove & dispose, complete	SY	3,360	$ 8.00	$ 26,880.00
15	343.080	Existing Curb & Gutter, PC Concrete, remove & dispose, complete-in-place	LF	200	$ 6.00	$ 1,200.00
16	441.001	Reflectorized Plastic Pavement Markings, 4" width, complete-in-place	LF	5,300	$ 1.50	$ 7,950.00
17	701.100BX	Trenching, Backfilling, & Compaction for 24" storm drain, up to 8' depth, pipe not incl., complete	LF	200	$ 33.00	$ 6,600.00
18	701.150AX	Trenching, Backfilling, & Compaction for 54" storm drain, up to 8' depth, pipe not incl., complete	LF	1,135	$ 45.00	$ 51,075.00
19	701.150BX	Trenching, Backfilling, & Compaction for 60" storm drain, up to 8' depth, pipe not incl., complete	LF	375	$ 50.00	$ 18,750.00
20	910.010	24" Reinforced Concrete Pipe, Class IV, furnish and install in open trench, complete-in-place	LF	200	$ 54.00	$ 10,800.00
21	910.020	54" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	1,135	$ 165.00	$ 187,275.00
22	910.024	60" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	375	$ 200.00	$ 75,000.00
23	910.104	Drainline, Remove & Dispose, 21" to 48" including trenching & backfilling, complete	LF	260	$ 40.00	$ 10,400.00
24	915.010	Catch Basin, Type "A", Single Grate, complete-in-place	EA	12	$ 4,100.00	$ 49,200.00
25	920.130	Manhole, 6' dia., Type "C" or "E", less than 6' deep, complete-in-place SD 2101	EA	6	$ 4,000.00	$ 24,000.00
26	920.570	Existing Manhole, Remove & Dispose, all depths, 4' to6' dia, compl.	EA	3	$ 1,500.00	$ 4,500.00

COAL AVENUE STORM DRAIN REHAB - DOWNSTREAM STORM DRAIN PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
SUB-TOTAL OF BID ITEMS 1-27						$734,910.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 50,525.06
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$805,435.06

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - BELL DIVERSION - PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 13,000.00	$ 13,000.00
2	6.01	Construction Project Sign, complete-in-place	EA	2	$ 700.00	$ 1,400.00
3	6.05	Construction mobilization, Complete	LS	1	$ 32,500.00	$ 32,500.00
4	6.06	Construction De-mobilization, Complete	LS	1	$ 13,000.00	$ 13,000.00
5	19.01	Construction Traffic Control & Barricading, complete	LS	1	$ 20,000.00	$ 20,000.00
6	20.01X	Control of Storm and Nuisance Flows	LS	1	$ 5,000.00	$ 5,000.00
7	21.01x	NPDES Compliance	LS	1	$ 5,000.00	$ 5,000.00
8	116.XXB	Asphalt Concrete Pavement, Superpave, SP-II, complete	TON	1,250	$ 85.00	$ 106,250.00
9	202.010X	Remove and Dispose of Excess Excavation, complete	CY	500	$ 6.00	$ 3,000.00
10	301.020	Subgrade Preparation, 12" at 95% compaction, complete-in-place	SY	2,500	$ 1.75	$ 4,375.00
11	336.XXA	Placement superpave asphalt concrete, 2" lift, SP-II, cip.	SY	10,000	$ 2.00	$ 20,000.00
12	336.120	Tack Coat, cationic emulsified asphalt, complete-in-place	SY	10,000	$ 0.50	$ 5,000.00
13	340.050	Curb & Gutter, Standard, Portland Cement Concrete, including subgrade preparation, complete-in-place, SD 2415	LF	200	$ 21.00	$ 4,200.00
14	343.030	Existing Pavement, Asphalt Concrete, more than 4" thick, sawcut, remove & dispose, complete	SY	2,500	$ 8.00	$ 20,000.00
15	343.080	Existing Curb & Gutter, PC Concrete, remove & dispose, complete-in-place	LF	200	$ 6.00	$ 1,200.00
16	441.001	Reflectorized Plastic Pavement Markings, 4" width, complete-in-place	LF	4,430	$ 1.50	$ 6,645.00
	510.110	Structural Concrete for J-Boxes, 4,000 psi, cip	CY	20	$ 900.00	$ 18,000.00
17	701.100BX	Trenching, Backfilling, & Compaction for 24" storm drain, up to 8' depth, pipe not incl., complete	LF	80	$ 33.00	$ 2,640.00
18	701.150AX	Trenching, Backfilling, & Compaction for 42" storm drain, up to 8' depth, pipe not incl., complete	LF	0	$ 42.00	$ -
19	701.150BX	Trenching, Backfilling, & Compaction for 60" storm drain, up to 8' depth, pipe not incl., complete	LF	1,120	$ 45.00	$ 50,400.00
20	910.010	24" Reinforced Concrete Pipe, Class IV, furnish and install in open trench, complete-in-place	LF	80	$ 54.00	$ 4,320.00
21	910.020	42" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	0	$ 105.00	$ -
22	910.024	60" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	1,120	$ 200.00	$ 224,000.00
	910.080	60" RCP 45 Deg Bend, furnish & install in open trench, complete-in-place.	EA	1	$ 3,500.00	$ 3,500.00
	910.090	Wye, 84" x 60" RCP, furnish & install in open trench, complete-in-place.	EA	1	$ 18,000.00	$ 18,000.00
23	910.104	Drainline, Remove & Dispose, 21" to 48" including trenching & backfilling, complete	LF	1,120	$ 40.00	$ 44,800.00
24	915.010	Catch Basin, Type "A", Single Grate, complete-in-place	EA	0	$ 4,100.00	$ -
25	920.130	Manhole, 6' dia., Type "C" or "E", less than 6' deep, complete-in-place SD 2101	EA	4	$ 4,000.00	$ 16,000.00

