

Loop 303 Drainage Improvements I-10 to Gila River Candidate Assessment Report

Final Report



Prepared for:

Flood Control District
of Maricopa County

Prepared by:

Project Engineering Consultants, Ltd.
2310 W. Mission Lane, Suite 4
Phoenix, Arizona 85021



Michael D. Heaton



In association with:

EDAW | AECOM

January 2008

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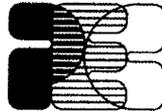
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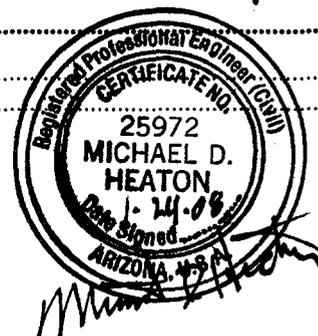
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1.0 Executive Summary

The Flood Control District of Maricopa County (FCDMC) contracted with Project Engineering Consultants, Ltd. (PEC) to create a Candidate Assessment Report (CAR) to plan future regional drainage facilities for the proposed State Route 303L (SR 303L) freeway between Interstate 10 and the Gila River. This report summarizes the second phase of the two-phase CAR that will identify locations for regional channels and basins adjacent to the proposed SR 303L to intercept storm water flows and provide an outfall to the Gila River. This project updates a portion of the *Loop 303/White Tanks Area Drainage Master Plan Update* (ADMPU), which was completed in 2005. The Flood Control District of Maricopa County, the City of Goodyear, and the Arizona Department of Transportation (ADOT) are the major partners for this project.

The study area is a one-half mile wide strip centered on Cotton Lane (or the proposed route of SR 303L) between I-10 on the north and the Gila River on the south. The five-mile project is located in the City of Goodyear.

Drainage solutions in the project area were first identified in the Loop 303/White Tanks ADMPU. Since completion of the ADMPU, development has occurred in the channel and basin sites proposed in the plan, necessitating additional examination of locations of drainage facilities.

This area of metropolitan Maricopa County continues to experience rapid growth and development. The area is rapidly transforming from an agricultural area to a residential and commercial development area. This change in land use puts pressure on agencies to acquire the land to be used for regional drainage facilities before these drainage ways are blocked by development. The additional information that has become available since the completion of the ADMPU in 2005 includes:

- Information about new developments in the project area.
- New ADOT alignment information
- Identification of development that has occurred in parcels previously identified as regional detention basin sites in the ADMPU.
- Information about the Morocco Ruin site and the efforts already made to clear the site for development.
- Identifying the location of the Palo Verde cooling line.
- Information about several parcels along Cotton Lane that are currently in the zoning process for development.

The purpose of this project is to design regional drainage facilities to a point where rights-of-way can be purchased for the future construction of those facilities. The project was divided into two phases.

- i) Phase I included collection of documents and data, preparing an existing facilities exhibit, identifying opportunities and constraints, and developing ten "seed" alternatives. The results of Phase 1 are

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summarized in *Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report*.

- ii) Phase II included revising the existing hydrology models, performing alternative analysis, identifying right-of-way needs, selection of a recommended alternative and developing Design Concept Report (DCR) level design plans for the recommended alternative.

The development of the recommended alternative included reducing the Seed Alternatives developed in Phase 1 to four for further analysis and eventually selecting a Recommended Alternative. This process included the study consultant providing engineering analysis and investigations along with a stakeholder and public information process. Stakeholder meetings were held during the project to discuss the progress and direction of the study. The public information process also included individual meetings with stakeholders and partners to obtain information and to stay up to date with developing plans in the area. The project was also highlighted in a public meeting held in conjunction with ADOT.

The Recommended Alternative (Figure 6-1) follows closely the original alignment of the ADMPU channel to Lower Buckeye Road where it then curves west and is located between a planned development and a likely ADOT roadway alignment. This alternative also eliminates the State Land Basin as it has limited impact on the flow rates conveyed by the channel. The alternative also includes the ability to split the flow to an existing channel in the Canyon Trials development if the original channel exceeds the capacity during interim design. A detention basin is located near the Union Pacific Railroad on property currently within a FEMA Floodplain. An additional benefit of this basin will be to minimize the floodplain which will benefit several adjacent structures. The southern end of the channel utilizes an existing irrigation wasteway as it enters the Gila River. The estimated cost of the Recommended Alternative is \$43.8M based on the concept level plans.

