P-3

PEAVINE DRAIN - MOUNTAIN VIEW CEMETERY DRAINAGE REPORT

A HYDROLOGICAL STUDY
AND RECOMMENDATIONS
ON THE DRAINAGE SYSTEM

CAPITAL PROJECTS PLANNING
ENGINEERING DIVISION
PUBLIC WORKS DEPARTMENT

CITY OF RENO
WASHOE COUNTY, NEVADA

Report Dated: 13 DECEMBER 1990

Revised: 10 JANUARY 1991

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #1

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: CLEAN
YEAR STORM: TWENTY-FIVE YEAR EVENT

Q = ?

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.17
54" - 8'X4'	20'	4530.26
VAULT - 54"		4530.78
VAULT	25'	4530.88
SS IN VAULT		4530.96
54" - VAULT		4531.63
54" RCP	793'	4544.65
72" - 54"		4545.17
MH (72 - 54)		4545.75
72" RCP	158'	4546.54
96" - 72"		4546.67
96" CMP	78'	4546.90
72" - 96"		4547.00
19 BEND		4547.10
72" RCP	110'	4547.43
60" - 72"		4547.51
60" RCP	6'	4547.54
54" - 60"		4547.67
54" RCP	558'	4551.67

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #2

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 72" RCP
CONDITION: CLEAN
YEAR STORM: ONE HUNDRED YEAR EVENT

Q=?

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.49
54" - 8'X4'	20'	4530.55
VAULT - 54"		4530.88
VAULT	25'	4531.00
SS IN VAULT		4531.08
54" - VAULT		4531.51
72" RCP	793'	4539.52
MH (72)		4539.89
72" RCP	158'	4541.49
96" - 72"		4541.68
96" CMP	78'	4542.14
72" - 96"		4542.33
19 BEND		4542.53
72" RCP	110'	4543.64
60" - 72"		4543.90
60" RCP	6'	4544.02
54" - 60"		4544.28
54" RCP	558'	4562.34

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #3

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: WITH DEBRIS
YEAR STORM: FIVE YEAR EVENT

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.33
54" - 8'X4'	20'	4530.42
VAULT - 54"		4530.94
VAULT	25'	4531.04
SS IN VAULT		4531.12
54" - VAULT		4531.79
54" RCP	793'	4559.24
72" - 54"		(TOO HIGH
MH (72 - 54)		TO CONTINUE)
72" RCP	158'	
96" - 72"		
96" CMP	78'	
72" - 96"		
19 BEND		
72" RCP	110'	
60" - 72"		
60" RCP	6'	
54" - 60"		
54" RCP	558'	

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #4

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: WITH DEBRIS
YEAR STORM: TWENTY-FIVE YEAR EVENT

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4531.58
54" - 8'X4'	20'	4531.67
VAULT - 54"		4532.19
VAULT	25'	4532.29
SS IN VAULT		4532.37
54" - VAULT		4533.04
54" RCP	793'	4631.67
72" - 54"		(TOO HIGH
MH (72 - 54)		TO CONTINUE)
72" RCP	158'	
96" - 72"		
96" CMP	78'	
72" - 96"		
19 BEND		
72" RCP	110'	
60" - 72"		
60" RCP	6'	
54" - 60"		
54" RCP	558'	

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY
DRAINAGE STUDY

TABLE OF CONTENTS

MOUNTAIN VIEW CEMETERY
DRAINAGE STUDY

EXECUTIVE SUMMARY

This drainage study was performed due to the complaints received from the following property owners: Reno Auto Wrecking, Mountain View Cemetery, Harker and Harker, and Tombstone Territory Motel. The results of this study identified that the major difficultly with handling the drainage in this basin is that storm flows cannot enter the storm drain, the Peavine Drain. This resulted in an overland flow which has caused documented flooding damage. In order to help remedy this problem, certain improvements must be completed which will provide the necessary storm flow protection. These are as follows:

1) Clean the ditch section just upstream of the storm drain to prevent large debris from clogging the inlet.

2) Clean out the silt and debris accumulation in the lower portion of the drain to improve the pipe's capacity.

3) Reconstruct the storm drain inlet to allow for a greater flow capacity to be accepted in to the drain. This improvement will cost approximately $42,000.00 and should be placed on the Capital Improvements Projects list for future funding, possibly with Bond Issue funds.

The above noted improvements are needed most to help in reducing the flooding problems that have affected the downstream properties in this drainage basin.

INTRODUCTION

Rain, it affects us in many ways. Certain amounts of rain can be very beneficial to our lives and welfare. But, when there is a large quantity of precipitation combined with steep grades in mountainous areas, large drainage basins and a storm drain with a clogging potential, it can be disastrous. Such was the situation that occurred in November of 1988 when a combination of these four caused a severe flooding problem.

It was this type of flooding problem that has identified a potential drainage problem and is the reason why this drainage study is being performed. The City of Reno was contacted by letter from the above mentioned group of citizens who were

directly affected by a flood which caused damage. These businesses are located in the vicinity of East Fourth Street and the Mountain View Cemetery. The flows in the drainage basin enter a 54" storm drain which changes pipe sizes along its course and empties into the Truckee River. A suggested solution, as requested by the Mountain View Cemetery, was to collect and pipe the storm drainage from the Interstate 80 area to the existing storm drain. This was hoped to avoid the overflow problems associated with the present conditions at the inlet of the storm drain.

This drain, more commonly known as the Peavine Drain, has a grated inlet which because of the narrow designed headwalls has a clogging potential from debris that is carried by the storm flow in the draw. When the drain inlet clogs, the flows build-up, overtops the banks and results in overland flooding. The overall problem is allowing the flows into the storm drain.

The upper section of the drain has a 100 year storm flow capacity from the pipe entrance down past West Fourth Street and the Southern Pacific Railroad. The lower end only has a 25 year storm flow capacity because during construction the originally designed 72" RCP was replaced with 54" RCP. No reason is known for this change in plans.

This report will be a study of this major drainage basin which collects the drainage from a portion of northwestern Reno. The report will utilize available resources and practical engineering judgement to provide an analysis of the causes of the flooding. Along with the analysis, this report will present practical solutions and a recommendation to try to prevent future problems with this drainage way.

REPORT FORMAT

To effectively analyze this drainage problem, the problem must first be understood completely, then research available data, from the research develop solutions, test the solutions by performing computations and finally develop the recommended action for improvement. This report will follow that format, and below is presented the steps in detail:

A) There was observed a flooding problem and the local businesses notified the City by letter requesting a solution.

B) The site was initially investigated by City Staff and NDOT along with the local businesses to develop both temporary and permanent solutions to the overflow flooding problem.

C) The problem continues to occur which prompts another written request by the local residents, thereby starting this report.

D) The existing information on file is researched.

E) A study is made of the existing facilities by Survey and Public Works crews.

F) Engineering computations are made and conclusions are developed to solve the flooding problem.

G) From the solutions developed, the recommended action is made along with an estimated cost to perform them.

THE DRAINAGE BASIN

The drainage basin which affects the Mountain View Cemetery is well defined as shown on Attachment Number One. This basin, with its beginnings from a portion of Peavine Mountain, flows in a southeasterly direction until the terminus at the Truckee River.

The storm runoff follows a distinct channel which crosses McCarran Blvd. through a 54" CMP just below West Seventh Street and a portion crosses McCarran at the Sierra Highlands Commercial Development through a 24" CMP then down a draw which crosses Interstate 80 in a 96" CMP just east of the entrance ramps to McCarran, continues in the draw and flows under the Highland Ditch under a flume section. The ditch follows along the toe of slope directly along the Mountain View Cemetery and enters a storm drain, the Peavine Drain, at the northwest corner of the Reno Auto Wrecking Yard approximately 800 feet north of West Fourth Street. In addition to the Highland Ditch, the Orr Ditch crosses this basin as it travels along West Fourth Street at the Peavine Drain between the roadway and the railroad tracks.

The drainage basin for this study, as identified on Attachment Number One, contains approximately 1.33 square miles in area and ranges from an elevation of 5280 feet at the beginning of the basin, to the final outfall at the Truckee River with an elevation of approximately 4530 feet. In this 750 feet of elevation change, the gradients in which the runoff traverses ranges from 50% on the slopes of Peavine to roughly 1% in the lower area of the basin. The Peavine Drain which starts at the base of the Mountain View Cemetery property with an inlet elevation of 4577.29, is a 54" RCP which proceeds changing pipe sizes along the way to the Truckee River approximately 1850' in length and discharges with an outlet elevation of 4528.2 (+/-).

Within the drainage basin are undeveloped natural lands and urbanized developed land areas. A majority of the land area has the Badland-Chalco-Verdico complex soil type and a Hydrologic Soil Group of D. This soil type is characterized by a high clay content, low permeability, moderate to high water erosion and medium to high runoff. The undeveloped land contains both, drainage ravines and gently rolling hills with desert flora and fauna. The ravines generally have rocky bottoms with eroding side slopes and the hills with slopes ranging between 4 to 25%. The SCS curve number for the existing conditions is approximately 81 with the future conditions calculated at 89. This future curve number was based upon the City of Reno's Land Use/Transportation Guide dated September 10, 1984. These areas will be evaluated using the SCS Method by the use of curve numbers to compute the storm flow quantities.

This drainage basin has been studied previously by Summit Engineering Corporation in their "Hydrologic Analysis Of The City Of Reno's Major Drainage Basins", dated October 1985. This study reviewed the major basins throughout the City and listed the existing and projected storm flows for each basin. It was in this study that a variety of flow calculations were analyzed. These included the use of isopeths in the Winzler-Kelly study and the NOAA Atlas 2 rainfall data.

For this basin, the NOAA Atlas 2 data would seem the most appropriate for the anticipated storm flows. This is because the flow begins at an elevation where the use of isopeths is questionable and a large portion of the basin lies in the Truckee River plain. The Winzler-Kelly study information was never accepted by the City of Reno because their conclusions were not supported by the data. The use of isopeths were found not to be suited for use in any area.

In order to properly determine the projected storm flows, the present and future developed conditions must be considered. From this, the 5 year and 100 year storm flows will be calculated using the SCS Method. These flow rates are necessary to determine if the present storm drain facilities are of adequate capacity and which improvements are necessary to provide anticipated storm flow protection.

For future developed conditions, the flow values as computed by Summit Engineering Corporation for this basin are the following: 5-year = 126 cfs and 100-year = 351 cfs. These values appear to be correct given the proposed land uses of the vacant land. Yet the total flow arriving at the storm drain that will be analyzed in this study is less than the above stated quantities since a portion of the basin drains into another storm drainage system and by overland flow. Of the total 1.33 square mile basin, the Renovista development

handles 0.25 square miles and approximately 0.06 square miles drain by overland flow. The approximate values to be considered with the Peavine Drain are as follows: 5-year = 115 cfs, 25-year = 218 cfs, 50-year = 270 cfs and 100-year = 305 cfs.

SURROUNDING DEVELOPMENTS

In the developed areas, the conditions range from single family residential development to a commercial / industrial development. During the development of these areas, the Rational Method was used to compute the future runoff conditions as noted in their respective hydrology reports. Also, by the subdivision development of the Sierra Highlands and Coit Areas, both residentially and commercially, and Renovista Ridge, a portion of this drainage basin is handled by a public storm drain system.

The Renovista Ridge drainage area contains approximately 0.33 square miles and has approximately 50 acres which drain to the wash that feeds the Peavine Drain. The remainder of the site is handled by a storm drain system that was designed to collect the 5 year storm and overland flow the larger events. Provisions are being taken to avoid direct runoff to the Highland and Orr Ditches which cross the property. Up-sizing of the storm drain system was done to collect the 100 year storm at the lower end of the site via a 54" and 66" RCP to route the flows under the Southern Pacific railroad tracks and West Fourth Street to the Truckee River.

