STORMWATER MASTER PLAN
CITY OF TALENT, OREGON

PREPARED BY:

Marquess & Associates, Inc.
CONSULTING ENGINEERS
MEDFORD, OREGON

Funded by Federal Emergency Management Agency Hazard Mitigation Grant Program

JANUARY, 1999

EXECUTIVE SUMMARY

This study summarizes the results of the storm drain inventory and drainage planning for the City of Talent. The study area includes the land within and upstream of the Urban Growth Boundary. Existing records were used to determine the slope and capacity of existing storm drains. All 10-year flows are based on future buildout condition.

The majority of Talent can develop without detention requirements. The area west of the Central Oregon and Pacific Railroad (COPR) tracks will need special attention. Either detention or a joint venture project to address runoff in this area will be required.

The Talent Irrigation District (TID) plans to enclose its canals west of Talent. This could have a significant impact on Talent. The City, TID and COPR need to coordinate a resolution to this issue.

Marquess and Associates, Inc. (MAI) makes several recommendations in this report. These include:

1. Perform a field reconnaissance of the existing storm drains to determine which existing pipes need to be replaced.

2. Document with photographs all existing flooding problems. These may require projects in addition to those identified by this study.

3. Continue to coordinate with the Talent Irrigation District and the Central Oregon and Pacific Railroad to develop plans to address joint storm drainage problems.

4. Monitor rainfall and water levels in Wagner Creek to verify or correct the Federal Emergency Management Agency's Flood Insurance Rate Map.

I. INTRODUCTION

The City of Talent recognizes the need to address its storm drainage issues in a comprehensive manner. In September, 1997, the City requested Marquess & Associates, Inc. (MAI) use existing as-builts to create a storm drain inventory map. In September, 1998, the City requested that MAI to create a Stormwater Master Plan and develop Storm Drain Design Standards. The City also participated in the Rogue Valley Council of Government's aerial contour mapping project. MAI and City staff jointly developed the Design Standards using the existing City of Salem, Oregon Storm Drain Standards as a model. MAI received the aerial photographs in mid-December and began the engineering analysis. On January 11, 1999, MAI presented preliminary findings to the Stormwater Task Force. Given the limited budget and schedule, MAI concentrated on designing a system based on fully developed conditions only.

II. TOPOGRAPHY AND CLIMATE

The City of Talent is located approximately 6 miles south of the City of Medford, in Jackson County, Oregon. The City lies along the western edge of the Rogue Valley in the shadow of the Siskiyou Mountains. The average elevation is approximately 1,600 feet above mean sea level. The land generally slopes to the east towards Bear Creek. One major tributary of Bear Creek named Wagner Creek cuts through Talent from the mountains. Two man-made canals and a railroad parallel the foot of the mountains west of Talent. These three features have a major impact on runoff patterns in Talent.

Talent is located in the rain shadow of the Siskiyou Mountains. Average annual precipitation is less than 20 inches per year. The climate is mild. Summer high temperatures in the Rogue Valley exceed 100 degrees an average of eight days per year. Winter low temperatures average in the 30's, rarely dropping below 10°.

III. SOILS

The soils in the vicinity of Talent are silty clay loams. The U. S. Geological Survey classifies the soils as Hydrologic Soil Types B and C. The permeability of these soils is classified as moderate. The soil type for most of the City is Type C. Type C soils are not suitable for infiltration systems.

IV. HYDROLOGY AND HYDRAULICS

Hydrology is the study of rainfall and runoff patterns. There are many different methods that could be used to estimate the runoff. The most commonly used method for small drainage areas is the Rational Formula. The Oregon Department of Transportation (ODOT) Hydraulics Manual has a complete description of the Rational Method. Below is a brief overview.

The Rational Formula is: $Q=CIA$

Q = Peak flow, in cubic feet per second (cfs)
C = Runoff Coefficient
I = Intensity of rainfall in inches per hour
A = Area of basin, in acres

The runoff coefficient varies from 0.1 to 0.95 depending upon factors such as the soil type and the degree of development. The runoff coefficient for various types of developments are shown in Table 1.

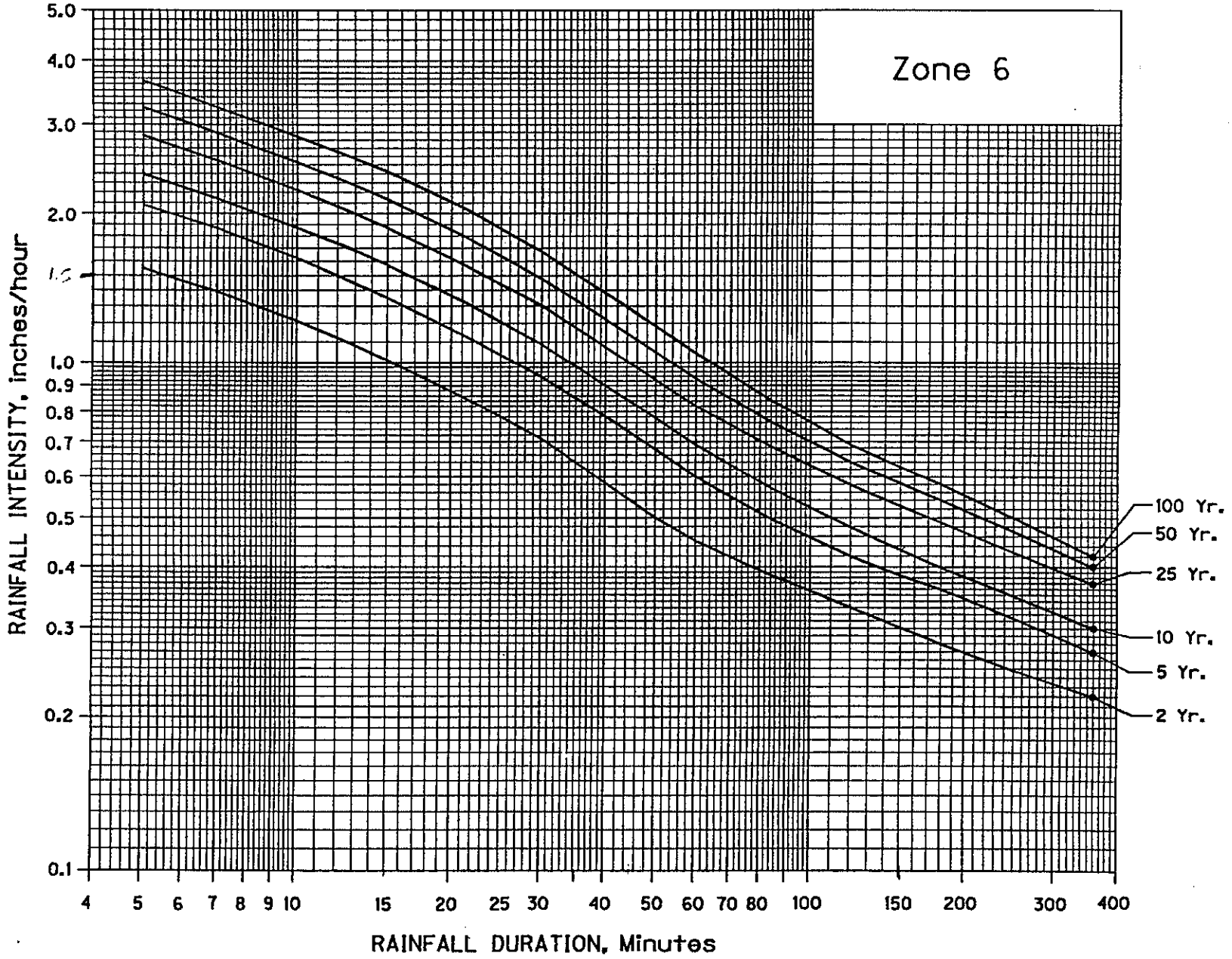
Table 1 - Runoff Coefficients for the Rational Method

Pavement and Roofs	0.9 - 0.95
Graveled Parking	0.5 - 0.6
City Business Areas	0.8 - 0.85
Apartment Areas	0.5 - 0.7
Single Family Residential	
1-3 units/ac	0.31 - 0.42
3-6 units/ac	0.38 - 0.49
Parks, Unimproved Areas	0.1 - 0.3
Light Industrial	0.5 - 0.8
Heavy Industrial	0.6 - 0.9

The "I" in the Rational Formula is the Intensity of the rainfall in inches per hour. The ODOT Hydraulic Manual provides an Intensity-Duration-Frequency (IDF) diagram which has been reproduced and included in this report. (See Figure 1.)

The first step in using the diagram is to determine the time of concentration, or the time it takes runoff to travel by the slowest route from the hydraulically most distant point of the basin to the outlet or point of interest. The velocity of the flow can be calculated using hydraulic formulas, nomographs or computer programs. The nomographs, equations and a detailed discussion of the methodology are published in the ODOT Hydraulics Manual. Often it is assumed that the time of concentration to the first (upstream) inlet is 10 minutes. The time of travel through the pipes is calculated by dividing the length of each pipe by the velocity. The velocity (and capacity) is obtained from nomographs or common engineering equations. Figure 2 is a nomograph that can be used for smooth (PVC and concrete) pipes.