Several issues remain to be resolved as the plans for the Loop 303 Channel proceed. These include survey and mapping, a detailed hydraulic analysis, agreements with the Roosevelt and the Buckeye Irrigation Districts for crossings and other major utility crossings, and continued coordination with ADOT as they develop the final alignment for the proposed freeway.

2.0 Introduction

2.1 Overview

The purpose of this project was to develop a Candidate Assessment Report (CAR) with professional engineering and landscape architectural services and identify regional drainage facilities, right-of-way, and cost estimates associated with the Loop 303 Channel from I-10 south to the Gila River. The CAR was separated into two phases. Phase 1, *Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report*, was completed in August 2006, and involved data collection and development of seed alternatives. This report (Phase 2) documents the alternative analysis that incorporated aesthetics and multi-use opportunities, updated hydrologic models, selected a recommended alternative, identified right-of-way needs and other project requirements.

2.2 Purpose and Need

SR 303L is a proposed freeway in the western portion of the Greater Phoenix Metropolitan Area. The Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU) evaluated and developed solutions to mitigate flooding hazards in the White Tanks drainage area. The ADMPU was completed by the FCDMC in 2005. The ADMPU recommended locating a regional channel and basins adjacent to the proposed SR 303L from approximately Greenway Road to the Gila River. This channel and basins would collect and convey storm water runoff and provide a regional outfall to the Gila River. Since completion of the ADMPU, development has occurred within the corridor of the proposed channel and basins south of I-10. This development has necessitated additional examination of channel and basin sites. The purpose of this study was to evaluate and make necessary adjustments to the channel and basin(s) locations based on the latest information from the City of Goodyear and ADOT and develop cost estimates (DCR level) and right-of-way acquisition recommendations. An additional study objective was to consider stakeholder and community expectations regarding aesthetic and multi-use functions of the regional flood control facilities.

2.3 Location

The original study limits were I-10 south to the Gila River and approximately 1/4 mile east and west of the Cotton Lane alignment. However, adjustments to the proposed alignment of SR 303L and its proposed system interchange with SR 801 (or I-10 Reliever) has enlarged the study area to approximately 1/2 mile west of Cotton Lane (Citrus Road) as the alignment approaches MC 85. See Figure 2-1.