COAL AVENUE STORM DRAIN REHAB - BELL DIVERSION - PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
26	920.570	Existing Manhole, Remove & Dispose, all depths, 4' to6' dia, compl.	EA	4	$ 1,500.00	$ 6,000.00
SUB-TOTAL OF BID ITEMS 1-27						$648,230.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 44,565.81
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$712,795.81

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - HARVARD STORM DRAIN - PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 15,500.00	$ 15,500.00
2	6.01	Construction Project Sign, complete-in-place	EA	2	$ 700.00	$ 1,400.00
3	6.05	Construction mobilization, Complete	LS	1	$ 38,750.00	$ 38,750.00
4	6.06	Construction De-mobilization, Complete	LS	1	$ 15,500.00	$ 15,500.00
5	19.01	Construction Traffic Control & Barricading, complete	LS	1	$ 30,000.00	$ 30,000.00
6	20.01X	Control of Storm and Nuisance Flows	LS	1	$ 5,000.00	$ 5,000.00
7	21.01x	NPDES Compliance	LS	1	$ 5,000.00	$ 5,000.00
8	116.XXB	Asphalt Concrete Pavement, Superpave, SP-II, complete	TON	1,880	$ 85.00	$ 159,800.00
9	202.010X	Remove and Dispose of Excess Excavation, complete	CY	500	$ 6.00	$ 3,000.00
10	301.020	Subgrade Preparation, 12" at 95% compaction, complete-in-place	SY	3,300	$ 1.75	$ 5,775.00
11	336.XXA	Placement superpave asphalt concrete, 2" lift, SP-II, cip.	SY	13,200	$ 2.00	$ 26,400.00
12	336.120	Tack Coat, cationic emulsified asphalt, complete-in-place	SY	13,200	$ 0.50	$ 6,600.00
13	340.050	Curb & Gutter, Standard, Portland Cement Concrete, including subgrade preparation, complete-in-place, SD 2415	LF	200	$ 21.00	$ 4,200.00
14	343.030	Existing Pavement, Asphalt Concrete, more than 4" thick, sawcut, remove & dispose, complete	SY	3,300	$ 8.00	$ 26,400.00
15	343.080	Existing Curb & Gutter, PC Concrete, remove & dispose, complete-in-place	LF	200	$ 6.00	$ 1,200.00
16	441.001	Reflectorized Plastic Pavement Markings, 4" width, complete-in-place	LF	7,500	$ 1.50	$ 11,250.00
17	510.110	Structural Concrete for J-Boxes, 4,000 psi, cip	CY	80	$ 900.00	$ 72,000.00
18	701.150AX	Trenching, Backfilling, & Compaction for 24" storm drain, up to 8' depth, pipe not incl., complete	LF	100	$ 33.00	$ 3,300.00
19	701.150BX	Trenching, Backfilling, & Compaction for 60" storm drain, up to 8' depth, pipe not incl., complete	LF	1,100	$ 45.00	$ 49,500.00
20	910.010	24" Reinforced Concrete Pipe, Class IV, furnish and install in open trench, complete-in-place	LF	100	$ 54.00	$ 5,400.00
21	910.020	48" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	0	$ 165.00	$ -
22	910.024	60" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, complete-in-place	LF	1,100	$ 200.00	$ 220,000.00
	910.080	60" RCP 45 Deg Bend, furnish & install in open trench, complete-in-place.	EA	2	$ 3,500.00	$ 7,000.00
23	910.104	Drainline, Remove & Dispose, 21" to 48" including trenching & backfilling, complete	LF	125	$ 40.00	$ 5,000.00
24	915.010	Catch Basin, Type "A", Single Grate, complete-in-place	EA	4	$ 4,100.00	$ 16,400.00
	915.080A	Cattle Guard Storm Inlet, complete-in-place	EA	1	$ 25,000.00	$ 25,000.00
25	920.130	Manhole, 6' dia., Type "C" or "E", less than 6' deep, complete-in-place SD 2101	EA	3	$ 6,000.00	$ 18,000.00
26	920.570	Existing Manhole, Remove & Dispose, all depths, 4' to6' dia, compl.	EA	0	$ 1,500.00	$ -