Once the time of concentration is known, the IDF curve for the Talent area (Zone 6 of the ODOT manual) is used to determine the intensity for a given return interval storm. A 10-year storm shall be used to design all catch basins, gutters, connector pipes, laterals and trunk lines. When the 10-year flow exceeds the capacity of a 36" pipe, the City may require a higher


RAINFALL INTENSITY - DURATION - FREQUENCY CURVES
Zone 6
RAINFALL INTENSITY, inches/hour
5.0
4.0
3.0
2.0
1.5
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
4
5
6
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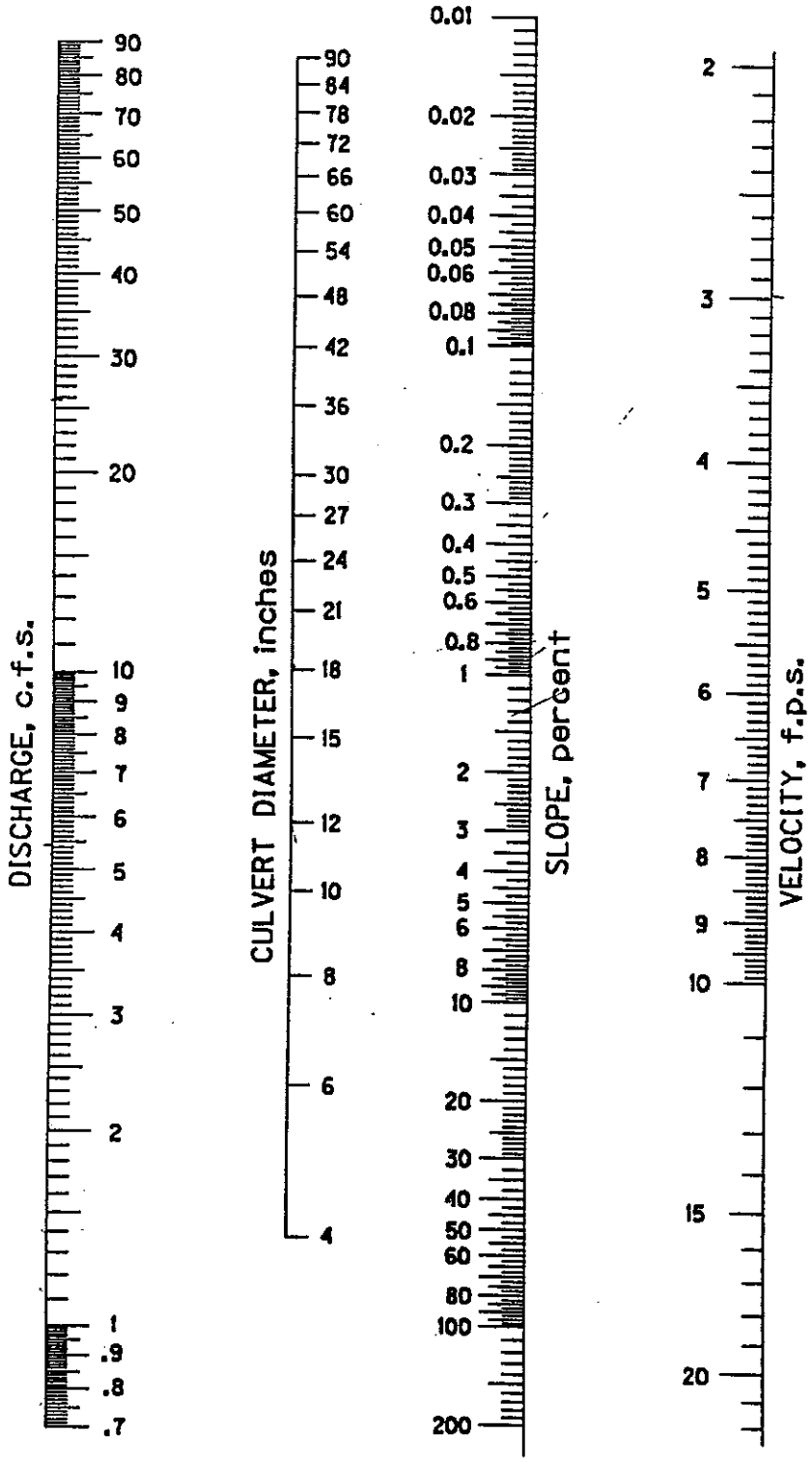
25
30
40
50
60
70
80
100
150
200
300
400
RAINFALL DURATION, Minutes
100 Yr.
50 Yr.
25 Yr.
10 Yr.
5 Yr.
2 Yr.

FIGURE 1

Figure 2



CAPACITY AND VELOCITY
NOMOGRAPH FOR
CIRCULAR CONCRETE PIPES
FLOWING FULL

n = 0.013

return frequency for design. The Storm Drain Design Standards address the specific hydraulic design requirements for facility designs.

The IDF curve for Zone 6 shows that for a time of concentration (TC) of 15 minutes, the intensity is 1.58 inches per hour, and for a TC of 35 minutes, the intensity is 0.96 inches per hour. This is approximately the upper and lower limits of the intensities that should be used for design in Talent. Given that the coefficient of runoff for residential areas is 0.45, the runoff from residential areas can range from 0.43 to 0.71 cfs per acre.

To calculate the flows at critical points, the City was divided into 38 subbasins denoted on Figures 4 through 10 as B1 through B38. The rational formula was used to calculate the flow at the outlet of each basin. The basins were then accumulated into 23 "watersheds" to account for areas where runoff from two or more subbasins joined together and shared drainageways. (See Figure 3) The watersheds are denoted by color coding, and labels W1 through W23.

V. EXISTING SYSTEM

Talent has never had a Stormwater Master Plan. Therefore, the existing storm drainage system has been designed and installed based on the judgment of engineers for individual developments. The City has not required off-site drainage system improvements as a condition of development. The resulting system lacks continuity. In many areas, roadside ditches serve as the only storm drainage system. Fortunately, the physical layout of the City limits the length of any particular storm drain. Therefore, there are not as many undersized pipelines as one would normally expect under these circumstances.

In September, 1997, the City hired Marquess & Associates, Inc. (MAI) to perform a vacant lands inventory and to develop Storm Drainage Design Standards. MAI gathered all available as-built construction plans for developments in Talent. We have compiled this information into a single AutoCAD drawing that shows the existing pipes and their sizes. MAI obtained permission from the City of Salem to use its Storm Drainage Design Standards as a basis for developing standards for Talent. These standards are very comprehensive. They define many of the policies that normally would be developed in a Stormwater Master Plan. The standards served as a policy guidance document prior to adoption of this Stormwater Master Plan.

The Talent Irrigation District has several facilities that have a major impact on drainage in the City. These include several 8" to 12" diameter pipelines and ditches that deliver irrigation water during the summer and are used to carry stormwater during the winter. The City and the irrigation district share maintenance responsibilities for these lines. The irrigation district has expressed interest in eliminating or turning over ownership of several of these lines to the City. Marquess & Associates, Inc., recommended which lines the City should acquire. These recommendations were based on hydrologic considerations only. No effort was made to determine the condition of these lines. Even if the lines are in poor condition, the City may need to acquire the lines to preserve any existing easements or rights of way. For this Master

Plan MAI reviewed our earlier comments. Originally, we believed that an 18" line in Creel Avenue could be used to eliminate the need for TID line T2. After reviewing the new topographic maps, however, we have concluded that this will not be practical. Line T2 should be replaced with 12" storm drain line. The City should obtain an easement for this line.

The Talent Irrigation District also owns two canals along the west (uphill) side of the City. These canals intercept a substantial amount of runoff and provide unintentional protection. Within two years, TID plans to convert these open canals into buried pipelines or install ditches and siphons which will prevent storm water from entering their canals. This will eliminate the protection. Runoff from hillsides will continue east to the railroad right of way. The ditch along the railroad and culverts under roads crossing the tracks were not designed to carry the flow. Section VI discusses possible solutions to this problem.

Using the method described in Section IV, MAI calculated the capacity of the existing and proposed pipes. These are shown in Figures 4-10. These Figures also show the projected 10 year flows (designated as Q10) for the future buildout condition.

MAI photographed a dozen locations to document the existing condition of Talent's storm drainage system. Figure 11 shows the location of the photographs sown in Figures 12-15. City maintenance personnel are probably much more familiar with existing storm drainage problems in Talent. The City should perform a field reconnaissance of the existing storm drains to determine which existing pipes need to be replaced. These would need to be added to the Capital Improvements List. The City should also document with photographs all existing flooding problems. These may also require projects in addition to those identified by this study.

VI. PROPOSED STORM DRAIN SYSTEM

The physical configuration of the City of Talent had a major impact on the design of the proposed storm drainage system. The City is segmented by several physical barriers to runoff. These barriers include the TID canals, the railroad tracks, Talent Avenue, Rapp Road, and Highway 99.