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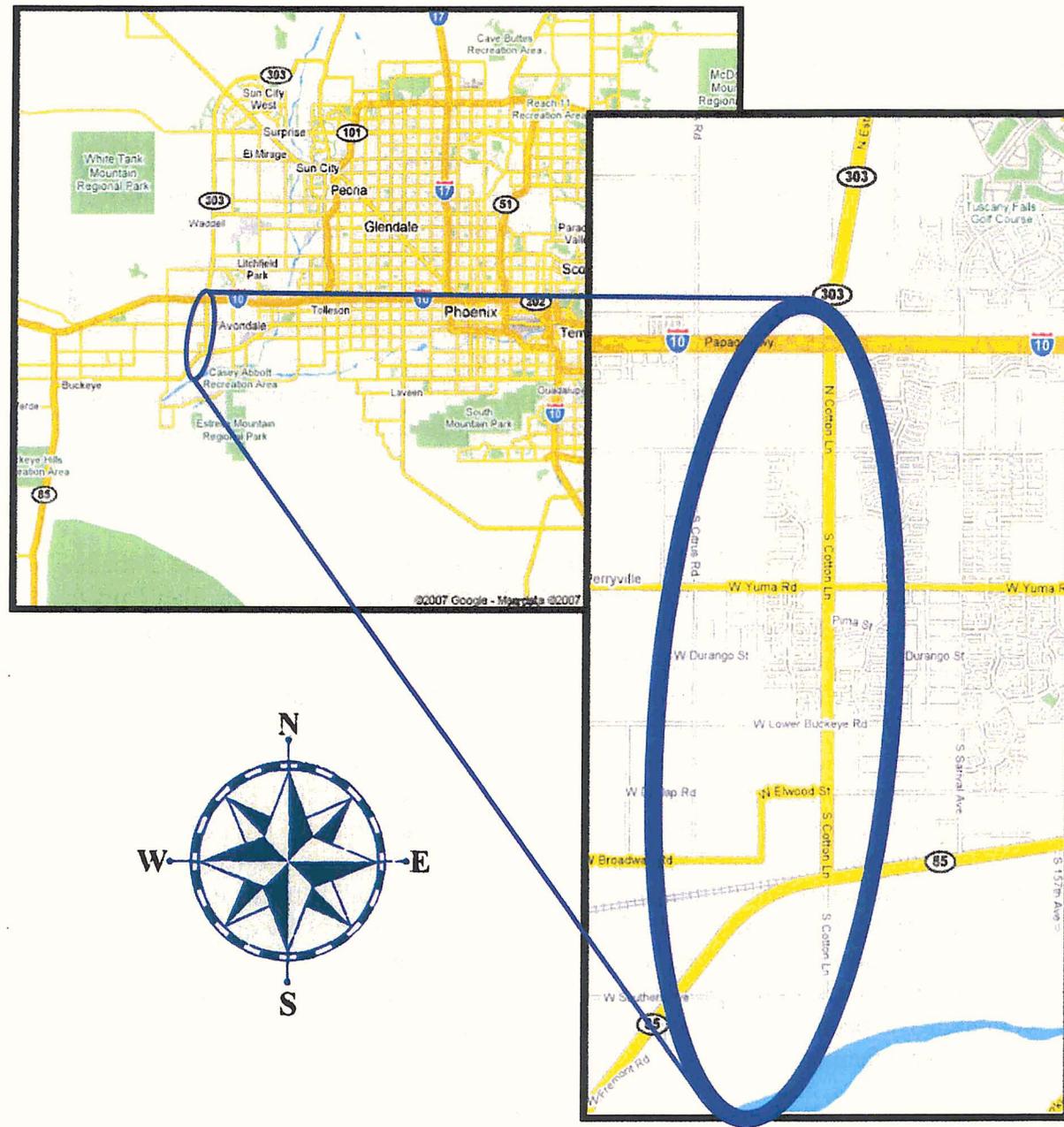


Figure 2-1 Vicinity Map

3.0 Existing Condition

The following sections summarize the work completed for Phase I of the CAR. Figures and additional information can be found in the *Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report*, completed in August 2006.

3.1 Land Use & Development

The study area for the Loop 303 CAR is located within the limits of the City of Goodyear, Arizona. Land use and development in the area has and is changing rapidly. Land use in the recent past was mostly farms, fields, and other agricultural associated uses. Over the last decade however, development has occurred at a rapid rate bringing in both residential and commercial



development. While some industrial land use is present, it is not present in large amounts. The most prominent is the large Rubbermaid Facility that has been sitting vacant for several years. A parcel of State Trust Land is also located within the study area.