The storm drain systems in the Sierra Highlands and Coit Areas collect the five year storm in a public storm drain system as outlined in the hydrology reports prepared for the subdivision projects. The piped flows in portions of these subdivisions along with their respective overland flows ultimately end up in the wash which conveys the drainage to the Peavine Drain. It can only be estimated the amount of runoff contributed from the Sierra Highlands Commercial Development since the hydrology report is unavailable.

PRESENT DRAINAGE BASIN CONDITIONS

Presently, the storm runoff collects into a defined channel (wash) approximately 1300 feet downstream from the start of the basin. The runoff from the basin collects in this channel and eventually enters the Peavine Drain and flows into the Truckee River. The runoff causes the channel to erode and carry deposits along with the storm water runoff which becomes deposited within the storm drain near the outfall.
Downstream of the existing channel, the flow from the basin

is carried by a major storm drain, the Peavine Drain. This storm drain was constructed by the State of Nevada Department of Transportation with the US 40 Improvement in 1954. In researching this improvement, NDOT had no past hydrology reports or studies in their files. Therefore, it can not be verified that the entire drainage area was considered in the sizing of the pipe and that the future developed conditions were considered in the design of the storm drain.

A site survey was performed by the Survey Section in early July 1990 which determined the elevations and topographic features of the drain inlet. A copy of the information is included on Attachment Number Two. As can be seen from the survey, there is a definite channel section that enters to the Peavine Drain and a 24 inch pipe drains into the channel from the Mountain View Cemetery. This 24 inch pipe is probably carrying irrigation runoff from the cemetery during the summer months along with drainage from the cemetery during times of precipitation.

As can be seen from the topographic shot at the inlet, the total depth of headwater which can be produced at the concrete headwall entrance to the Drain is 6.06 feet. This situation does not allow for the flow to build up to a large headwater condition before overtopping the headwall which causes the overflow onto the Reno Auto Wrecking Yard. The inlet condition is the controlling factor for the amount of flow handled by this drain. This can be shown from the existing inlet capacity of 140 cfs (as shown on Attachment Number Three) compared to the 100 year flow condition of 305 cfs.

In addition to the site survey at the entrance of the drain, Public Works crews filmed a video log of the storm drain from the entrance through most of the line to the pipe outlet. This video survey noted the conditions of the pipe along with the various inlets to the drain for accepting runoff. (This video is available for viewing upon request.) Please see Attachment Number Four for the written log of the video survey.

The drain is generally in good condition with the exception of the last 1000 feet. There is debris ranging from a slight accumulation of rocks and silt to almost half filling the pipe. This accumulation reduces the flow capacity by restricting the pipe cross sectional area. The debris accumulation starts approximately at the crossing of the Orr Ditch with the Peavine Drain. It was also at this point where there was a significant amount of water entering the drain during a dry event. It was concluded that, the Orr Ditch bypass valve was leaking allowing irrigation water to enter the drain.

The ditch runoff is another source of storm flow that enters the drain. The Orr Ditch contains runoff from other drainage basins since it traverses many areas picking up some runoff in addition to the irrigation water by its construction of following the natural land contours. The ditch is in normal operation during the growing season and is shut down during the late fall to early spring. During this time, the 48" gate valve which is located at the crossing of the Orr Ditch with the Peavine Drain, is left open to discharge any runoff collected upstream. The capacity of this ditch is approximately 50 cfs and the peak flows in the storm drain normally coincides with the heavy precipitation and runoff months. Therefore, this ditch carrying runoff from the other drainage areas adds to the existing flows in this basin.

The Highland Ditch crosses over the wash in a flume structure just south of Interstate 80. This ditch is in operation until the colder weather causes icing which does not allow the water to freely flow to the reservoir. When the ditch is shut down, the relief valves at the flume are opened until the ditch is put back in operation in the spring. Because the ditch naturally collects storm runoff, the open valve adds flow to the drainage channel during the winter months. These flows enter the wash through a 24" CMP just upstream the flume section. In addition, during periods of high flow, the ditch will overtop at the flume section and the relief valve is opened to reduce the downstream flow. Ultimate capacity of the ditch is approximately 50 cfs.

A set of plans are on file for the original Peavine Drain improvement. These plans were the construction drawings and not record drawings. The plans indicate, as shown on Attachment Number Five, that a 54" RCP begins at the channel, and continues, up sizing to various pipe sizes along the way, finally emptying to a 8' x 4' RCB to the Truckee River. The television log taken by Public Works indicated that the downstream end of the Drain has a 54" pipe instead of the 72" as shown on the plans. With this situation, the drain capacity is reduced from the 436 cfs of the 72" to 202 cfs of the 54" at the same slope.

Since the existing pipe at the lower end is different from the original plans, computations were made to determine its capacity. (Please see the pipe flow computations on Attachment Number Six.) By having the drain begin where it does, most of the basin's runoff is collected and piped under West Fourth Street (Former US 40), the Southern Pacific railroad tracks and most of the developed areas along the river. From the railroad tracks south, the storm runoff is by overland sheet flow and does not enter the storm drain.

As noted below, this is the best estimate of the storm drain as constructed on site:

Inlet Elevation = 4577.29

Pipe Section and Slope	Elevation change
54" RCP for 558 LF @ 5.6 %	- 31.25
60" RCP for 6 LF @ 5.6 %	- .34
72" RCP for 110 LF @ 3.03%	- 3.33
96" CMP for 78 LF @ 1.23%	- .96
72" RCP for 158 LF @ 1.23%	- 1.94
54" RCP for 793 LF @ 1.23%	- 9.75
Lawton Interceptor Vault for 25 LF @ 1.23%	- .31
54" RCP to 8' x 4' RCB for 20 LF @ 1.23%	- .24
8' x 4' RCB for 80 LF @ 1.23%	- .98

Outlet Elevation = 4528.2 (+/-)

STORM DRAIN CAPACITY LIMITATIONS

It is with the defined drainage channel where certain problems have been identified. The channel itself can contain the present flows, but the debris that is carried along with the storm flow seems to cause one of the problems. When a heavy flow occurs, the debris which is carried along reaches the existing headwall at the 54" RCP. This in turn clogs the inlet to the drain and causes the runoff to build-up, overtop the banks and overland flow to the downstream properties. A headwater build-up of 6.07 feet will overtop the headwall and turn into overland flow. In addition, with an anticipated 100 year flow of 305 cfs and the present inlet control on the storm drain, a headwater condition of 18.5 feet would have to occur in order to force the 305 cfs into the pipe (as shown on Attachment Number Seven).

A combination of the previously stated factors along with a clogging potential at the trash rack is what probably caused the flooding during the storm referenced by the adjacent property owners in November of 1988. It was with this flooding that prompted the City to look into the problems with this drainage basin and ultimately, this study. Please see the correspondence for this project in Attachment Number Eight.

A third limitation with the Peavine Drain is the outlet condition. The drain was constructed with the invert on the last section of the pipe discharging below the normal water level of the Truckee River. With the normal water level being approximately 4529 feet and the invert of the box at 4528.2 feet (+/-), the exit of the pipe is about 1 foot below the

river. Especially at the high water level (100 year flood stage) of 4536, the invert of the outlet discharges roughly 8 feet below the surface of the river.

This condition promotes the siltation build-up in the last 1000 feet of the pipe by severely reducing velocities prior to discharge. At the discharge of the drain, the 8' x 4' box culvert, the sediment had filled up the bottom 1.5' of the drain. This itself limits the storm drain capacity to roughly half of design.

The calculations made range from computing various storm flows in the drainage basin to analyzing the existing Peavine Drain capacities by the hydraulic grade lines. The hydraulic grade line for the existing storm drain has been computed for various conditions. Two show the drain completely clean of debris with a 54" and 72" pipe on the lower end and the others show the effect on the lower end of the storm drain approximately half full of debris for the 5 and 25 - year events. A summary of these calculations are given in the attached Tables One through Four.

The attached plan and profile sheets show the hydraulic grade line (HGL) for the following conditions: the current conditions with a 54" RCP at the lower end with accumulation of silt and debris at the 5-year and 25-year events and with the 54" RCP in a clean condition at the 25-year event. The HGL at the storm drain outlet ends at the top of pipe since as shown by the hydrograph of the Vista Gaging Station there is no significant river flow until 30 hours after the event starts and peaks approximately 60 hours afterwards from the beginning of the storm. This delay allows for the channelized flow from the drainage basin to exit the storm drain prior to the river elevation increasing. The hydrograph was prepared for the U.S. Army Corps Of Engineers' study of the Truckee Meadows and is shown on Attachment Number Nine.

CONCLUSION

From this report, it has become evident that there exists a problem with the handling of the storm flows from this drainage basin. As shown by the Hydraulic Grade Lines, the present condition of the drain with the accumulation of silt and debris can not even handle 115 cfs (the 5-year event) because the material in the line reduces the flow along with the cross sectional flow area. With the line cleaned out, the capacity of the storm drain is equivalent to the 25-year event. The inlet condition limits the amount of flow that can actually enter the drain to 140 cfs and from overland flow to additional inlets the total flow in the pipe can increase to approximately 218 cfs. This leaves approximately 87 cfs to

flow overland during the one hundred year event. If the 54" pipe downstream was replaced with a 72" pipe as originally shown on the plans, the storm drain would be able to pass the 100-year event. Also, additional flow could be accepted if the drain's inlet was improved to accept a larger flow by use of a modified headwall design and lower invert.

The below list notes the identified problems which affect the Peavine storm drain. These are as follows:

A) The inlet condition of the Peavine Drain is limiting the amount of flow that can enter the storm drain.

B) The drainage channel has an erosion problem which is worsened by the expansion of the Cemetery, causing deposition of soils in the line.

C) The bar grate (trash rack) for the Peavine Drain accumulates a large amount of debris, especially tumble weeds restricting entrance flows.

D) The large amount of debris and sediment accumulation within the storm drain.

E) The reduction in pipe size at the lower end of the storm drain.

F) The vault area of the Lawton Interceptor intersecting the Peavine Drain, a potential debris catcher.

G) The outlet condition of the Peavine Drain which reduces velocities promoting siltation.

H) No provision for a dedicated overland storm flow should the drain not be able to handle the flows.

POSSIBLE SOLUTION ALTERNATIVES

To properly handle the future 100 year storm flows for this drainage basin, one or more of the following alternatives should be utilized or a combination of certain aspects from some of the given alternatives. These alternatives are listed as options to be considered based upon the previous engineering study, but in no case should be considered as the only options available.

A) DO-NOTHING ALTERNATIVE

Of course, with the options of solving any problem there is always the do-nothing alternative. By choosing this procedure it will only cause the problem of handling the storm flows to worsen. This by increasing the maintenance costs of cleaning

the existing facilities and the costs of repairing the damage and clean-up costs associated with the flooding. The do-nothing alternative will also create bad feelings between the City and the people who are directly affected by the flooding problems. It is with these reasons that this alternative is not beneficial and will not be considered as a solution.

If for any reason that the do-nothing alternative is chosen for additional improvements, a good channel maintenance procedure needs to be addressed and implemented.

B) CONSTRUCT A SEPARATE OVERFLOW SYSTEM OR CHANNEL TO INTERCEPT THE EXCESS OVERLAND FLOW

This option could be considered along with other improvements since an event could occur which would not be able to be handled by the existing drain and would contribute to the downstream flooding problems.

This alternative is not as costly as a new storm drain system since it is basically a parallel flow channel being constructed with the existing drain line. Because of an open channel flow, precautions would have to be made when crossing roadways and railroad tracks and public safety considerations. This overland flow would also need to be contained within a dedicated storm drainage easement.