The general idea is to convey the runoff at every opportunity to Bear Creek or Wagner Creek as quickly as possible. This serves two important purposes. First, it limits the amount of large diameter pipes required and therefore minimizes costs. Second, by getting the water to the creeks quickly peak flows in the creeks are actually decreased in Talent. This is because the time of concentration of the creeks is much longer than the time of concentration of the local runoff from the City. The idea is to drain the City before the runoff from the mountains arrives.

MAI has designed a storm drainage system that limits the size of the watersheds and therefore limits the size of pipes necessary to drain the City. A few watersheds presented a significant

WATERSHED PLAN

SCALE: 1"=1200'

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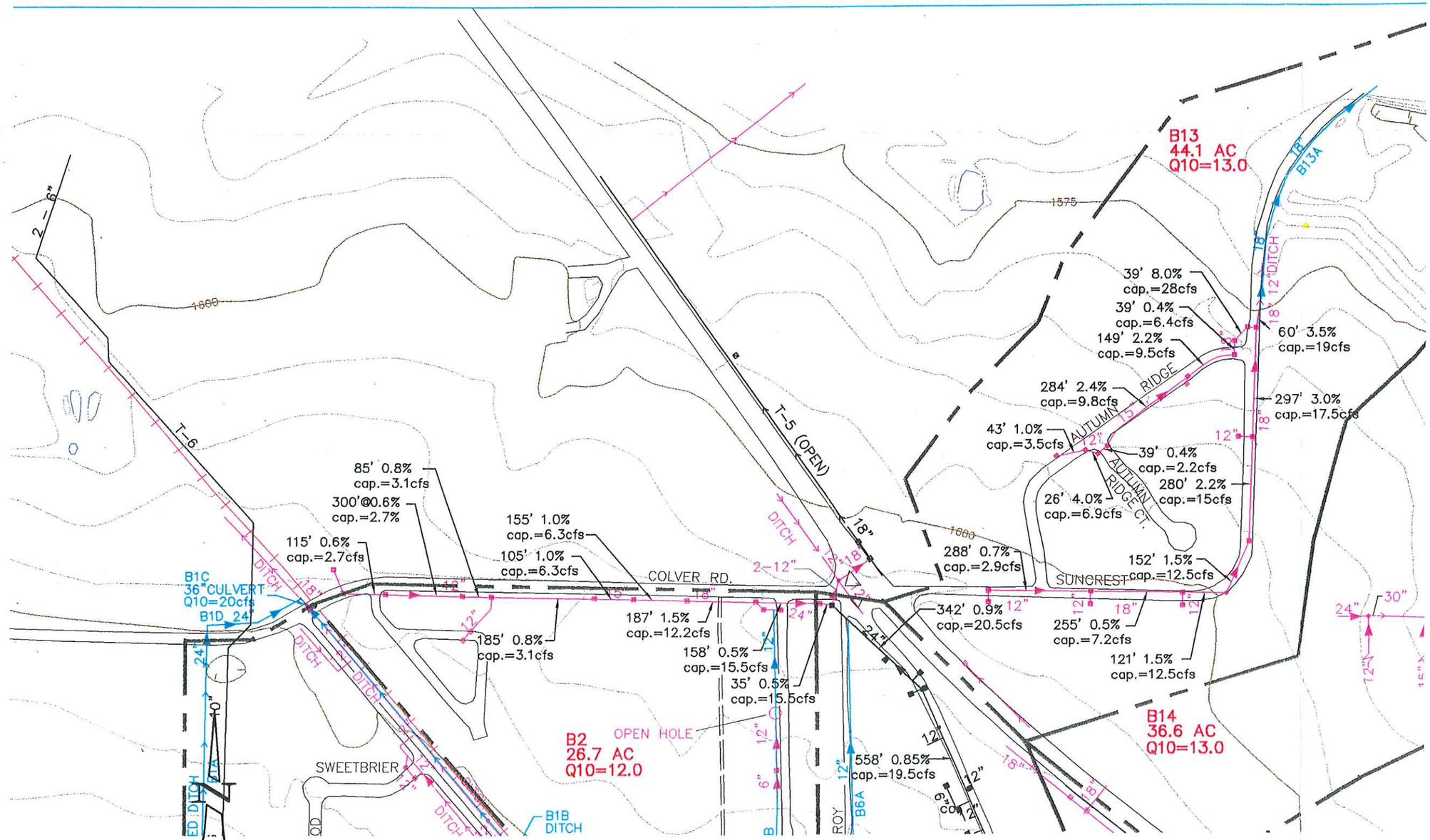
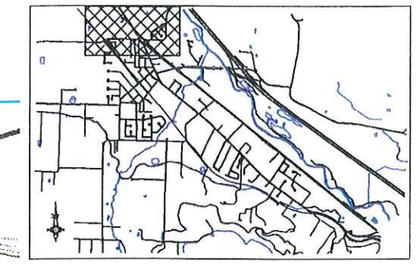
STORM DRAIN MASTER PLAN

TALENT, OREGON

JOB: 32-99	DATE: 1-7-98	SCALE:	DRAWING NO.
DRAWN: ACJ	CHECKED: TWC	1"=1200'	3 OF





VICINITY MAP

SCALE: NTS

LEGEND

- EXISTING DITCH
- EXISTING STORM DRAIN
- WATER
- FUTURE STORM DRAIN
- RAILROAD TRACKS
- BASIN BOUNDARY
- Q10= 10-YEAR FLOW

W E S

STORM DRAIN MASTER PLAN

SCALE: 1"=300'

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STORM DRAIN MASTER PLAN

TALENT, OREGON

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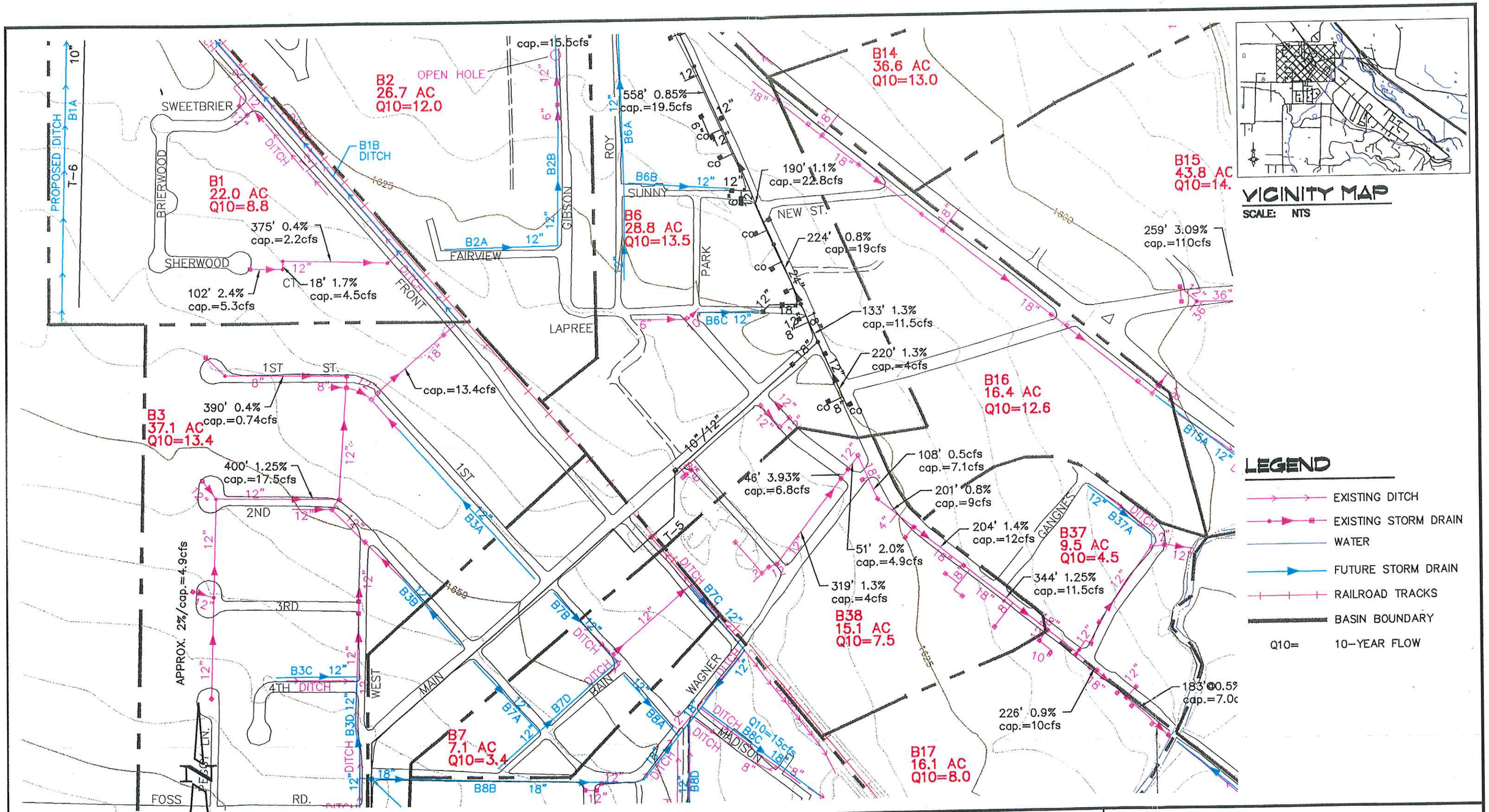