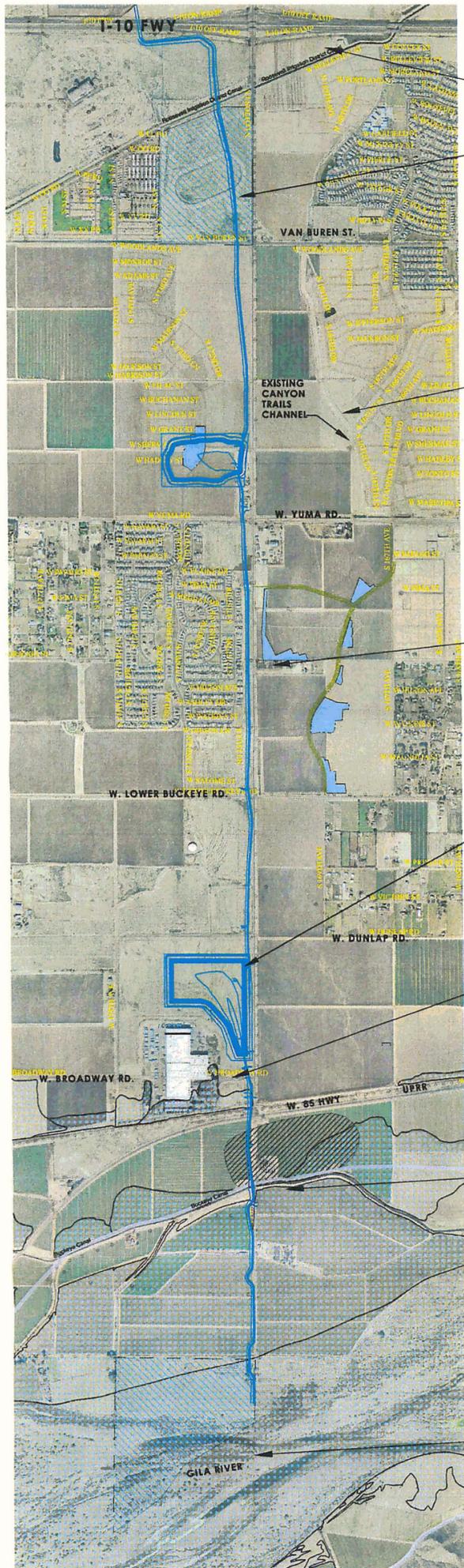
3.2 Drainage

Drainage facilities in the study area are mostly those associated with residential and commercial development. The major provision for drainage is a large earthen channel constructed by the Canyon Trails Subdivision to provide a drainage outfall for several phases of the development. This channel begins near I-10 east of Cotton Lane and slopes southward eventually reaching Cotton Lane near Lower Buckeye Road. The intent of this channel was to tie into the future Loop 303 Channel. There is no current outfall to the Gila River for the area, as the proposed Loop 303 Channel is intended to provide this outfall. Neighborhood retention basins and agricultural tailwater ditches are the only other drainage facilities in the vicinity. The largest of these is the Buckeye Irrigation District (BID) wasteway that is used to “waste” excess irrigation flows from the BID canal to the Gila River. Figure 3-1 provides an idea of the existing conditions at the site and the location of the proposed ADMPU channel



EXISTING CONDITIONS IN PROJECT AREA

LOOP 303 DRAINAGE IMPROVEMENTS



Roosevelt Irrigation District Canal



Existing Canyon Trails Channel



Existing Canyon Trails Channel



Orchard



Former Rubbermaid Facility



Buckeye Canal



Gila River



Gila River

3.3 Utilities & Roadway

The Loop 303 Channel is a large project extending several miles and will impact many utilities within the study area. A full investigation of utilities in the project area was conducted in Phase 1, *Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report*, completed in August 2006.

The following is a list of major roadways and utilities in the study vicinity.

Major Utilities and Roadways

Electric	69 KV Transmission	Arizona Public Service (APS)
Transportation	Interstate 10	Arizona Department of Transportation (ADOT)
Transportation	MC 85	Maricopa County Department of Transportation (MCDOT)
Transportation	Railroad	Union Pacific Railroad (UPRR)
Transportation	Cotton Lane Bridge	Maricopa County Department of Transportation (MCDOT)
Transportation	Arterial Streets	City of Goodyear
Pipeline	Palo Verde Cooling	Palo Verde Nuclear Generating Station (PVNGS)
Pipeline	Petroleum	Kinder Morgan
Pipeline	Natural Gas	Southwest Gas
Irrigation	Main Canal	Buckeye Irrigation District
Irrigation	Main Canal	Roosevelt Irrigation District
Communication	Fiber Optic	Sprint
Communication	Fiber Optic	Level 3 Communications

3.4 Cultural

The project area has been inhabited for over a thousand years by the Hohokam Indians, from approximately 500 BC to 1450 AD and later by the European settlers. Existing today there is evidence of a Hohokam village, known as the Morocco Ruin within the project area.

Most of the Morocco Ruin site was destroyed by farming, but recent survey unearthed a prehistoric cemetery and part of the village. Today most of the site has been cleared for development and it is anticipated that the entire site will be cleared by the State Historic Preservation Office (SHPO) by the time this project is set for construction.