C) EXTEND 54" RCP TO I-80 WITH PIPED FLOWS

This is the solution which was suggested by the Mountain View Cemetery and would directly benefit the Cemetery by allowing more land to be developed. While on the surface it may seem as a good solution, it will only worsen an existing problem. By piping the flows, the entire capacity of the drainage channel is lost. In addition, the overland flows will still need to be collected and may cause ponding areas of storm water due to a full pipe not being able to accept the runoff or in the worst case, create the same type of overland flooding that did the damage in November of 1988. This alternative will be a costly one because of the length (approximately 3800') of storm drain from the inlet of the existing drain to I-80. With this solution, the undersized downstream pipe would still have to be addressed.

D) CONSTRUCT A DETENTION POND NORTH OF I-80

This alternative requires a great deal of property acquisition in addition to a great expense with construction. By being north of the Interstate Highway, the 96" CMP constructed under the highway which has the capacity to handle the 100 year storm flows which can handle the 100 year storm would become virtually useless.

E) CONSTRUCT A DETENTION POND SOUTH OF I-80

This alternative requires a great deal of property acquisition in addition to a great expense with construction. By being south of the Interstate there is a 96" CMP which has the capacity to handle the 100 year storm flows. This will have all the drainage flowing directly into the detention pond. This is a better alternative than the North pond, yet still not the best because of the high costs involved with construction and land acquisition.

F) INLET CONDITION IMPROVEMENTS

The inlet condition of the drain severely limits the amount of water that can enter into the storm drain. Presently, only an amount equal to roughly the 5-year event can be accepted in a clear flow condition. This inflow is further limited because of the trash rack configuration and the large amount of tumble weeds which are present in the area.

To help this problem, the inlet of the drain needs to be placed at a lower elevation to allow for the ponding depth to increase thereby increasing the flow into the pipe. This depth does have a limit because of the existing topography, adjacent properties and set grade of the storm drain.

Along with this, the drain inlet headwall configuration needs to be opened substantially with an improved trash rack capable of allowing the tumble weeds to float to the top during drainage events.

G) CHANNEL CLEANING AND IMPROVEMENT

By improving the channel and clearing out the vegetation along with stabilizing the banks, the situation of a large amount of debris flowing down the channel and clogging the inlet can be reduced. The channel could be improved by lining it with rip-rap or concrete lining. In addition to the lining, a device to catch the large debris, like tumbleweeds, from getting to the drain entrance could be constructed. These improvements will also need to be backed up by additional maintenance in order to clear the trapped debris. By preventing a majority of the debris from entering the storm drain will greatly assist in keeping the line clean.

H) PEAVINE DRAIN CLEANING PROGRAM

In order to allow a drain to perform its intended use, a line must be maintained by repairing the deficiencies and keeping the line clean and cleared of debris. Once a debris accumulation begins, it is difficult for the line to clean

itself when the debris has an obstruction to overcome. As shown on the video tape, approximately half of this line must be cleared of the silt and debris that has accumulated over the years. In addition to the debris, some of the loose rebars at the joints need to be trimmed. Just by cleaning the line, the lower end of the drain will double its present day capacity.

A rough estimate of the quantity of debris in the line was estimated at 320 (+/-) cubic yards of material. This translates into approximately 40 truck loads, 8 CY each, of debris which needs to be removed from this line.

I) PIPE SIZE REDUCTION ALONG DRAIN

The only way to improve upon this would be to remove the undersized pipe sections (54" RCP) and replace them with the correctly sized storm drain (72" RCP). This is shown on Attachment Number Six by the 436 cfs capacity of the larger pipe as opposed to the 202 cfs capacity of the 54" pipe. This process would be very costly and the reason of why it was constructed with the smaller sized pipe is unknown. From the Hydraulic Grade Lines (HGL) it can be seen that the HGL extends out of the ground for the 5 year event in the present condition. The head cannot build-up enough to force the quantity of water through the pipe at its present size almost half full of debris. Another aspect would be either create a dedicated overflow channel or to construct a parallel system to handle the overflow during the higher year event storms.

Because the 100 year flows cannot enter the storm drain nor be carried by the drain, they will eventually become overland flow from the drain inlet to the Truckee River.

J) OUTLET CONDITION IMPROVEMENTS

Not much could feasibly be done with the drain outlet since the pipe is on a specific grade to maintain capacity in the line. One aspect that could be implemented would be a consistent maintenance program along with a paved channel or rock rip-rap improvement from the outlet of the drain to the edge of the Truckee River. The channel improvements would greatly help out in preventing the over-grown condition at the outlet which was discovered at the start of this study.

RECOMMENDATIONS

This study of the Peavine Drain was performed to provide solutions in reducing the flooding that occurs when storm flows cannot enter the drain and eventually end up as an overland flow. In order to solve this problem, certain improvements must be completed which will provide a storm flow protection equal to the twenty-five year event. These are as follows:

1) Clean the open ditch section just upstream of the storm drain inlet. This will help in preventing debris from entering the drain and in preventing the clogging of the drain inlet which has been one of the causes of overland flooding.

2) Clean out the silt and debris accumulation in the lower portion of the storm drain. This action will allow the storm drain to function better since the capacity to handle the flows will be improved.

3) Reconstruct the storm drain inlet to allow for a greater flow capacity to be accepted in to the drain. The drain itself has capacity to handle greater flows, but the ditch flow can not enter the pipe due to the inlet condition. By removing the beginning 24 feet of storm drain the invert will be lower 1.34 feet. This along with constructing a new headwall with the groove end of the pipe will increase the drain's inlet capacity to approximately 190 cfs.

   This increase in flow and the intake of overland flow at downstream points will fill the drain to capacity in its existing condition. Any further capacity increases will first have to address the deficient pipe size in the downstream portion of the Peavine Drain.

   This improvement involves the reconstruction of the inlet headwall with pipe removal and will cost approximately $42,000. This project should be placed on the Capital Improvements Projects list for future funding, possibly with Bond Issue funds.

The above noted improvements are needed most to help in relieving the flooding problems that have affected the downstream properties in this drainage basin. These few improvements would greatly help by allowing the drain to function during a twenty-five year event instead of not being able to function during the course of one year.

ESTIMATED COSTS FOR INLET IMPROVEMENTS

ITEM	COST
Excavate and Remove twenty-four feet (three sections) of 54" RCP and existing Headwall.	$ 8,000.00
Install Modified Headwall which has opened up the inlet, width of approx. three pipe widths and straight end walls.	$14,000.00
Re-grade channel to inlet of the Peavine Drain and provide grouted rip-rap to prevent debris from entering.	$ 8,000.00
Install new trash rack to fit the new headwall design with 30 degree slope and three pipe width length.	$ 7,000.00
Construction Contingencies	$ 3,000.00
Engineering Costs	$ 2,000.00
GRAND TOTAL	$42,000.00