STORM DRAIN MASTER PLAN

SCALE: 1"=300'

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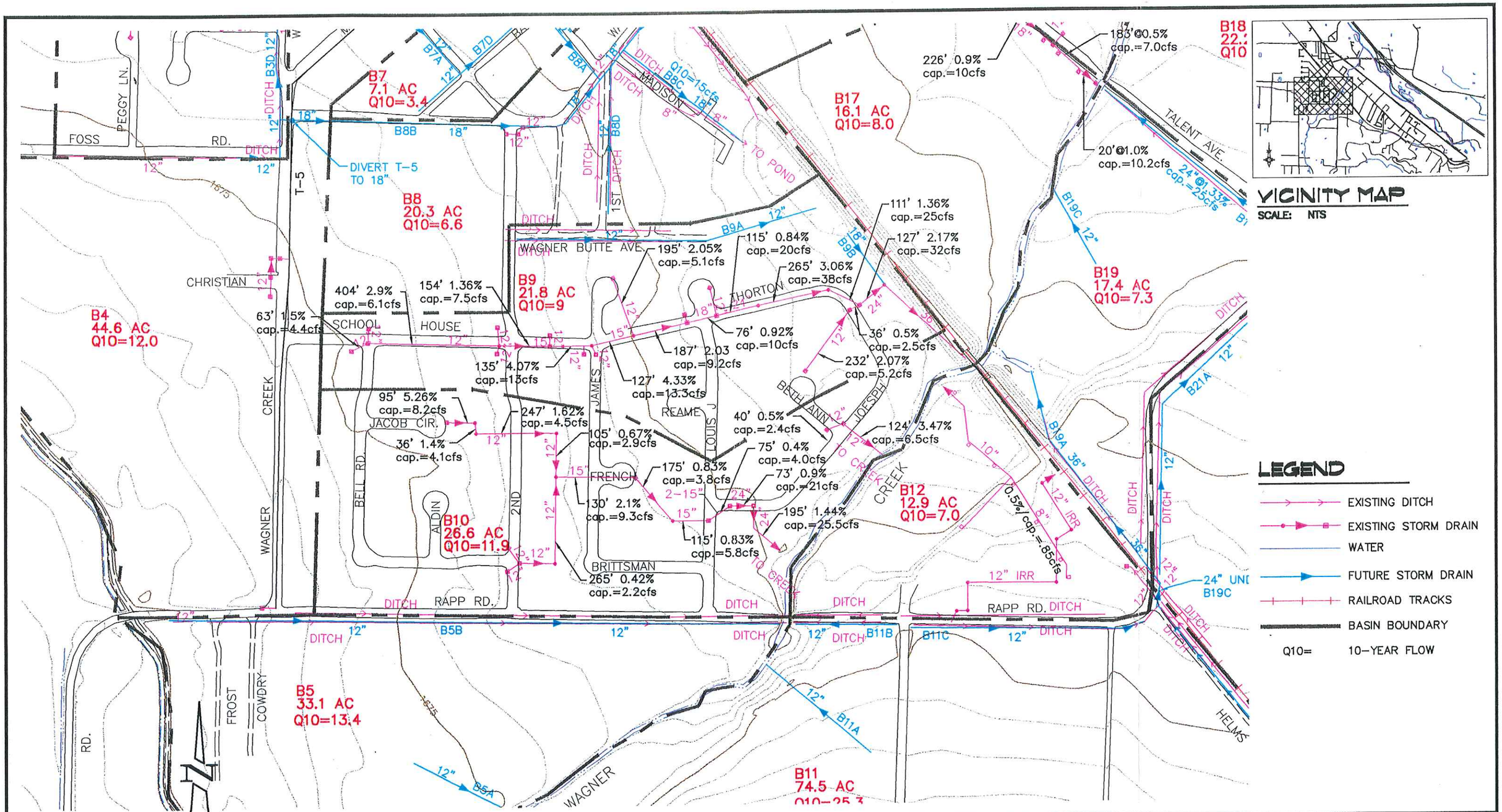

STORM DRAIN MASTER PLAN

SCALE: 1"=300'

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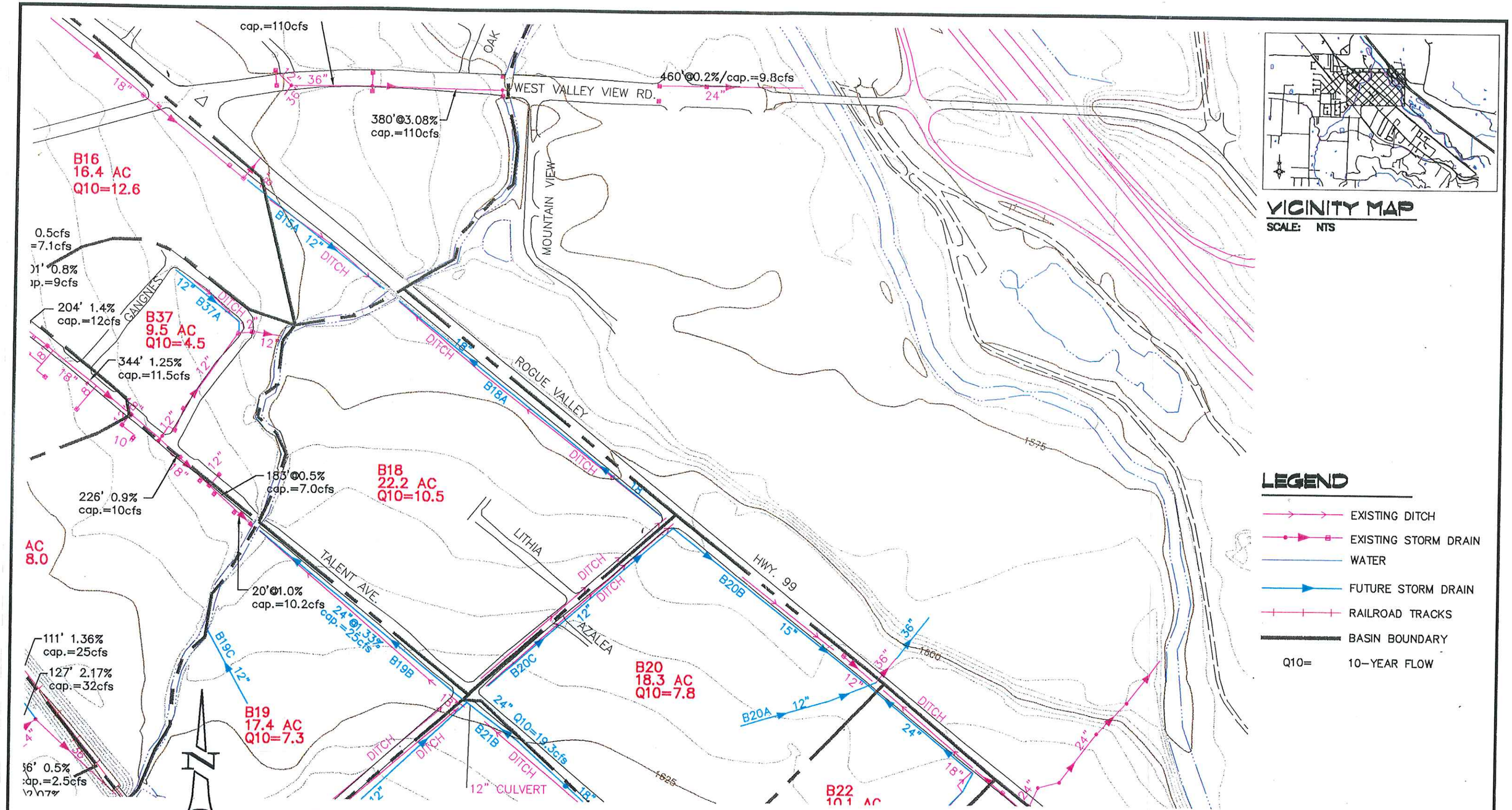