COAL AVENUE STORM DRAIN REHAB - HARVARD STORM DRAIN - PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
SUB-TOTAL OF BID ITEMS 1-27						$777,375.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 53,444.53
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$850,819.53

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - DOWNSTREAM WATER PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 2,100.00	$ 2,100.00
2	6.05	Construction mobilization, Complete	LS	1	$ 5,300.00	$ 5,300.00
3	6.06	Construction De-mobilization, Complete	LS	1	$ 2,100.00	$ 2,100.00
4	801.002X	6" DI Waterline Pipe excluding fittings (std. Spec. sec. 801), inlcuding trench & compacted backfill to 6' depth, complete-in-place	LF	800	$ 40.00	$ 32,000.00
5	801.055	Existing Waterline, 6" to 14", with fittings, Remove and Dispose, excl. trenching, complete	LF	800	$ 7.00	$ 5,600.00
6	801.057	Existing Waterline, 16" to 36", with fittings, Remove and Dispose, excl. trenching, complete	LF	400	$ 14.00	$ 5,600.00
7	801.059	Non-pressurized Connection, existing waterline, all sizes, including fittings, complete-in-place	EA	8	$ 1,500.00	$ 12,000.00
8	801.065	Ductile Iron MJ Fittings, Class 250, 4" to 14" waterline, including jointing material, complete-in-place	LB	600	$ 3.50	$ 2,100.00
9	801.081	6" Gate Valve, cip, SD 2333	EA	8	$ 800.00	$ 6,400.00
10	801.101X	Gate Valve, 4"-12", Remove & Dispose, Complete	EA	8	$ 500.00	$ 4,000.00
11	801.104	Valve Box, Remove & Dispose, compl.	EA	8	$ 200.00	$ 1,600.00
12	801.106	Valve Box, cip, SD 2326	EA	8	$ 500.00	$ 4,000.00
13	801.111	Valve Box, Adjust to Grade, cip, SD 2332	EA	8	$ 400.00	$ 3,200.00
14	801.150	Mechanical Joint Restraining Gland, DI & PVC, 4"-8", complete-in-place	EA	40	$ 90.00	$ 3,600.00
15	801.155	Joint Restraining Harness, DI & PVC push on bells, 4"-8", complete-in-place	EA	10	$ 150.00	$ 1,500.00
16	801.XXX	Air Release Valve, cip, SD 2350	EA	4	$ 6,000.00	$ 24,000.00
SUB-TOTAL OF BID ITEMS 1-16						$115,100.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 7,913.13
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$143,013.13