MOUNTAIN VIEW CEMETERY
DRAINAGE REPORT

APPENDIX

Q5-115cfs

Q25-218cfs

Q100-305cfs

RENOVISTA DRAINAGE AREA

DRAINAGE BASIN

DRAINAGE CHANNEL

PEAVINE DRAIN

1 MILE

7000 FEET

1 KILOMETER

ROAD CLASSIFICATION

Heavy-duty

Medium-duty

Light-duty

Unimproved dirt

Interstate Route

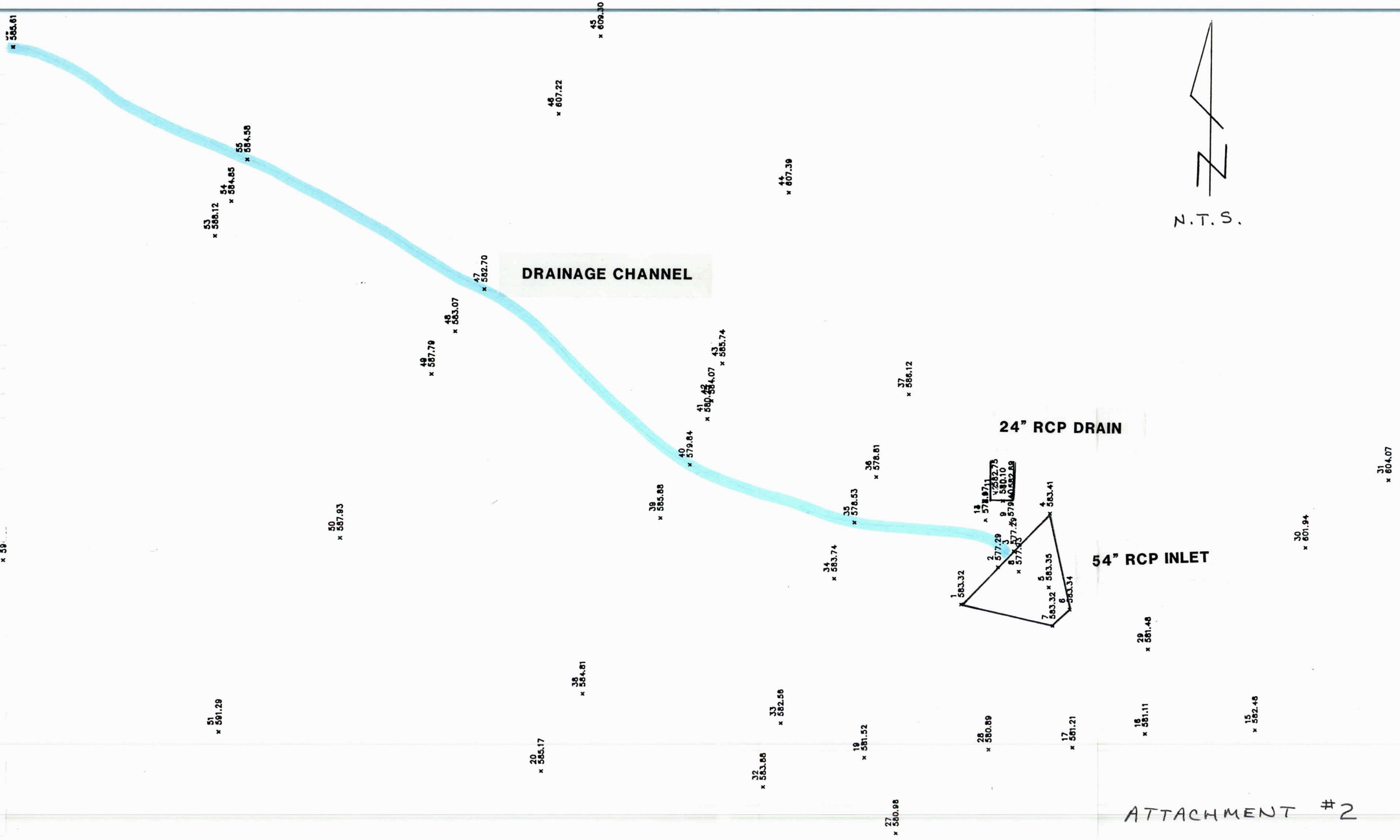
U. S. Route

NEVADA

(MT. ROSE NE) 2062 IV NE

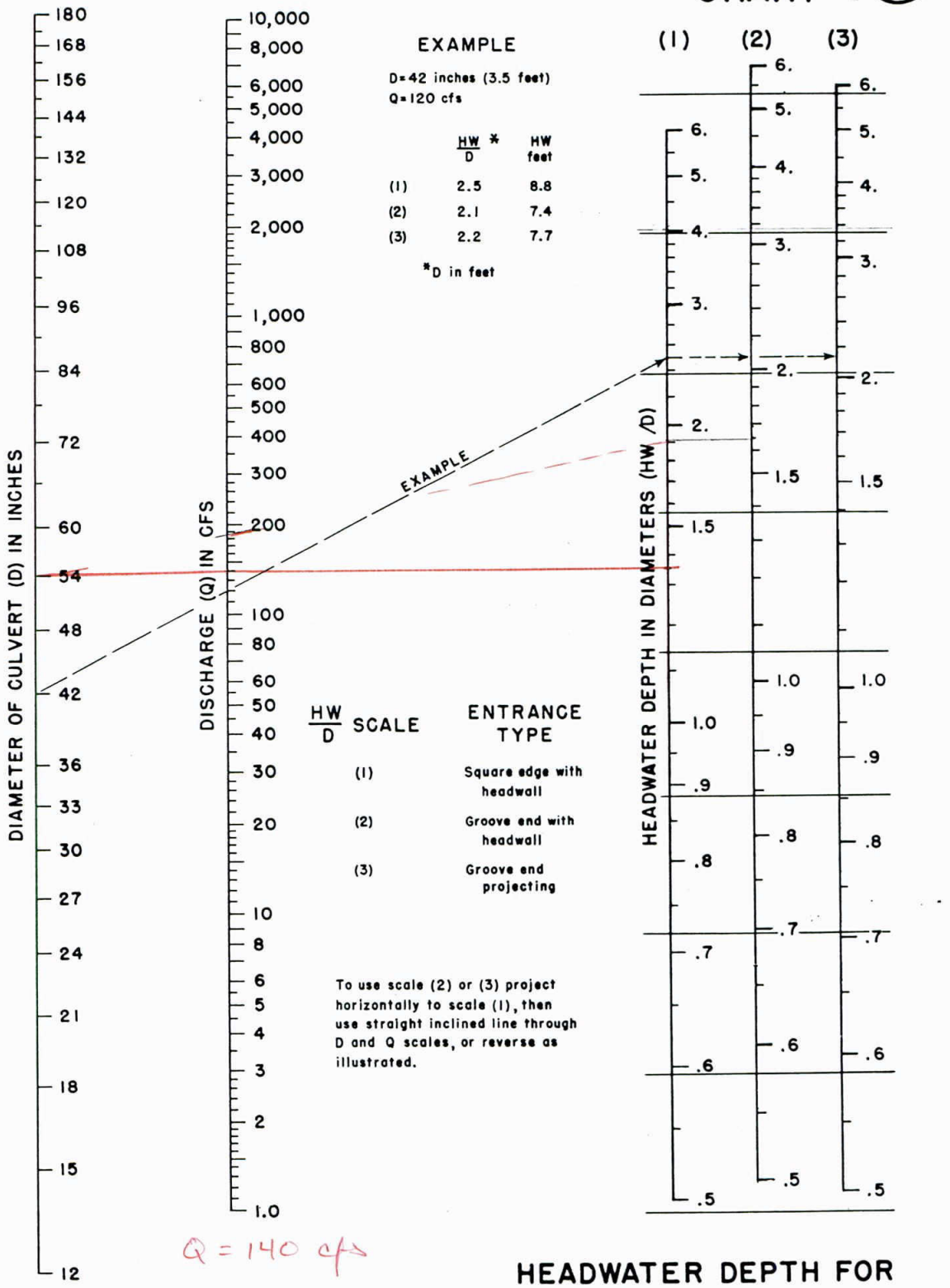
N.T.S.

ATTACHMENT #1


DRAINAGE CHANNEL
24" RCP DRAIN
54" RCP INLET
N.T.S.
ATTACHMENT #2

EXISTING 54"ø HEADWALL

CHART 1



Q = 140 cfs

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

ATTACHMENT #3

CITY OF RENO
Inter-Office Memo

July 16, 1990

To: Mike Einwick, Engineering Division

Thru: John Loete, Maintenance Engineer

From: Dennis Kumpf, P.W. Supervisor, Sewer Line Section

Subject: CEMETERY DRAIN LINE INSPECTION

On July 12, 1990, the Sewer Line Section completed a visual inspection of the storm drain from the bar screen adjacent to the Mountain View Cemetery to the Truckee River. Initially we found the outlet channel at the river plugged with rocks, branches, leaves and silt. It was necessary to clean the channel with a backhoe to relieve the standing water which was backed up for approximately 300 feet. The inspection team then started at the barscreen and proceeded south through the pipe. A video tape was made of the inspection. We were only able to inspect the first 1,400 feet of the 2,100 foot run, due to approximately two feet of silt in the pipe.

The structural condition of the pipe is good. There are some cracks in the crown of the pipe and several joints where rebar is protruding. The pipe is clean for the first 1,000 feet of the run. Then there are many rocks in the line from 1,000 to 1,200 feet and gradually increasing silting after that, all the way to the outlet at the river (approximately 2,100 feet).

There are five (5) structures or pipes that could contribute flow to the pipe as follows:

1. At 350 feet there is a yard drain that would take surface runoff on junkyard property.
2. At 750 feet there is a second yard drain on junkyard property.
3. At 925 feet there is a 24 inch CMP coming in from the east, which apparently takes surface drainage from the north side of 4th Street.
4. Also, at 925 feet there is an 18 inch RCP coming in from the west, which apparently takes surface drainage from the north side of 4th Street.
5. At 1,100 feet there is a 6x7 RCP vault on the Orr irrigation ditch with a gate valve that, when opened, diverts water from the ditch into the pipe.

At approximately the 1,800 foot mark there is a two (2) manhole arrangement on the line. It is at this point that the Lawton sanitary sewer interceptor goes through the pipe.

ATTACHMENT #4

In summary, the structural condition of the line is generally good. The reduction of pipe size from 72 inches to 54 inches for the last 700 feet to the river and the heavy silting of this same section, severely limits the capacity of the system. Please refer to the attached map for locations and the attached field report for specifics of the inspection. If there is any further information I can provide, please contact me.

DAK/kvf

xc: Dave Hansen, Sewer Line Section Foreman
Barney Davidson, Sewer Line Section Foreman
Mike Frederick, Sewer Line Section Video EOI
Sewer Line Section File

#4

CITY OF RENO, NEVADA
SEWER LINE SECTION
1640 E. Commercial Row
Reno, Nevada 89512

TV & GROUTING LOG

Date July 11, 1990

Location Cemetery Drain Line

Customer Einwick

Pipe Condition Good

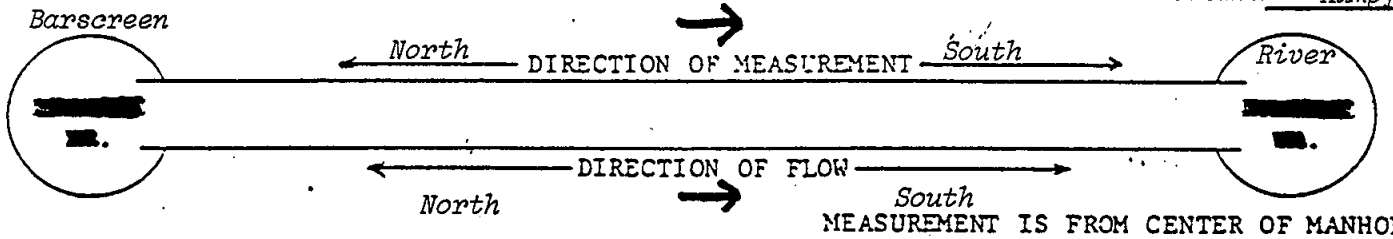
Pipe Size Various Type RCP and CMP

Manhole Condition Good

Joint Type Cement

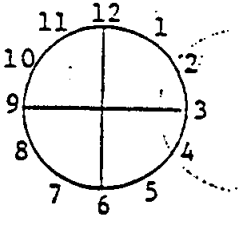
Inspector Frederick, Nichols, Seals

Foreman Kumpf



MEASUREMENT IS FROM CENTER OF MANHOLE

AREA



Distance	Area	Photo No.	Remarks	Chemical Used
			The Cemetery drain line is defined as the line erected	
			approximately 1954 running from the barscreen at the	
			Mountain View Cemetery south to the Truckee River.	
-10-0 ft.			Ten feet prior to the barscreen is a 24" RCP that	
			drains the cemetery. This pipe is usually always active.	
0 ft.			Pipe inlet- 4'X6' retractable barscreen.	

h#

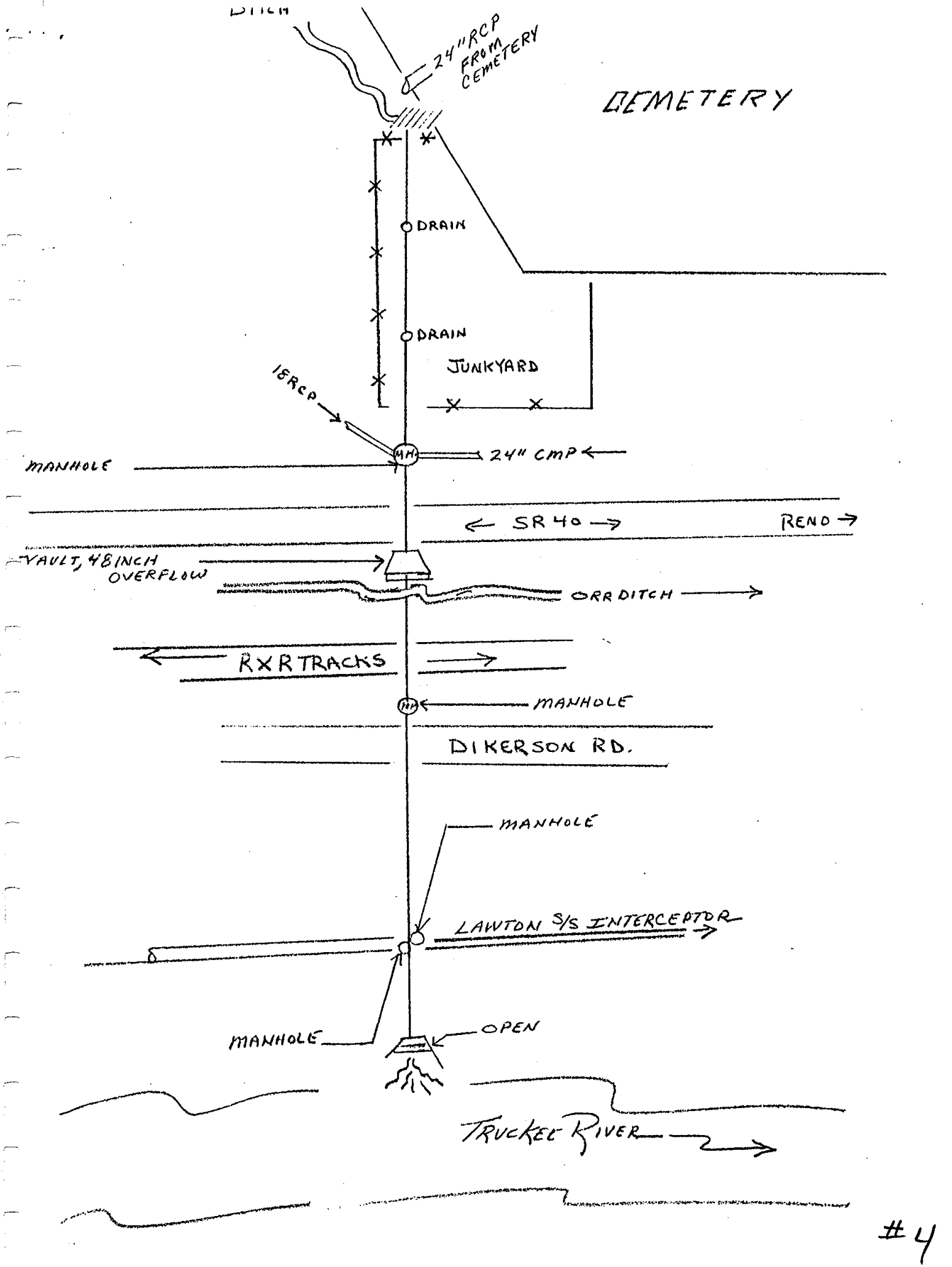
31-9129

Distance	Area	Photo No.	Remarks	Chemical Used
1000-1100 ft.			96" CMP makes transition to 72" RCP as the line intersects the Orr irrigation ditch vault. Vault is a 6 X 7 RCB with a gate valve that can be opened to take water from the ditch. Valve is passing water.	
1100-1200 ft.			72" RCP to the manhole on Dickerson Road. Makes transition to 54" RCP at the downstream side of the manhole. Pipe is in good condition, many rocks.	
1200-1400 ft.			54" RCP, pipe is in good condition, many rocks and starting to see heavy silting. Cant risk going further with the camera at this point due to the silting.	
1400-2100 ft.			At this point the 1954 plans say the pipe is 72" RCP but as far as we can see its 54" RCP which is consistent with the first 900 feet of the line.	
2100 ft.			Pipe makes transition to an 8 X 5 RCB at the outlet of the drain line.	
2100-2175 ft.			Open channel to the Truckee River.	