STORM DRAIN MASTER PLAN

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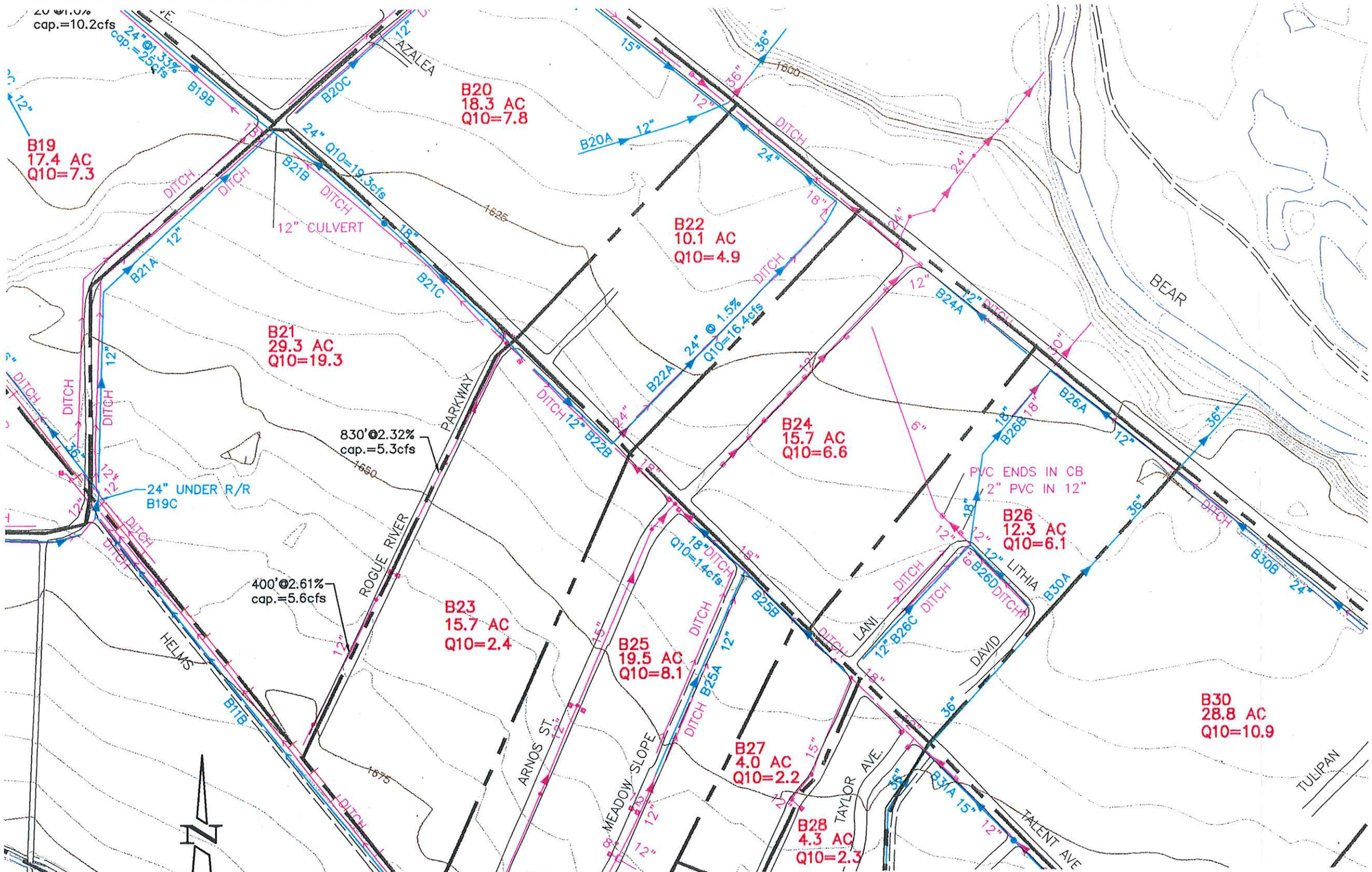

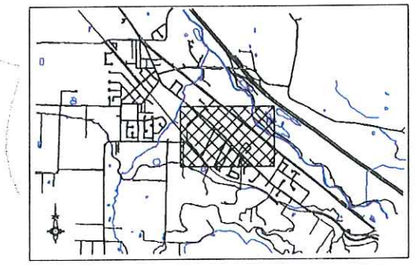

VICINITY MAP

SCALE: NTS

LEGEND

- EXISTING DITCH
- EXISTING STORM DRAIN
- WATER
- FUTURE STORM DRAIN
- RAILROAD TRACKS
- BASIN BOUNDARY
- Q10= 10-YEAR FLOW

STORM DRAIN MASTER PLAN

SCALE: 1"=300'

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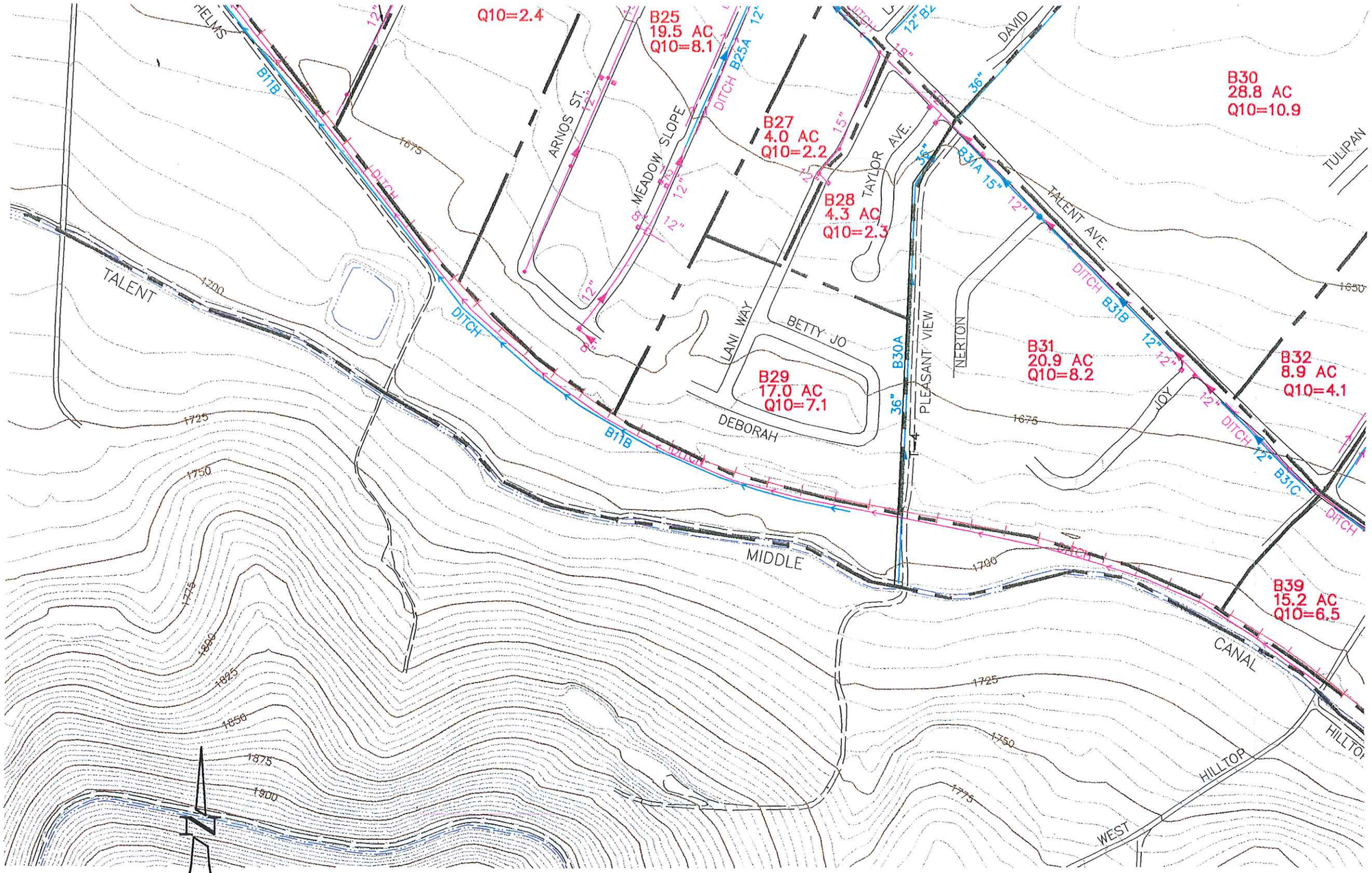

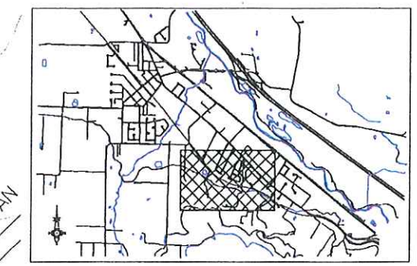

VICINITY MAP

SCALE: NTS

LEGEND

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STORM DRAIN MASTER PLAN

SCALE: 1"=300'