3.5 Landscape Character & Scenic Resources

The landscape character assessment for the project area mainly utilized the County-wide landscape character assessment provided by the FCDMC. The main purpose of the Scenery Resource Assessment (SRA) is to maximize opportunities for preserving and enhancing the distinctive landscapes within the study area. The SRA specifically addresses three components that help to establish the relative importance of the scenic resource within the context of the project area. These include landscape character, scenic quality, and visual sensitivity. The SRA also include assessments that determine the relative compatibility of these resources with a variety of flood protection methods routinely utilized by the FCDMC in providing flood protection.

Referencing the Existing Scenic Resource Compatibility Map (*Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report, Exhibit 4A*) we find the project area is identified as Flood Protection Method Compatibility Classes 1, 2 and 3.

Class 1: Includes natural landscape settings which are compatible with non-structural and occasionally compatible with the soft structural method. Class 1 is recommended for areas along the Gila River where there are designated regional, county open spaces and conservation areas. These areas need to maintain a high level of scenic quality for preservation of the landscape and by using this method it will generally not introduce structural elements or facilities.

Class 2: Includes natural appearing and pastoral landscape settings which is compatible with non-structural and soft structural methods and is occasionally compatible with the semi-soft method. To the south of the project area Class 2 would be appropriate for areas along the Gila River. This is compatible with this area because the hard structural components of these facilities are either non-existent or are buried or concealed so as not to be visually evident.

Class 3: Includes rural and suburban settings which are compatible with non-structural, soft structural and semi-soft structural methods and occasionally compatible with hard structural methods with aesthetic treatments. Most of the project area falls within this compatibility class. Today the project area is experiencing rapid growth as the land use changes from agricultural to a residential and commercial use. This conversion provides opportunities to design Class 3 drainage facilities that best integrate with the urban environment. Due to the introduction of visible structural components, in an urban environment these components can be designed to remain visually subordinate to and complement the desired character of settings in which they are located.

3.6 Recreational Resources

The Recreational Resource Assessment (RRA) helps to identify trails and open space linkages planned in the region, and supports overall recreational and multi-use connectivity. The RRA includes an inventory of existing and future planned recreation

use areas, trails, and open space resources within the study area and within the regional context of the study area.

The regional open space inventory (*Loop 303 Drainage Improvements Candidate Assessment Report Data Collection Report, Exhibit 5*) shows existing and proposed regional open spaces and linkages within a 10-mile boundary surrounding the project area. Major regional open spaces include the White Tanks Regional Park, the Estrella Mountains Regional Park, and significant natural open spaces provided by the Agua Fria River and the Gila River. The Maricopa Regional Trail proposed in the 10-mile boundary include north-south segments that connect from the White Tank Mountains to the Gila River through the proposed Tuthill Outfall channel, segments along Bullard Wash, the Agua Fria River, and Waterman Wash. Major east-west segments include those that run parallel to Northern Avenue, the RID Canal and the El Rio project area. The inventory also includes the MAG Desert Spaces plan adopted in 1995 that recommends areas for retention and conservation.

At a local level the future land use inventory (*Loop 303 Drainage Improvements Candidate Assessment Report Data Collection Report, Exhibit 3*) shows within the one mile project area that the City of Goodyear has identified local trail segments parallel to the major arterials, and along the RID Canal and MC-85. Also there is the potential for other parks and trails within the Canyon Trails development which could be connected by proposed flood protection methods that would become more accessible via drainage ways.

3.7 Opportunities and Constraints

The project area is quickly being developed into residential and commercial land use. Designing regional drainage facilities at this level allows the best opportunity to integrate the existing and future regional drainage facilities in the character of the area. Many of these opportunities are listed below.

Opportunities

- Use of the existing Loop 303 Channel ROW set aside for regional drainage facilities by the City of Goodyear
- Land at the south basin location in ADMPU is still available
- Many undeveloped parcels are not in plan approval process yet
- Use of the floodplain upstream of railroad
- Use of the existing railroad crossing east of Cotton Lane
- Use of the existing BID wasteway
- Use of the new SR 303L alignment
- Use of the existing and new Canyon Trails drainage channels
- Morocco Ruin is mostly cleared along Cotton Lane
- Possible integration of recreation trails and drainage channels.
- Possible trail tie-ins with the El Rio Project area and Maricopa County trail system
- Use of the underpasses for recreational linkages north of I-10 and across the SR 303L alignment

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- Use of the existing and proposed park areas identified by City of Goodyear and developments for possible detention areas and partnering opportunities

While the project affords some exciting opportunities for design, development as well as existing facilities places some limitations on the type and locations of regional drainage facilities.