h#

Distance	Area	Photo No.	Remarks	Chemical Used
0-350 ft.			54" RCP to the first drain located on junkyard property. Pipe is in good condition, some cracking at the crown, intermitant rebar protruding from joints. Pipe is clean.	
350-750 ft.			54" RCP to the second drain located on junkyard property. Same notations as above.	
750-925 ft.			54" RCP to one joint of 60" RCP that then makes transition to 72" RCP. There is a manhole here that apparently has been cemented over. There is a 24" CMP entering from the east and a 18" RCP entering from the west. Both times we were in this line neither of these two pipes have been active. Same notation as above on pipe condition.	
925-1000 ft.			72" RCP makes transition to 96" CMP as the line goes under the railroad tracks at this point. Pipe condition is good but as the grade flattens out here there are many rocks in the bottom.	

6#


DITCH
24" RCP FROM CEMETERY
CEMETERY
DRAIN
DRAIN
JUNKYARD
15 RCP
MANHOLE
24" CMP
SR 40
RENO
VAULT, 48 INCH OVERFLOW
ORR DITCH
RXR TRACKS
MANHOLE
DIKERSON RD.
MANHOLE
LAWTON S/S INTERCEPTOR
MANHOLE
OPEN
TRUCKEE RIVER

#4

FED. ROAD DIV. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	F 001-1(10)	WASHOE	WA-01	1	16	40

L 07 to 13+58 ~ Waste excess excavation as directed by the Engineer.

12+29 ~ Adjust water line crossing (Misc. work).

14+20 ~ Adjust water line and sewer line crossing (Misc. Work).

15+39 ~ Install 24'x20' pipe in irrigation ditch (Misc. Work ~ Pipe to be furnished by City of Reno).

15+33 ~ Move power pole Lt (By Utility Co.).

T. 19N., R. 19E., M.D.B. & M.

11+75 ~ Adjust sewer line crossing (Misc. Work).

11+96 ~ Install 30'x20' pipe in irrigation ditch (Misc. Work ~ Pipe to be furnished by City of Reno).

12+57.58 to 12+77.58 ~ Construct RCB transition. Construct concrete collar to 72" RCP. (See sheet No. 17).

12+77.58 to 13+57.58 ~ Construct special 8'x4'x80' RCB. (See sheet No. 17).

"F" 17+60.56 P.O.T. = "D" 9+64.64 ∠ = 6°42'30" Rt

"H" 13+57.58 P.O.T. END DRAIN LINE

GORDON E. CUTLER

RALPH WAGGONER

"D" 4+13.57 ∠ = 3°41'00" Rt

DICKERSON ROAD

oiled Drive

9.97'

GORDON E. CUTLER Res

Shed

Water Line

Pump Well Pipe Filler Cap

Irrig. Ditch

Dry Well

Septic Tank

3" Gate

Diversion Box

LYNN WAY

S. 7°20'50" E. - 418.76'

10

Residence

RALPH WAGGONER

Dry Well

Septic Tank

Timber Div. Box

Irrig. Ditch

S. 22°20'50" E. 6.00'

S. 37°20'50" E. - 103.00'

Timber Div. Box

3" Pipe

Red

Truckee River

"D" 13+53.43 P.O.T.

"D" 12+48.58 P.O.T. = "H" 12+48.58 ∠ = 43°00'02" = "H" 12+54.58 ∠ = 17.00, 15+12.54

"F" 10+82.00 to "H" 12+57.58 ~ New 72"x 972' RCP to grade. Install angle section at Sta "H" 12+48.58 and "H" 12+54.58. Construct concrete collar and transition to 96" tunnel liner. (See sheet No. 17).

"F" 10+67.89 P.C.

SOUTHERN PACIFIC R.R.

200'

S.P.R.R. R/W Line

SEC. 10

SEC. 15

Concrete

BENDER WAREHOUSE

BENDER WAREHOUSE

"D" 7+13.81 ∠ = 125°00' Rt

Δ = 31°57'44"
R = 1000'
L = 557.85'
T = 286.39'

"F" 16+25.74 P.T.

"F" 12+73 to "H" 13+32 ~ Remove fence necessary to construction. Reconstruct after RCP and RCB is in place.

"F" 12+40 ± ~ Construct 42" manhole with solid cover. Cut base to fit 72" RCP. Cut opening in 72" RCP. (See sheet No. 17).

17+60 ~ Move power pole Rt (By Utility Co.).

"D" 11+89 ~ Move power pole Rt (By Utility Co.).

"H" 12+87 ~ Remove tree on center line (No direct payment).

72" RCP

Transition RCP to RCB

8'x4' RCB

4570

4550

4540

4530

4520

-1.23%

-1.23%

4525.85

"F" 17+60.56 P.O.T. = "D" 9+64.64 ∠

"D" 12+48.58 P.O.T. = "H" 12+48.58 ∠

"H" 13+57.58 P.O.T. END DRAIN GRADE

"D" BM No. 01 ~ Elev. 4551.32' Steel pin 25' Lt Sta "F" 14+95

"D" BM No. 13 ~ Elev. 4531.65' Steel bolt 18' Lt Sta "H" 13+32

11 12 13 14 15 16 17 10 11 12 13

REDUCED PLANS
DO NOT SCALE

GRATE DETAIL

Sta "F" 10+01.5

4'-6"
10 bars @ 5 3/4" = 4'-4 1/2"

3 1/2"x3"x 1/4" Frame ∠

3"x 1/4" Main bars

3"x 1/4" End bars

1"x 1/4" Spacers (Flush with Top)

2'-2"

2'-2"

4'-6"

NOTE
Weld all joints with 4" fillet weld

120°

Concrete paving

G"xG" No. 10 and 10 wire mesh fastened to liner at lap joints

1" Min.

TUNNEL LINER PAVING

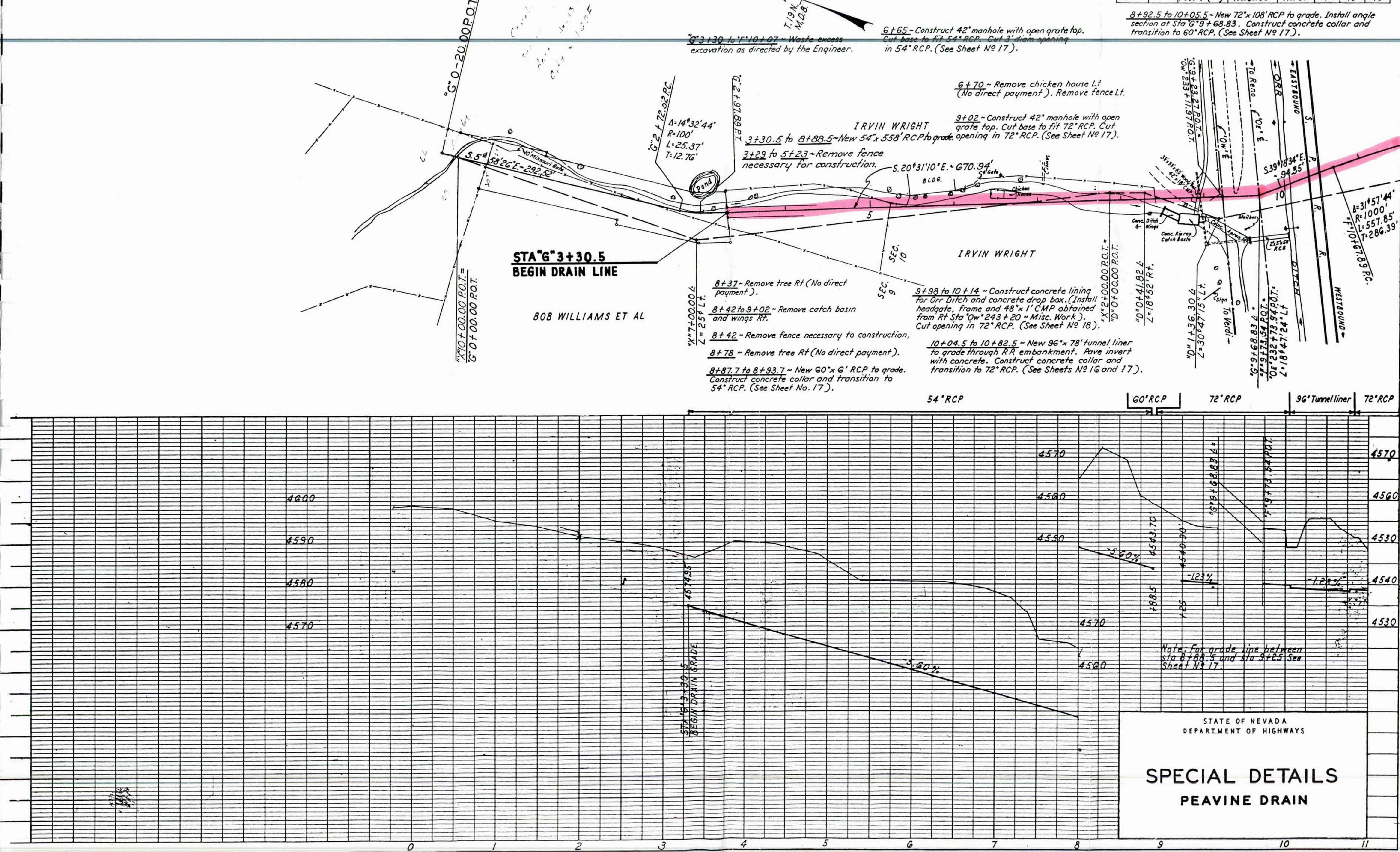
STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

SPECIAL DETAILS

PEAVINE DRAIN

ATTACHMENT #5

FED. ROAD DIV. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	F001-1 (10)	WASHOE	WA-01	1	15	40



STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

SPECIAL DETAILS
PEAVINE DRAIN

ATTACHMENT #5

COMPUTATIONS FOR MANNING FORMULA FLOWING FULL OR HALF FULL

FILE NAME: MANNING.WK1
USER NAME: EINWECK
DATE: 05-Oct-90
PROJECT NAME: MOUNTAIN VIEW CEMETERY DRAINAGE STUDY

FULL FLOW TABLE--USED FOR STORM SEWER COMPUTATIONS

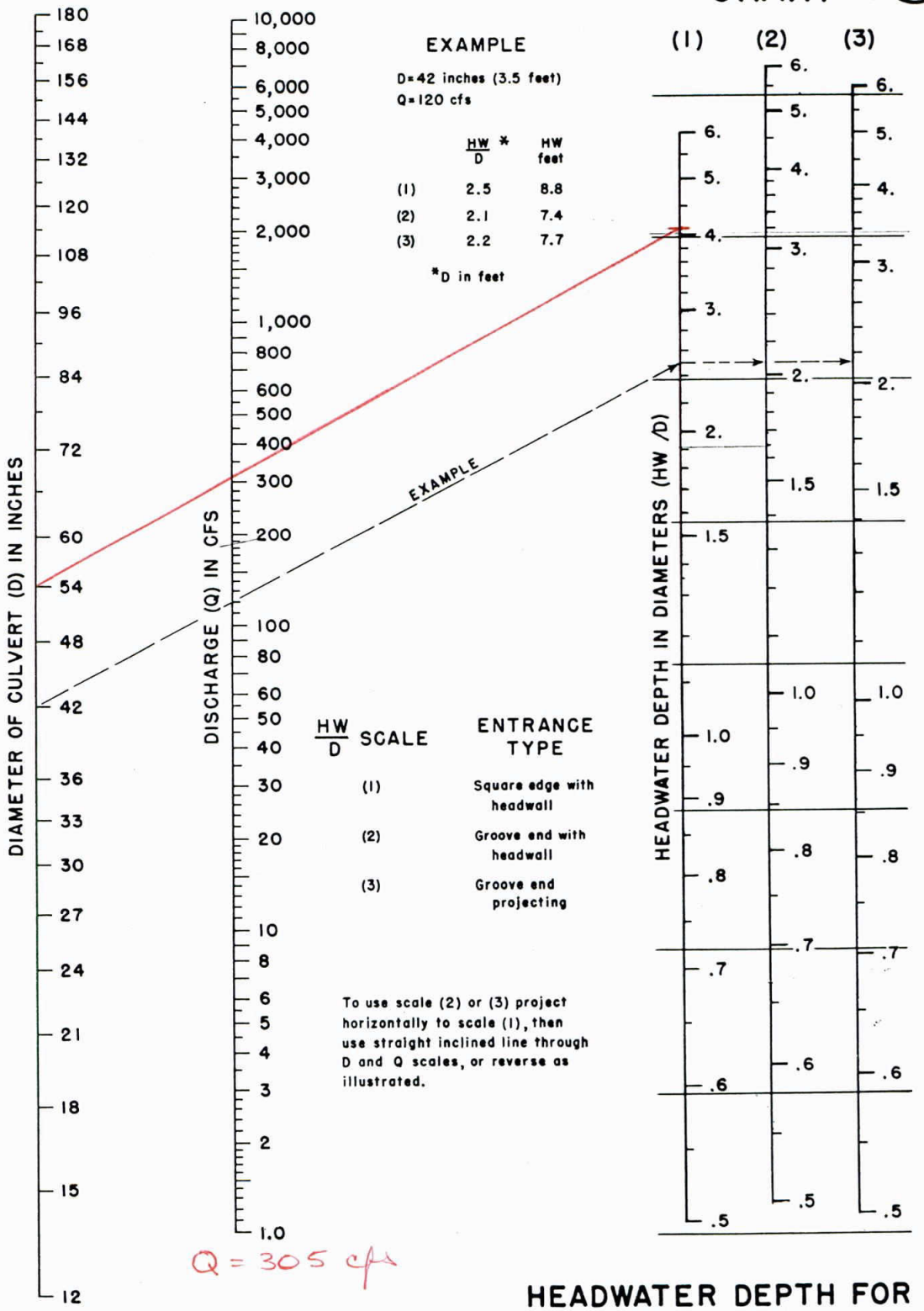
DIAMETER INCHES	SLOPE FT/FT	n	AREA SQ FT	R E2/3	S E1/2	Q CFS	Q GPM	Q GPD	V FPS	
54	0.0560	0.0140	15.9044	1.0817	0.2366	432.1197	193935.3	2.8E+08	27.16990	
60	0.0560	0.0140	19.6350	1.1604	0.2366	572.3024	256849.3	3.7E+08	29.14705	
72	0.0303	0.0140	28.2744	1.3104	0.1741	684.5506	307226.2	4.4E+08	24.21096	
96	0.0123	0.0190	50.2656	1.5874	0.1109	692.1263	310626.2	4.5E+08	13.76938	
72	0.0123	0.0140	28.2744	1.3104	0.1109	436.1509	195744.5	2.8E+08	15.42564	
54	0.0123	0.0140	15.9044	1.0817	0.1109	202.5175	90889.87	1.3E+08	12.73346	← CONTROLLING FACTOR IF CLEANED

TYPE	COND.	AREA-sf	P	R	S	n	Q-cfs	V-fps	
8'x4' RCB	CLEAN	32	24	1.333	0.0123	0.014	456.381	14.262	
8'x4' RCB	DEBRIS	20	21	0.952	0.0123	0.020	159.528	7.976	
54" RCP	CLEAN	15.9043	14.1372	1.125	0.0123	0.014	202.524	12.734	
54" RCP	DEBRIS	8.515	12.041	0.707	0.0123	0.020	55.687	6.540	← CONTROLLING FACTOR CURRENTLY
72" RCP	CLEAN	28.2743	18.8495	1.500	0.0123	0.014	436.203	15.428	
72" RCP	DEBRIS	19.742	18.035	1.095	0.0123	0.020	172.794	8.753	

ATTACHMENT #6

EXISTING 54" AND HEADWALL

CHART 1

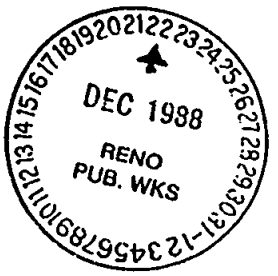


HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

ATTACHMENT #7



December 8, 1988

Mr. Millard Reed
City of Reno
P. O. Box 1900
Reno, Nevada 89505

Dear Mr. Reed:

This letter is in reference to flooding that occurs during any major rainstorm involving the inlet and culvert between Mountain View Cemetery property North of the Reno Auto Wrecking property and extending South under Highway 40 to the Truckee River.

A meeting was held December 6, 1988 at the site with the following agencies and property owners involved:

Reno Auto Wrecking - Dick Mills
Tombstone Territory Mortel - Pat Venner
Mountain View Cemetery - Wayne Reynolds
Harker & Harker - Jack Harker and Jim Harker
Nevada Department of Transportation - Ken Davis
City of Reno - John Loete

Upon visual inspection, the above group discussed two ideas to solve the continuing, worsening problem - one temporary and one permanent. The temporary would be to clean the channel extending from Interstate 80 to the inlet, removing brush, willows, and sand at the outlet and debris washed from properties above the North of the I-80 Freeway where the flooding begins. The permanent solution would be to extend the culvert from the existing inlet to Interstate 80 and provide a workable inlet on the North side of the freeway. Mountain View is agreeable to the one time temporary solution and the permanent solution.

It was also discussed that the flooding has worsened recently after each rainstorm because of increased development in the Northwest which causes more overflow drainage to enter the Highland Ditch waterway which then enters the Mountain View property from the overflow spillway. Also, a letter should be sent to Sierra Pacific Power Company and/or Westpac Utility Company discussing their involvement through the overflow coming from their Highland Ditch.

This flooding has become very expensive to each property owner listed above, including the Nevada Department of Transportation in maintaining Highway 40. Since the problem will not disappear, your attention is greatly needed.

Sincerely yours,

Dick Mills

Dick Mills, Reno Auto Wrecking

Jack Harker

Jack Harker, Harker and Harker

Jim Harker

Jim Harker - Harker and Harker

Wayne Reynolds

Wayne Reynolds - Mountain View Cemetery

Pat Venner

ATTACHMENT # 8

RECEIVED
JAN 17 1990
Engineering Div.

City of Reno

POST OFFICE BOX 1900 • RENO, NEVADA 89505

December 28, 1988

Steve, 1/16/90
Remember this. Mrs Venner called me last week. She would like up date on progress of "study". I told her nothing but that I would have you call as soon as you could, She is happy with our cleannup other than that she want entire ravine up to I-80 spotlessly clean. The war drums are being warmed up.

John

Mr. Dick Mills
Reno Auto Wrecking
2429 W. 4th Street
Reno, NV 89503

SUBJECT: CULVERT UNDER MOUNTAIN VIEW CEMETERY

Dear Mr. Mills:

Thank you for your letter of December 8, 1988, concerning the above subject. We have included this area on our list of drainage problem areas for further study and possible inclusion in our capital improvement programing for funding consideration.

In the meantime, our Maintenance Division will schedule the ditch cleaning and debris removal work into their program. Mr. Wayne Reynolds of the Mountain View Cemetery will be contacted to arrange for the necessary access to the ditch.

If you have any further questions or concerns regarding this issue, please call.

Sincerely,

MILLARD G. REEL
PUBLIC WORKS DIRECTOR

By: _____
Steve Varela, P.E.
City Engineer

MGR:SV:dj

cc: Jack Harker
Jim Harker
Wayne Reynolds - 786-8579 or note! 329-4462
Pat Venner
John Loete, Maintenance Engineering
Robert Gottsacker, Capital Projects Planning

Robert Co.
Any further status?
If yes what?
If no check & return

#8

Mountain View Cemetery

NON PROFIT - NON SECTARIAN - CEMETERY - CREMATORY - COLUMBARIUMS - MAUSOLEUMS

P.O. Box 5118 • Reno, Nevada 89513 • 435 Stoker Ave. • Phone (702) 329-9231

May 9, 1990

Mr. Millard G. Reed, Public Works Director
City of Reno
P. O. Box 1900
Reno, Nevada 89505

RE: CULVERT UNDER MOUNTAIN VIEW CEMETERY

Dear Millard:

This will confirm our verbal discussion at the Boards recognition dinner a few weeks ago in which you eluded no knowledge of the proposed culvert installation in your capital improvement program.

We have been having flooding problems for several years in the "Peavine Drain Ditch" which flows through our property where it goes into culvert under the Reno Auto Wrecking Yard, Fourth Street and then dumps back into the Truckee River.

On November 23, 1988 we had a major flooding problem in which our property was washed away while flooding our maintenance building; then flooding the Reno Auto Wrecking Yard washing over their entrance road and leaving boulders and masses of mud strewn over Highway 40; and then proceeding west on Highway 40, dumping into and flooding over the banks the Orr Ditch and finally flooding the Harker & Harker property and then the Tombstone Territory Motel before it finally subsided in the Micasa Too Resturant Parking lot.

On December 6, 1988, Mr. Dick Mills of Reno Auto Wrecking, Jack and Jim Harker of Harker and Harker Inc., Pat Venner of Tombstone Territory Motel, Ken Davis of NDOT, John Loete from your office and myself had a meeting at the site where it was confirmed that the Peavine Drain Ditch was an overflow ditch for the Highland Ditch owned by the Sierra Pacific Power Company, but that with all of the City of Reno's building in the Northwest Area of Reno above the Highland Ditch, during any rainstorm of any magnitude, the City of Reno's stormdrains were not sufficient to carry the runoff, and that the runoff drained into the Highland Ditch, causing it to overflow into the Peavine Drain Ditch, causing it to flood Mountain View Cemetery and clog up the drain inlet going under the Reno Auto Wrecking Yard, thus flooding the wrecking yard, thus flooding Highway 40 with rock and mud and debris, thus causing the Orr Ditch to overflow when receiving all this water which in turn floods the Harker and Harker property and finally the Tombstone

Territory Motel. While Micasa Too Resturant and the Warehouse Market have not yet been flooded, there is the potential that it could happen if a storm lasts just a few hours longer than the one in November 1988!

The December 6, 1988 meeting brought both a temporary and a permanent solution to this problem. We agreed to both of these solutions which now seem to have been forgotten by your office. The temporary solution was for City Crews to clean up the Peavine ditch bed to prevent immediate repeat of the problem, but the permanent solution of having the City of Reno extend the 54" culvert from the existing inlet next to the Reno Auto Wrecking Yard to the the outlet on the south side of interstate 80 which would solve this problem once and for all, has been forgotten.