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TALENT, OREGON			
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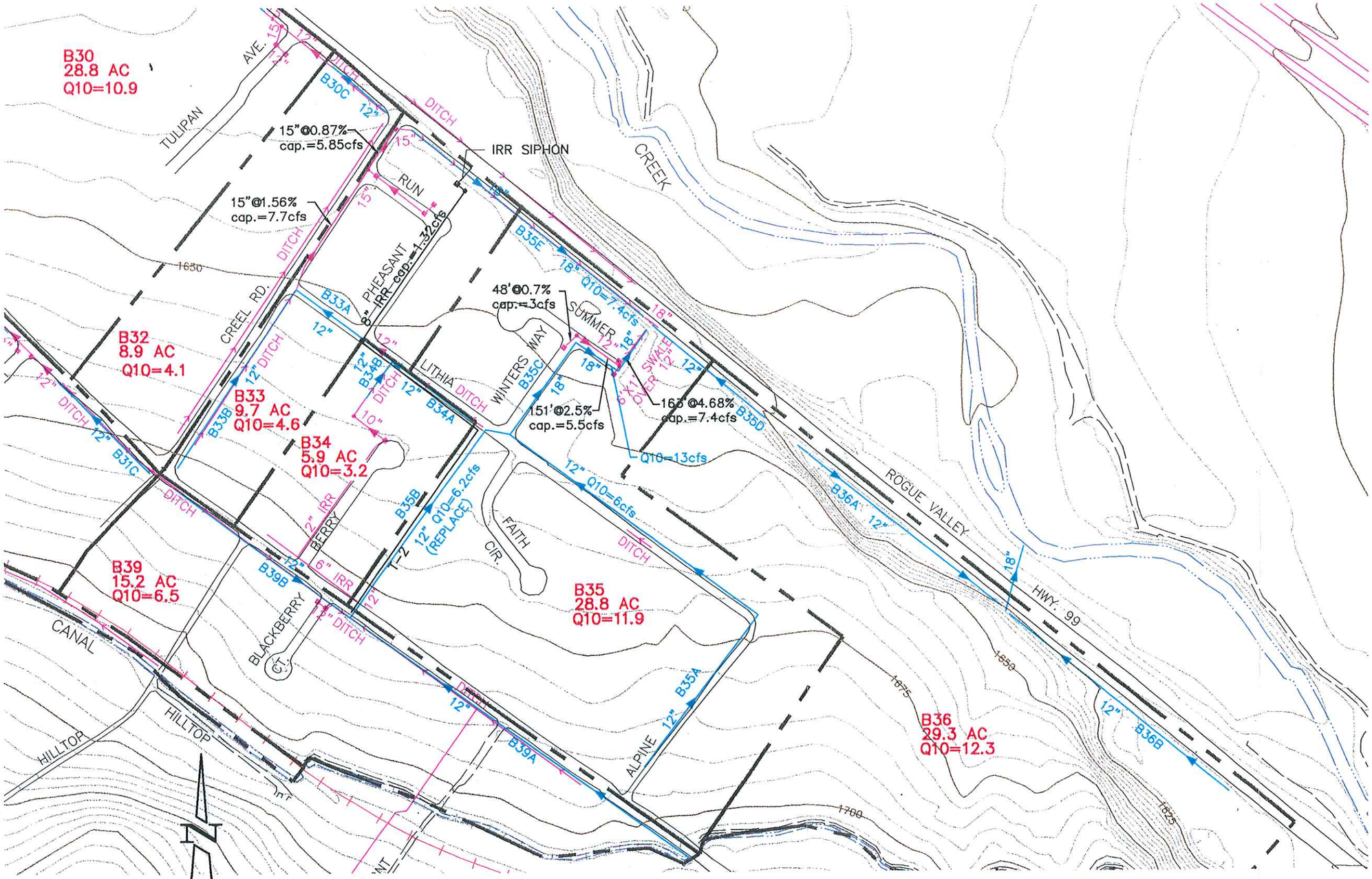

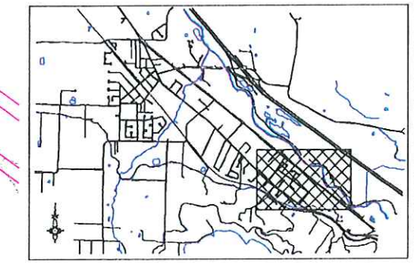

VICINITY MAP

SCALE: NTS

LEGEND

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- EXISTING STORM DRAIN
- WATER
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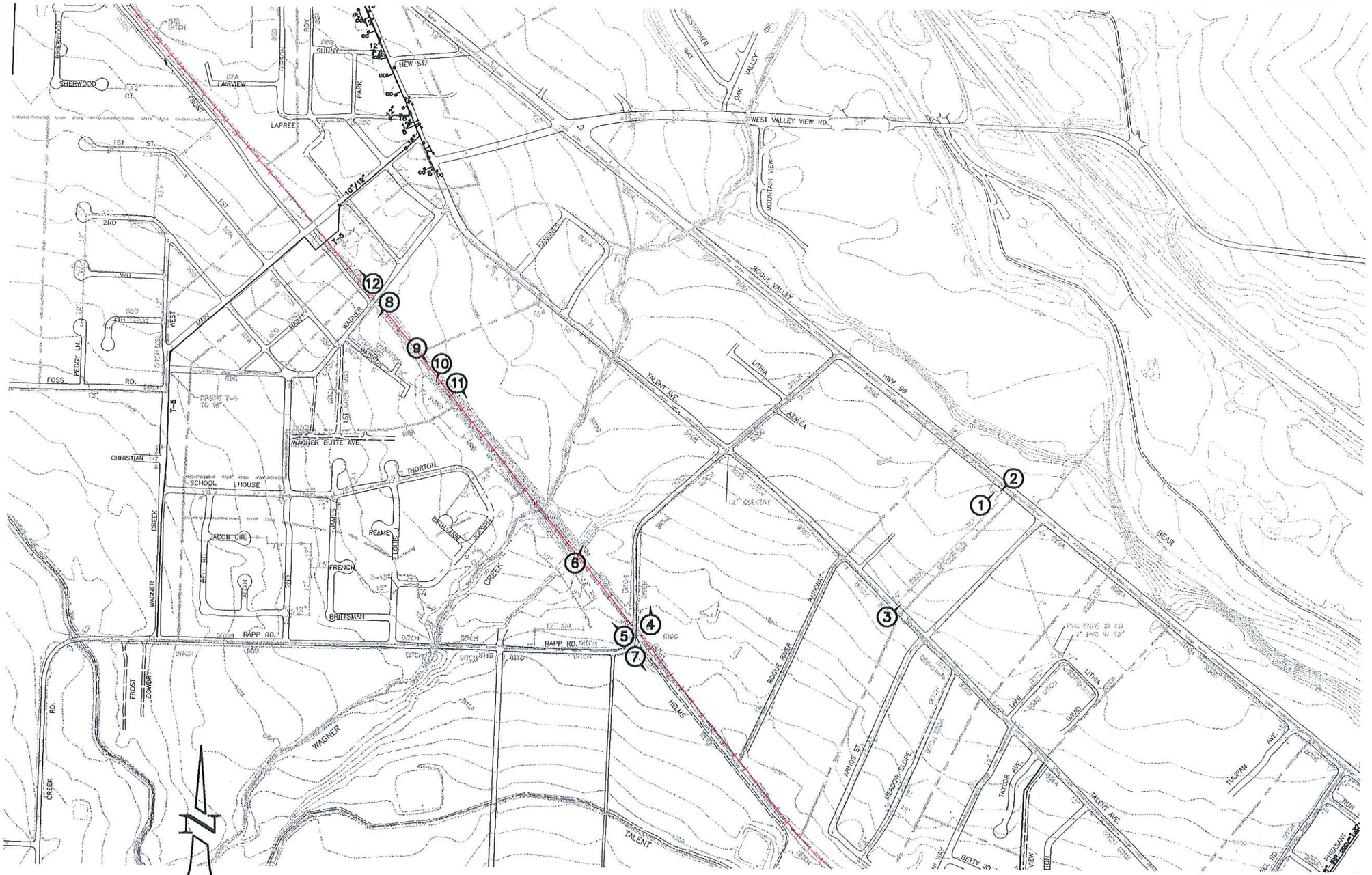