Constraints

- Land at the north basin site in ADMPU no longer available
- Area rapidly developing / limits to Right-of-way for “kinder and gentler” drainage facilities
- Cost of land increasing
- Planned new roadways/freeways (I-10 widening, SR 303L realignment, SR 801, MC-85 improvements, Cotton Lane Widening, Cotton Lane bridge)
- Limited size of the drainage easements set aside by the City of Goodyear
- Palo Verde Cooling Line crossing
- Kinder-Morgan Petroleum Pipeline
- The proposed outfall at the Gila River calls for an environmentally sensitive design

4.0 Future Conditions

4.1 Land Use

It is anticipated by the City of Goodyear that the study area will continue to develop the agricultural land into residential/commercial developments, with the largest portion anticipated to be as residential development. The general plan identifies commercial/industrial development along Cotton Lane near the arterial and collector streets. Along the Union Pacific Railroad the development is expected to be general and light industrial. The *2003 City of Goodyear General Plan* indicates a total build out in about 2030.

4.2 Drainage

Regional drainage facilities anticipated for the study area includes the Loop 303 Channel and associated detention basin as recommended in this study. The Loop 303 Channel will provide a regional outfall to the Gila River. Nearby development will utilize this channel/basin/outfall system as a drainage outfall for their subdivisions. The Canyon Trails Development channel will be connected to this regional system to provide a positive outfall for the area.

4.3 Utilities & Roadway

As the area continues to develop transportation corridors will also increase in number and carrying capacity. ADOT is currently studying two additional major freeways and two major traffic interchanges in the study area. The SR 303L will cross the area from the north to the south and will include a freeway to freeway interchange at I-10. ADOT is also planning a future freeway to freeway interchange with the proposed east-west SR 801 near MC-85. The final design of the SR 303L freeway is anticipated to begin in 2016 and the SR 801 in the 2020 time frame. In the near future MC-85 will be upgraded and improved.

Major utility corridors for this area are known and will not likely expand significantly. Local utilities however, will continue to expand at the growth rate of the surrounding vicinity. City utilities, such as water and sewer, as well as electricity and communication utilities will increase in a large degree along transportation corridors.

4.4 Landscape Character/Scenic Resources

Future environmental/cultural changes include, as mentioned previously, the rapid growth as land use has changed from agricultural to a residential and commercial use. These changes affect the availability of land, the price of land and determine what type of facilities would be appropriate for the area. Future land uses conveyed in the *2003 City of Goodyear General Plan*, are mostly residential with community commercial uses planned at the I-10, Van Buren and Yuma Road intersection. General industrial uses are planned south of Elwood Road and north of Broadway Road.

4.5 Landscape Character/Scenic Resources

Referencing the Future Scenic Resource Compatibility Map (*Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report, Exhibit 4B*) we find the project area includes the addition of the Scenic Resource Compatibility Class 4.

Class 4: Includes urban settings, which are compatible with the non-structural, soft structural, semi-soft, and hard structural method with aesthetic treatments and occasionally compatible with the semi-hard structural without aesthetic treatment. Due to the proposed introduction of general industrial uses planned south of Elwood Road a class 4 becomes compatible for these areas. This method can include aesthetic treatments such as landform meanderings, use of color, textural patterns and other architectural embellishments to establish visual and cultural context and a unique sense of place within local communities. This method also includes mounding and planting overbank areas creating effective visual screening for adjacent properties.

4.6 Recreational Resources

Overall, the project area exhibits regional and local recreation opportunities that can increase connectivity. The various alternative systems planned along the Loop 303 Channel present an opportunity to enhance the range and quality of recreation experience available in the study area. There is also the opportunity to improve accessibility within existing and new planned communities with the proposed channel which links the I-10 corridor to the Gila River. The City of Goodyear has also identified local trail segments parallel to major arterials and along the RID Canal and the MC 85. Potential park locations have also been identified in the study area in the future lands use plan. See Exhibits in the *Loop 303 Drainage Improvements Candidate Assessment Report – Data Collection Report*.