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - BELL WATER PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 1,000.00	$ 1,000.00
2	6.05	Construction mobilization, Complete	LS	1	$ 2,500.00	$ 2,500.00
3	6.06	Construction De-mobilization, Complete	LS	1	$ 1,000.00	$ 1,000.00
4	801.002X	6" DI Waterline Pipe excluding fittings (std. Spec. sec. 801), inlcuding trench & compacted backfill to 6' depth, complete-in-place	LF	400	$ 40.00	$ 16,000.00
5	801.055	Existing Waterline, 6" to 14", with fittings, Remove and Dispose, excl. trenching, complete	LF	400	$ 7.00	$ 2,800.00
6	801.057	Existing Waterline, 16" to 36", with fittings, Remove and Dispose, excl. trenching, complete	LF	0	$ 14.00	$ -
7	801.059	Non-pressurized Connection, existing waterline, all sizes, including fittings, complete-in-place	EA	4	$ 1,500.00	$ 6,000.00
8	801.065	Ductile Iron MJ Fittings, Class 250, 4" to 14" waterline, including jointing material, complete-in-place	LB	400	$ 3.50	$ 1,400.00
9	801.081	6" Gate Valve, cip, SD 2333	EA	2	$ 800.00	$ 1,600.00
10	801.101X	Gate Valve, 4"-12", Remove & Dispose, Complete	EA	2	$ 500.00	$ 1,000.00
11	801.104	Valve Box, Remove & Dispose, compl.	EA	2	$ 200.00	$ 400.00
12	801.106	Valve Box, cip, SD 2326	EA	2	$ 500.00	$ 1,000.00
13	801.111	Valve Box, Adjust to Grade, cip, SD 2332	EA	2	$ 400.00	$ 800.00
14	801.150	Mechanical Joint Restraining Gland, DI & PVC, 4"-8", complete-in-place	EA	30	$ 90.00	$ 2,700.00
15	801.155	Joint Restraining Harness, DI & PVC push on bells, 4"-8", complete-in-place	EA	6	$ 150.00	$ 900.00
16	801.XXX	Air Release Valve, cip, SD 2350	EA	2	$ 6,000.00	$ 12,000.00
SUB-TOTAL OF BID ITEMS 1-16						$51,100.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 3,513.13
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$74,613.13

2. UNIT PRICES

COAL AVENUE STORM DRAIN REHAB - HARVARD WATER PROJECT NO. 4522

BID ITEM NO.	SPEC. ITEM NO.	DESCRIPTION	UNIT	EST. QTY	UNIT PRICE	AMOUNT
1	4.01	Construction Staking, complete	LS	1	$ 1,400.00	$ 1,400.00
2	6.05	Construction mobilization, Complete	LS	1	$ 3,500.00	$ 3,500.00
3	6.06	Construction De-mobilization, Complete	LS	1	$ 1,400.00	$ 1,400.00
4	801.002X	6" DI Waterline Pipe excluding fittings (std. Spec. sec. 801), inlcuding trench & compacted backfill to 6' depth, complete-in-place	LF	600	$ 40.00	$ 24,000.00
5	801.055	Existing Waterline, 6" to 14", with fittings, Remove and Dispose, excl. trenching, complete	LF	600	$ 7.00	$ 4,200.00
6	801.057	Existing Waterline, 16" to 36", with fittings, Remove and Dispose, excl. trenching, complete	LF	0	$ 14.00	$ -
7	801.059	Non-pressurized Connection, existing waterline, all sizes, including fittings, complete-in-place	EA	6	$ 1,500.00	$ 9,000.00
8	801.065	Ductile Iron MJ Fittings, Class 250, 4" to 14" waterline, including jointing material, complete-in-place	LB	600	$ 3.50	$ 2,100.00
9	801.081	6" Gate Valve, cip, SD 2333	EA	3	$ 800.00	$ 2,400.00
10	801.101X	Gate Valve, 4"-12", Remove & Dispose, Complete	EA	3	$ 500.00	$ 1,500.00
11	801.104	Valve Box, Remove & Dispose, compl.	EA	3	$ 200.00	$ 600.00
12	801.106	Valve Box, cip, SD 2326	EA	3	$ 500.00	$ 1,500.00
13	801.111	Valve Box, Adjust to Grade, cip, SD 2332	EA	3	$ 400.00	$ 1,200.00
14	801.150	Mechanical Joint Restraining Gland, DI & PVC, 4"-8", complete-in-place	EA	40	$ 90.00	$ 3,600.00
15	801.155	Joint Restraining Harness, DI & PVC push on bells, 4"-8", complete-in-place	EA	10	$ 150.00	$ 1,500.00
16	801.XXX	Air Release Valve, cip, SD 2350	EA	3	$ 6,000.00	$ 18,000.00
SUB-TOTAL OF BID ITEMS 1-16						$75,900.00
NEW MEXICO GROSS RECEIPTS TAX @ 6.875%						$ 5,218.13
UTILITY RELOCATION ALLOWANCE						$ 20,000.00
TOTAL OF BID ITEMS PLUS NMGRT						$101,118.13