PHOTO SITE PLAN

SCALE: NTS

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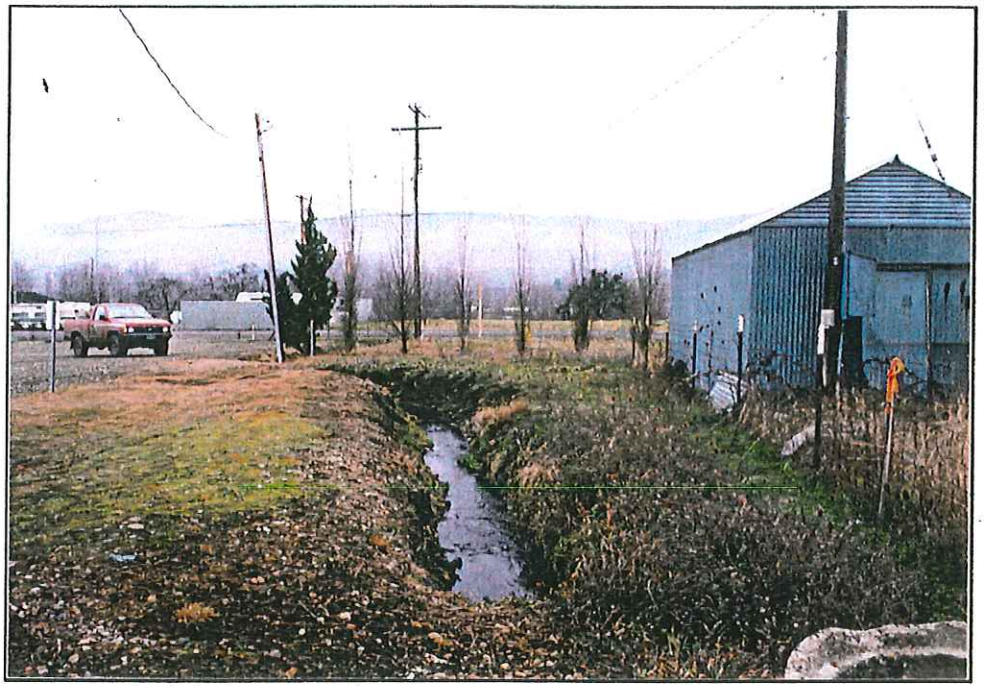

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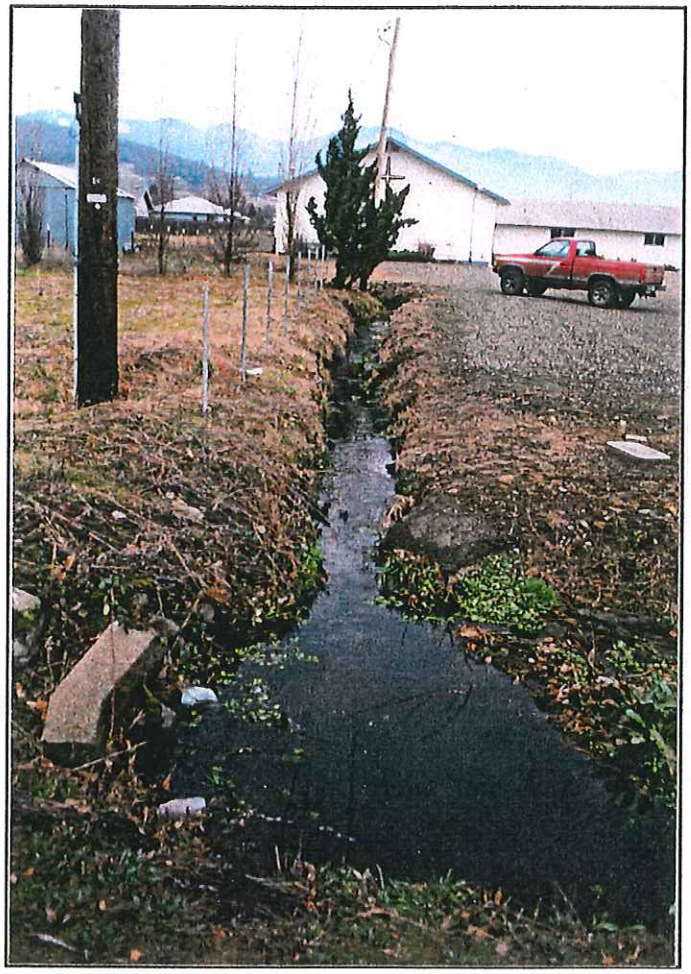

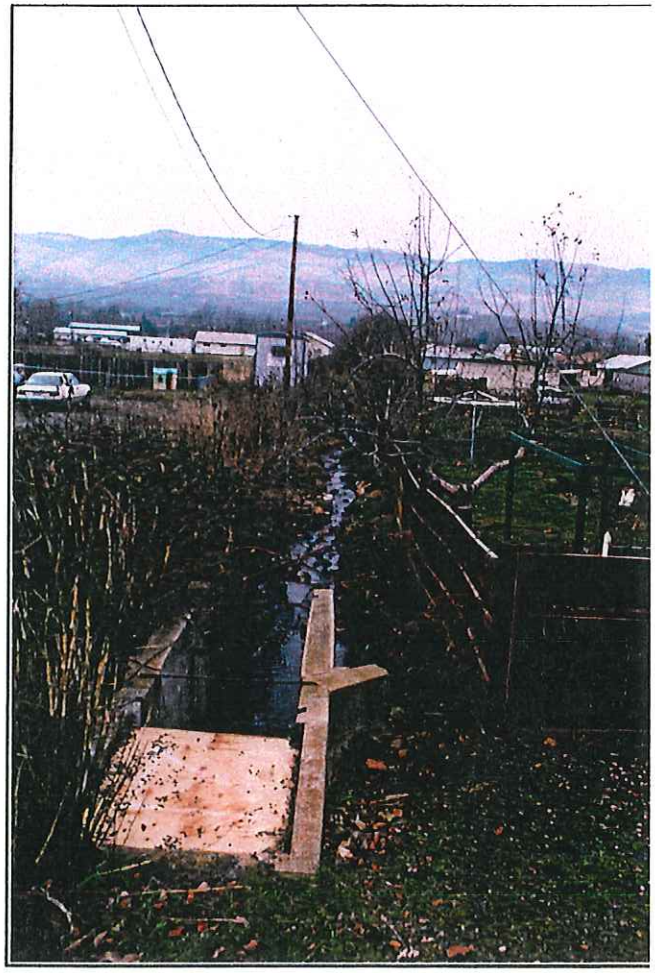

2

3

FIGURE 12

4

5

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FIGURE 13

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8

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FIGURE 14

10

11

12

FIGURE 15

challenge. Watershed W17 is currently 107.2 acres and has a 10-year flow of 38.6 cfs. This flow is much larger than the system can handle. The TID pipe T-5 drains 51.7 acres west of the railroad tracks into the downtown area. W17 should be split into W17A and W17B by preventing storm runoff from crossing the railroad tracks. This will be accomplished by:

1) Constructing an 18" line from near the intersection of Foss and Wagner Creek Road down Wagner Street and Madison Street to the existing pond near the east end of Wagner Butte Avenue; and
2) Construct 270 feet of 12" line parallel to the railroad north from Wagner Road to divert flow that now goes to T-5.

The City is also experiencing flooding problems in Watershed W18. Watershed W18 is the 59.1 acres north of Foss Lane and west of Front Street. The TID pipe T-6 overflows and causes flooding in the Sweetbriar Estates. MAI recommends that a ditch parallel to T-6 be constructed to prevent runoff from entering T-6. A 24" inch line across Colver Road, then east to the railroad ditch is also proposed.

The 10-year peak flow runoff from W18 is about 22 cfs Currently, the drainage systems discharge into a ditch between Front Street and the Central Oregon and Pacific Railroad (COPR) tracks. The area is already fully developed. MAI is not aware of flooding problems along this ditch and has therefore not shown a pipe to replace this ditch. We have shown a 36" culvert under Colver Road discharging into the COPR ditch. The City should discuss the use of this ditch with the COPR.

The Talent Irrigation District is planning to eliminate all stormwater from its system. This will have a significant impact on the City of Talent, COPR and private landowners below the canal. The most critical issue is the runoff from the hillside west of Talent that is now intercepted by the two canals west of the City. The City could construct a collection system parallel to the new TID pipeline and convey the runoff through pipes to either Wagner Creek or Bear Creek. In discussions with TID, they stated their willingness to allow the City to construct a collection system within their right of way. The City should pursue negotiations with TID to resolve the problem. One question that needs to be answered by legal counsel is whether the fact that the canal provided an unintentional flood control benefit, which the City relied upon for many decades, in any way obligates TID financially to participate in the resolution of this problem. At a minimum, TID should provide a diversion structure and conveyance facility which will insure the canal is emptied south of Alpine Way so that the City will not have to deal with runoff that does not originate directly uphill of the City.

An alternative solution to the problem south of Rapp Road is to create a regional detention area/wetlands west of the railroad. This could attenuate the peak flows and reduce the size of the pipes or ditch that will be needed to convey the runoff to Wagner Creek. The proposed area is south of Rapp Road. The City, COPR, TID would all benefit from cooperation. This City should encourage COPR, TID and the owners of the land to jointly fund the project. Some of the area is industrially zoned. Development on this property will be required to

provided individual on-site detention basins. The on-site detention requirements for the development could be waived.

VII. DETENTION REQUIREMENTS

Section IIA.5) of the Storm Drainage Design Standards states: "The design storm peak discharges from the subject property may not be increased from conditions existing prior to the proposed development, except when it can be demonstrated by the applicants that there will be no adverse impact, subject to approval of the City Engineer."

If the storm drainage system from the proposed development to Wagner Creek, Bear Creek or to an adequately sized drainage facility outside of the city limits has sufficient capacity to pass the design flow under build out conditions, no detention will be required.

The proposed storm drainage system should be adequate to serve most areas of Talent without requiring detention.