Millard, this problem has become very expensive for us property owners involved, and we would like to resolve this matter before another rainstorm causes the same thing to happen again.

We mailed you a letter December 8, 1988 addressing this problem, and on December 28, 1988 received a response from Steve Varela, P.E. City Engineer stating that this problem was being included in the study for possible inclusion in your capital improvement program funding. Mr. Varela's letter was copied to our group, John Loete and Robert Gottsacker but no information was received on the disposition of this problem.

I am now asking for your answer, since the situation is intolerable to us property owners. I will appreciate your response in a timely manner. Thank you.

Sincerely,

Wayne Reynolds
General Manager

WR:bh

Jack Harker
Jim Harker
Pat Venner
Ken Davis

#8

Bob G.

City of Reno

POST OFFICE BOX 1900 • RENO, NEVADA 89505

August 3, 1990

Mr. Wayne Reynolds
Mountain View Cemetery
P. O. Box 5118
Reno, Nevada 89513

RE: **MOUNTAIN VIEW CEMETERY - DRAINAGE**

Dear Mr. Reynolds:

Reference is made to your letter of July 25, 1990 concerning the above-referenced subject. As previously promised in a letter dated December 28, 1988, this problem has been included in our list of drainage problem areas. We hope to have a preliminary analysis of the area by the end of August 1990.

At this time it appears that a solution to alleviate the flooding problems would focus on debris control. This is evident by your observations and the fact that the existing culverts could handle even large storm events under clean water conditions. Much of this debris problem is aggravated by fill encroachment along the cemetery property, which should not be continued. Whether or not the solution is to pipe the culvert the full length of your property to I-80 or some other remedy, it appears the cost will be substantial.

Currently there are no funds appropriated for these improvements and it's hard to predict when there will be. This proposed project will be included on our 5-year capital improvement program for City Council consideration of funding in the 1991-92 fiscal year.

#8

At best, funds could be approved for the 1991-92 fiscal year with construction in the spring of 1992. In the interim, our Maintenance Division is aware of this problem and will keep a close eye on it.

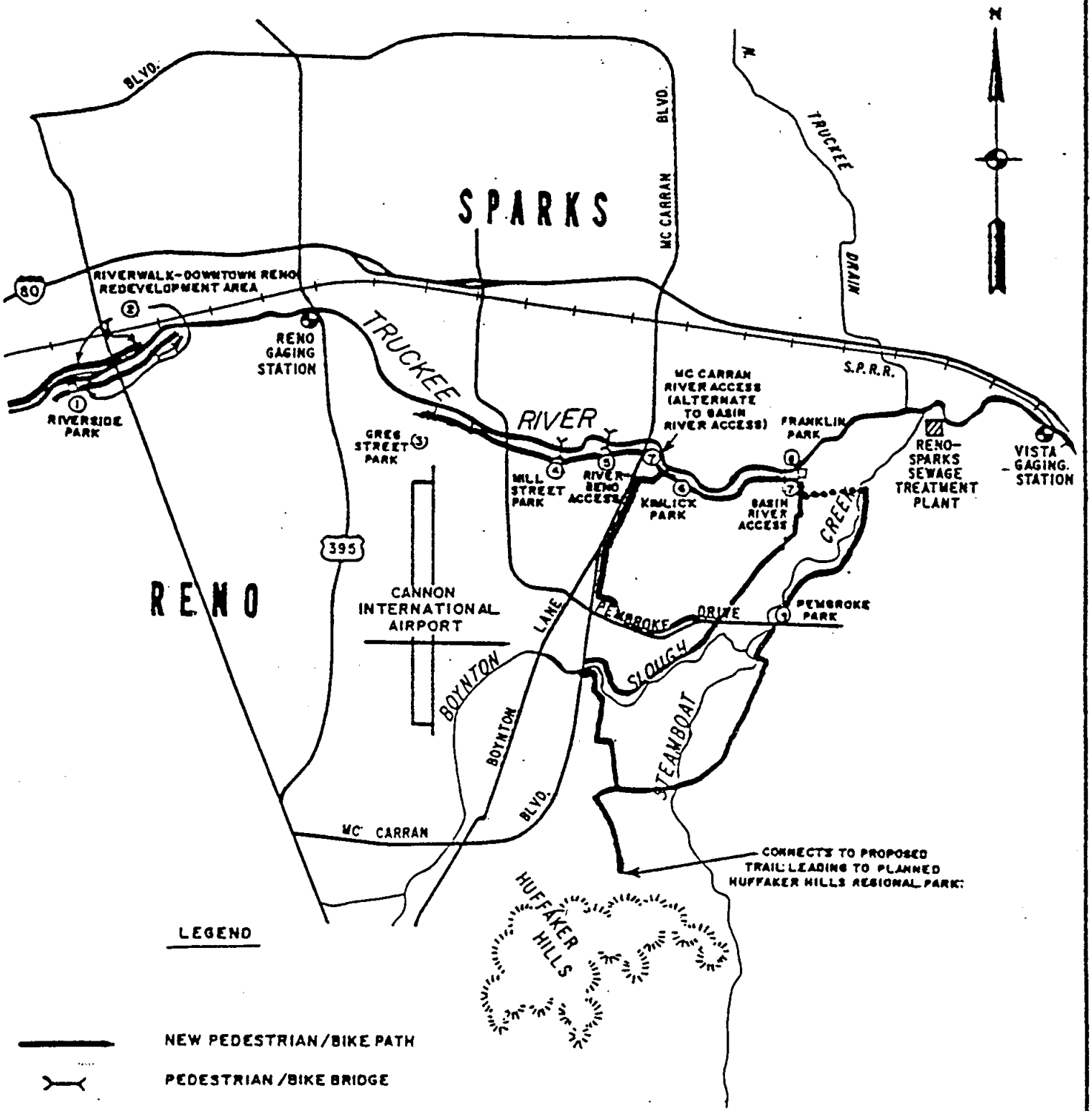
Sincerely,

STEVE VARELA, P.E.
CITY ENGINEER

SV:pj

cc: City Council Members
Hal Schilling
Millard G. Reed
Jack D. Harker
James R. Harker
Dick Mills, Reno Auto Wrecking
Pat Venner, Tombstone Territory Motel
Rick Nelson, N.D.O.T.

#8

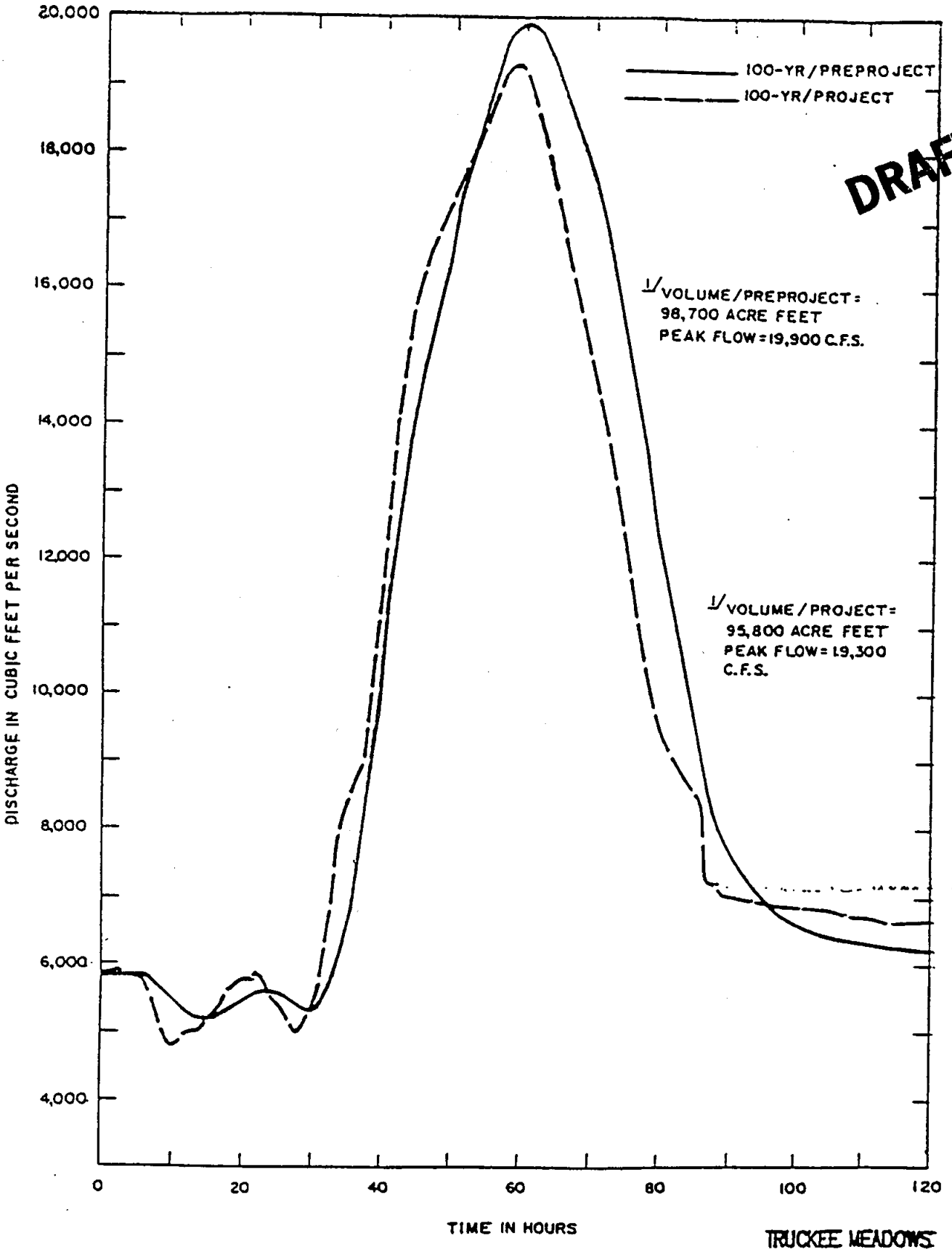


TRUCKEE MEADOWS PLAN OF ACTION

CORPS PROPOSED RECREATION ACCESS AND FACILITIES

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
JULY 1988

ATTACHMENT #9



1/ VOLUME REPRESENTS THAT VOLUME ACCUMULATED OVER A 5-DAY (120 HR.) PERIOD.