The vacant lands west of the COPR tracks and south of Rapp Road may require detention due to the lack of an adequate conveyance facility parallel to the tracks. This area will require special attention. The City should require detention on all development (with the exception of residential developments less than 0.75 acres) unless the swale along the tracks described in Section VI is constructed.

Detention will not be required for residential developments less than 0.75 acres gross acres.

VIII. DRAINAGE EASEMENTS

Talent has many open ditches that are not within public rights-of-way. Many developments have released their storm drainage into these ditches without obtaining easements from downstream property owners. Any ditch that conveys water from more than one parcel is conveying "public" water and should have an easement granted to the City. An easement does not transfer the maintenance responsibility from the landowner. It only grants the City the right to enter the property to maintain or remove obstructions to flow if the property owner fails to maintain the channel.

Section II.A.4) requires the developer to obtain and cause to be recorded an easement across private property as needed to connect the site to an approved point of discharge. At a minimum, the developer shall be required to obtain easements to the point the flow enters a public right-of-way.

IX. OFFSITE IMPROVEMENTS

Where the City is aware of existing drainage problems downstream of a proposed development, the developer shall be required to either provide detention to offset any increase in flows caused by his development or correct the downstream problem and obtain easements through the problem area.

X. WAGNER CREEK

Wagner Creek flows through the City of Talent to Bear Creek. The drainage area of Wagner Creek at the mouth is 23.8 square miles. The Federal Emergency Management Agency regulations apply to development along Bear Creek because the City participates in the National Flood Insurance Program (NFIP). Failure to enforce NFIP regulations could result in suspension of all flood insurance policies within the jurisdiction. The August, 1979 Flood Insurance Study included Flood Insurance Rate Maps (FIRMs) which show the 100-year floodplain, flood elevations and profiles along Wagner Creek. The flood elevations were generated by a hydraulic model that used a 100-year flow of 2,146 cfs. This flow was based on a regression equation developed by the U. S. Geological Survey. In 1998, MAI appealed the use of this regression equation due to what we believed were extremely inaccurate flows for streams in Medford. FEMA reviewed our appeal and concurred that the equation was only accurate over a narrow range of basin areas. FEMA generated a new regression equation for all of Jackson County. Fortunately, Wagner Creek is close to or within the narrow range of accuracy of the original USGS equations. They should:

1. Collect high water marks along Wagner Creek from the 1997 flood and calibrate a new hydraulic model for Wagner Creek.

2. Plot a profile of the water level during that flood and compare the results to the profiles in the Flood Insurance Study and the new hydraulic model.

3. Install a rain gauge and a water level gauge on Wagner Creek to create a hydrologic model of Wagner Creek.

4. Use the hydraulic model to determine the actual peak flow during the 1997 flood.

5. Check the accuracy of the Flood Insurance Rate Maps.

XI. WATER QUALITY

It is not the intent of this Stormwater master Plan project to address water quality issues. No water quality samples were taken. The City of Talent is exempt from the National Pollutant Discharge Elimination System municipal permitting requirements due to its population.

There are steps the City can take to minimize Talent's water quality impacts on its creeks. Talent is already implementing several ideas, including:

1. Requiring oil separating devices on private catch basins.

2. Stenciling "Dump No Oil - Drains to Stream" at catch basins.

3. Requiring setbacks to development along streams.

Detention basins will also help reduce sediment loads to the creeks. Sediment is a major pollutant from cities. The City should aggressively pursue enforcement of its regulations against construction site sediment runoff.

XII. CENTRAL OREGON AND PACIFIC RAILROAD

The Central Oregon and Pacific Railroad (COPR) owns the tracks through Talent. Runoff from development flows into the COPR rights-of-way in many locations. MAI contacted COPR to discuss the use of ditches along the railroad to convey storm drainage. MAI contacted COPR to request a meeting to discuss specific drainage issues in Talent No date for the meeting has been set, but MAI has discussed the problems with COPR. COPR recognizes that its facility is located in an area that naturally collects runoff. COPR has concerns that future development could increase the runoff from these tributary areas. This could cause erosion along the toe of the railroad fill. The City does not want to add any culverts under the railroad tracks. This would increase flows in the storm drainage system east of the tracks. The City would like to convey all runoff upstream of the railroad tracks to Wagner Creek.

If TID buries its canals, the amount of flow that would reach the COPR right-of-way would increase drastically. The City, COPR, affected landowners, and TID should jointly participate in construction of an open swale along the tracks to convey runoff to Wagner Creek.

The City should also consider requiring detention on the industrial lands west of the railroad tracks. If the open swale were adequately designed, the detention would not be necessary.

The open swale would be a wide, naturally vegetated area with a mild slope. This would eliminate the possibility of erosion and provide wildlife habitat benefits.

XIII. CAPITAL IMPROVEMENTS LIST

MAI has developed an Excel spreadsheet that reflects the projects shown on Figures 4-10. The cost estimates are budget level only. They are based on the assumptions that the City owns, or developers will be required to dedicated right-of-way for the projects.

Estimated Construction costs are based on:

Diameter	Cost/ft.
12"	$60.00
15"	$64.00
18"	$65.00
24"	$70.00
30"	$80.00
36"	$92.00

Talent Stormwater Master Plan
Capital Improvement Projects list

Storm Line	L.F.	Diameter	$/ft.	Construction Cost
B1A	1021	OPEN DITCH	$12.0	$12,252.00
B1B	1461	OPEN DITCH	$12.0	$17,532.00
B1C	78	36	$92.0	$7,176.00
B1D	337	24	$70.0	$23,590.00
B2A	364	12	$60.0	$21,840.00
B2B	896	12	$60.0	$53,760.00
B3A	651	12	$60.0	$39,060.00
B3B	290	12	$60.0	$17,400.00
B3C	261	12	$60.0	$15,660.00
B3D	586	12	$60.0	$35,160.00
B5A	348	12	$60.0	$20,880.00
B5B	1947	12	$60.0	$116,820.00
B6A	985	12	$60.0	$59,100.00
B6B	326	12	$60.0	$19,560.00
B6C	207	12	$60.0	$12,420.00
B7A	312	12	$60.0	$18,720.00
B7B	271	12	$60.0	$16,260.00
B7C	498	12	$60.0	$29,880.00
B7D	530	12	$60.0	$31,800.00
B8A	265	12	$60.0	$15,900.00
B8B	1212	18	$65.0	$78,780.00
B8C	486	18	$65.0	$31,590.00
B8D	470	12	$60.0	$28,200.00
B9A	971	12	$60.0	$58,260.00
B9B	205	18	$65.0	$13,325.00
B11A	438	12	$60.0	$26,280.00
B11B	322	12	$60.0	$19,320.00
B11B	2835	OPEN DITCH	$12.0	$34,020.00
B11C	753	12	$60.0	$45,180.00
B13A	776	18	$65.0	$50,440.00
B15A	560	12	$60.0	$33,600.00
B18A	1090	18	$65.0	$70,850.00
B19A	813	36	$92.0	$74,796.00
B19B	863	24	$70.0	$60,410.00
B19C	270	12	$60.0	$16,200.00
B19C	78	24	$70.0	$5,460.00
B20A	456	12	$60.0	$27,360.00
B20B	818	15	$64.0	$52,352.00
B20C	777	12	$60.0	$46,620.00
B21A	1217	12	$60.0	$73,020.00
B21B	414	24	$70.0	$28,980.00
B21C	557	18	$65.0	$36,205.00
B22A	1374	24	$70.0	$96,180.00
B22B	315	12	$60.0	$18,900.00
B24A	385	12	$60.0	$23,100.00

B25A	635	12	$60.0	$38,100.00
B25B	612	18	$65.0	$39,780.00
B26A	418	12	$60.0	$25,080.00
B26B	574	18	$65.0	$37,310.00
B26C	448	12	$60.0	$26,880.00
B26D	241	12	$60.0	$14,460.00
B30A	2730	36	$92.0	$251,160.00
B30B	840	24	$70.0	$58,800.00
B30C	208	12	$60.0	$12,480.00
B31A	361	15	$64.0	$23,104.00
B31B	548	12	$60.0	$32,880.00
B31C	371	12	$60.0	$22,260.00
B33A	345	12	$60.0	$20,700.00
B33B	615	12	$60.0	$36,900.00
B34A	292	12	$60.0	$17,520.00
B34B	133	12	$60.0	$7,980.00
B35A	1430	12	$60.0	$85,800.00
B35B	736	12	$60.0	$44,160.00
B35C	615	18	$65.0	$39,975.00
B35D	420	12	$60.0	$25,200.00
B35E	855	18	$65.0	$55,575.00
B36A	752	12	$60.0	$45,120.00
B36B	815	12	$60.0	$48,900.00
B37A	295	12	$60.0	$17,700.00
B39A	1193	12	$60.0	$71,580.00
B39B	632	12	$60.0	$37,920.00
	47203	**Total Construction Cost**		**$2,771,522.00**
		Engineering and Administration		**$415,728.30**
		Contingencies		**$277,152.20**
		TOTAL		**$3,464,402.50**