TRUCKEE MEADOWS
PLAN OF ACTION

TOTAL FLOW AT VISTA
UNDER 100-YEAR FLOOD
CONDITIONS

SACRAMENTO DISTRICT, CORPS OF ENGINEERS
JULY 1968

ATTACHMENT #9

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #1

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: CLEAN
YEAR STORM: TWENTY-FIVE YEAR EVENT
FLOW: 218 CFS

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.17
54" - 8'X4'	20'	4530.26
VAULT - 54"		4530.78
VAULT	25'	4530.88
SS IN VAULT		4530.96
54" - VAULT		4531.63
54" RCP	793'	4544.65
72" - 54"		4545.17
MH (72 - 54)		4545.75
72" RCP	158'	4546.54
96" - 72"		4546.67
96" CMP	78'	4546.90
72" - 96"		4547.00
19 BEND		4547.10
72" RCP	110'	4547.43
60" - 72"		4547.51
60" RCP	6'	4547.54
54" - 60"		4547.67
54" RCP	558'	4551.67

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #2

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 72" RCP
CONDITION: CLEAN
YEAR STORM: ONE HUNDRED YEAR EVENT
FLOW: 305 CFS

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.49
54" - 8'X4'	20'	4530.55
VAULT - 54"		4530.88
VAULT	25'	4531.00
SS IN VAULT		4531.08
54" - VAULT		4531.51
72" RCP	793'	4539.52
MH (72)		4539.89
72" RCP	158'	4541.49
96" - 72"		4541.68
96" CMP	78'	4542.14
72" - 96"		4542.33
19 BEND		4542.53
72" RCP	110'	4543.64
60" - 72"		4543.90
60" RCP	6'	4544.02
54" - 60"		4544.28
54" RCP	558'	4562.34

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #3

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: WITH DEBRIS
YEAR STORM: FIVE YEAR EVENT
FLOW: 115 CFS

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4530.61
54" - 8'X4'	20'	4530.70
VAULT - 54"		4531.22
VAULT	25'	4531.32
SS IN VAULT		4531.40
54" - VAULT		4532.07
54" RCP	793'	4575.11
72" - 54"		(TOO HIGH
MH (72 - 54)		TO CONTINUE)
72" RCP	158'	
96" - 72"		
96" CMP	78'	
72" - 96"		
19 BEND		
72" RCP	110'	
60" - 72"		
60" RCP	6'	
54" - 60"		
54" RCP	558'	

54" RCP INVERT ELEVATION = 4574.95

MOUNTAIN VIEW CEMETERY DRAINAGE STUDY
HYDRAULIC GRADE LINE CALCULATIONS
SUMMARY TABLE - #4

BASE LINE - TOP OF 8' X 4' RCB
ELEVATION = 4529.85
LINE: 54" RCP
CONDITION: WITH DEBRIS
YEAR STORM: TWENTY-FIVE YEAR EVENT
FLOW: 218 CFS

MAJOR POINT	LENGTH	HGL - ELEV
8'X4' RCB	80'	4531.58
54" - 8'X4'	20'	4531.67
VAULT - 54"		4532.19
VAULT	25'	4532.29
SS IN VAULT		4532.37
54" - VAULT		4533.04
54" RCP	793'	4631.67
72" - 54"		(TOO HIGH
MH (72 - 54)		TO CONTINUE)
72" RCP	158'	
96" - 72"		
96" CMP	78'	
72" - 96"		
19 BEND		
72" RCP	110'	
60" - 72"		
60" RCP	6'	
54" - 60"		
54" RCP	558'	

54" RCP INVERT ELEVATION = 4574.95

Mike R

my calcs show only an increase from 140 to 160 cfs by lowering pipe invert 1.35 ?

Mr. Wayne Reynolds - Mt. View Cemetery
Jack D. Harker - Harker and Harker
James R. Harker - Harker and Harker
Dick Mills - Reno Auto Wrecking
Pat Venner - Tombstone Territory Motel

Subject: Peavine Drain / Mountain View Cemetery
Storm Drainage Study

Dear :

With respect to Wayne Reynolds' letter of May 9, 1990, the City of Reno has performed a drainage study on the drainage basin which flows past the Mountain View Cemetery and into the Peavine Drain. This is the storm drain which begins at the northwest corner of the Reno Auto Wrecking Yard.

In the near future, the Public Works staff will be working on cleaning the lower end of the drain to improve the flow handling characteristics. In addition to that improvement, we have placed on our Capital Improvement Projects List, a project to reconstruct the inlet of the storm drain. This project will prevent debris from entering the pipe and increase the amount of water that the pipe can accept.

If you should have any questions in regards to this project, please contact myself or Michael Einweck at 334-2230. We will be happy to provide you with any additional details that you may need.

Sincerely,

Steve Varela, P.E.
City Engineer

cc: City Council Members
Hal Schilling
Millard Reed
John Loete
Rick Nelson, NDOT
project file

Helpful! John L. can give a reasonable schedule

Check with Loete about this

1-11-91 @ 8:45A talked to D. Kemppe re. sch., he said that J. Loete would be preparing a memo to address this in the ~~fall~~ near future.

ME

OK by me! Have SV review prior to putting on letterhead KbC.

City of Reno

CAPITAL PROJECTS PLANNING
P.O. BOX 1900 RENO, NV 89509
(702) 334-2230 FAX (702) 334-2490

TRANSMITTAL

DATE: 29 JAN 1991

TO: JOHN LOETE
PUBLIC WORKS

RE: PEAVINE DRAIN-MOUNTAIN VIEW CEMETERY DRAINAGE REPORT

X	FOR YOUR INFORMATION	___	FOR YOUR SIGNATURE
___	FOR APPROVAL	X	AS REQUESTED
___	FOR REVIEW & COMMENT	___	RETURNED FOR CORRECTION
___	FOR YOUR USE	___	RETURNED
___	_____		

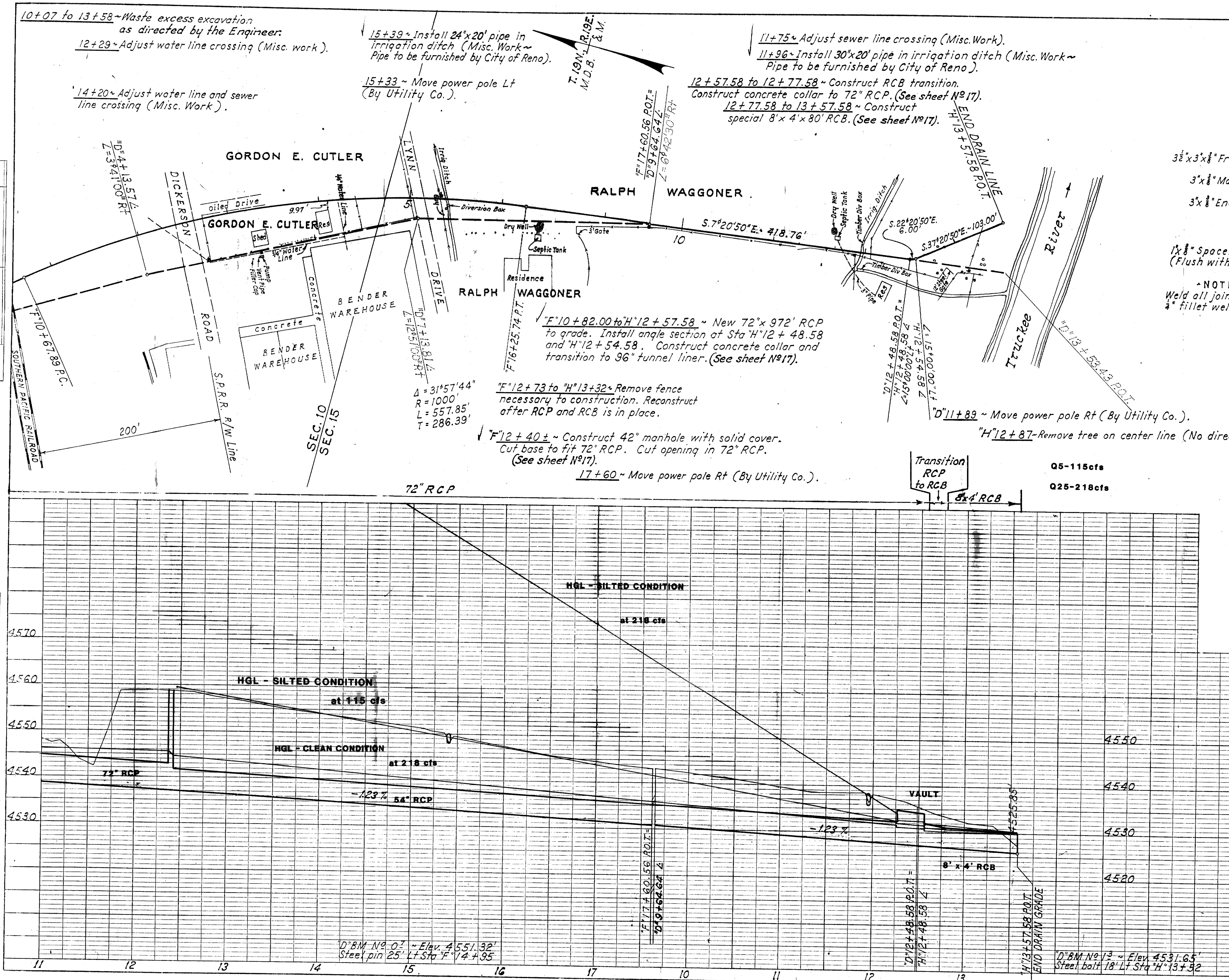
COMMENTS: I HAVE ATTACHED ONLY THE OVERALL DRAINAGE AREA FROM THE APPENDIX. LET ME KNOW IF YOU NEED ADDITIONAL INFORMATION.

SINCERELY,

CITY OF RENO

BY: Michael Einweck

FED. ROAD DIV. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	F 001-1(10)	WASHOE	WA-01	1	16	40



STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

SPECIAL DETAILS
PEAVINE DRAIN

PLATE 1 – PLAN-PROFILE
KEUFFEL & ESSER CO., NEW YORK

FED. ROAD DIV. NO.	STATE	PROJECT NO.	COUNTY	CONTROL SECTION	STATE ROUTE	SHEET NO.	TOTAL SHEETS
7	NEVADA	F001-1 (10)	WASHOE	WA-01	1	15	40

CONSTRUTION REVISIONS
CONTRACT NO 912 SHOWN

"G" 3+30 to "F" 10+07 ~ Waste excess excavation as directed by the Engineer.

6+85 ~ Construct 42" manhole with open grate top. Cut base to fit 54" RCP. Cut 3' diam. opening in 54" RCP. (See Sheet Nº 17).

"G" 8+58 to "G" 9+02 ~ Riprap ditch Left to manhole 9+02 (Change Order No 9)

6+70 ~ Remove chicken house Lt. (No direct payment). Remove fence Lt.

9+02 ~ Construct 42" manhole with open grate top. Cut base to fit 72" RCP. Cut opening in 72" RCP. (See Sheet Nº 17).

3+30.5 to 8+88.5 ~ New 54" x 558' RCP to grade.

3+29 to 5+23 ~ Remove fence necessary for construction.

8+92.5 to 10+05.5 ~ New 72" x 108' RCP to grade. Install angle section at Sta "G" 9+68.83. Construct concrete collar and transition to 60" RCP. (See Sheet Nº 17).

8+37 ~ Remove tree Rt (No direct payment).

8+42 to 9+02 ~ Remove catch basin and wings Rt.

8+42 ~ Remove fence necessary to construction.

8+78 ~ Remove tree Rt (No direct payment).

8+87.7 to 8+93.7 ~ New 60" x 6' RCP to grade. Construct concrete collar and transition to 54" RCP. (See Sheet No. 17).

9+98 to 10+14 ~ Construct concrete lining for Orr Ditch and concrete drop box. (Install headgate, frame and 48" x 1' CMP obtained from Rt Sta "Ow" 243+20 ~ Misc. Work). Cut opening in 72" RCP. (See Sheet Nº 18).

10+04.5 to 10+82.5 ~ New 96" x 78' tunnel liner to grade through R R embankment. Pave invert with concrete. Construct concrete collar and transition to 72" RCP. (See Sheets Nº 16 and 17).

STATE OF NEVADA
DEPARTMENT OF HIGHWAYS

SPECIAL DETAILS
PEAVINE DRAIN

PLAN			
NOTE BOOK	SURVEYED		
	PLOTTED		
	ALIGNMENT CHECKED		
NO.	RT. OF WAY CHECKED		
		BY	DATE

PROFILE			
NOTE BOOK	SURVEYED		
	PLOTTED		
	GRADES CHECKED		
	B. M.S NOTED		
NO.	STRUCTURE NOTAT'NS CH'KD.		

PLATE — PLAN-PROFILE O. P. R. & R. E. STANDARD
KEUFFEL & ESSER CO., NEW YORK.