5.0 Alternatives Analysis

Phase 1 of the Loop 303 CAR study developed 10 “Seed Alternatives” for consideration in the Phase 2 portion of the project. Of these alternatives, some of the alternatives proposed to use facilities designed by others, such as the channels and basins in the Canyon Trails development. Other alternatives proposed using land not yet developed such as the State Trust Land near the intersection of Cotton Lane and Van Buren Street. A discussion of each of these alternatives is found in the *Loop 303 Drainage Improvements Candidate Assessment Report Data Collection Report*. The names of the alternatives are listed here for information purposes only:

- Alternative 1 – “No Action” or keep ADMPU plan
- Alternative 2 – Concrete Channel
- Alternative 3 – State Land Basin
- Alternative 4 – Enlarged Channel
- Alternative 5 – Enlarged Channel with Basin
- Alternative 6 – Railroad & Mesquite Basin
- Alternative 7 – Mesquite Drive Basin East
- Alternative 8 – Mesquite Drive Basin West
- Alternative 9 – Multi-Small Basin Channel
- Alternative 10 – Off Alignment Channel

At the onset of the Loop 303 CAR Phase 2, a Team Partner and Agency meeting reviewed the Seed Alternatives and three additional alternatives were added to the list. These were hybrid versions of the seed alternatives, but warranted discussion and development prior to selecting the alternatives to be analyzed in more detail. These additional seed alternatives include:

- Alternative 11 – State Land & Railroad Basins – This alternative is a modification of Alternative 6 that keeps the railroad basin location and moves the Mesquite basin from a higher value intersection to the State Trust Land further north.
- Alternative 12 – Underground System – This alternative replaces the proposed channel with a pipeline, thus allowing for complete use of the right-of-way for trails and recreation features.
- Alternative 13 – State Land –Dual System – This alternative allows a portion of the flow from the main Loop 303 Channel to be diverted into the Canyon Trails Channel in order to reduce the channel cross-section along Cotton Lane from Van Buren Street to Lower Buckeye Road.

Team Partners and Agency staff reviewed the elements in a decision matrix prior to selecting the four alternatives for further analysis. The group evaluated the seed alternatives by discussing the north half and south half of each alternative separately. The alternatives that were selected for further evaluation will be presented in the sections that follow. Details of the discussions of the selection meeting are included in the meeting memorandum from the Team/Partner Agency Meeting No. 1; November 6, 2006 provided in Appendix F.

The following sections describe the four alternatives selected for further study. The descriptions used are preliminary discussion points that were used for comparison purposes during the alternative evaluation process. As the evaluation process moved forward, new information

became available. The information was modified during the process of refining towards the eventual recommended alternative. The recommended alternative was then refined further. For details on the recommended alternative, see Section 6.

5.1 “No Action” or keep Loop 303/White Tanks ADMPU Recommended Alternative

The “No Action” Alternative was the preferred alternative proposed in the original Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU). The northern basin proposed in the ADMPU, however, cannot be built because the land has been developed.

Location

This alternative begins on the southern side of I-10 by a connection to the proposed basins on the north side of I-10. The channel flows southward along the west side of Cotton Lane, crossing under the Roosevelt Irrigation District (RID) Canal, the Union Pacific Railroad Tracks, MC-85, and the Buckeye Irrigation District (BID) Canal before it discharges into the Gila River near the Cotton Lane alignment.

Hydrology

This alternative provides conveyance and storage for the 100-year flood event. The hydrology for this alternative was not modified from the original analysis.

Right-of Way

The Right-of-Way requirements were not modified from the original plan. The northern basin proposed in the ADMPU, however, cannot be built because the land has been developed. Right-of-way for the channel south of I-10 in the 2004 ADMPU preliminary plans varies based on the design. The following are the approximate requirements:

- 113' I-10 Van Buren Street
- 100' Van Buren Street to the North Basin
- 60' North Basin to Yuma Road
- 100' Yuma Road to Lower Buckeye Road
- 60' Lower Buckeye Road to the South Basin
- 70' South Basin to Buckeye Irrigation District Canal (BID)
- 50'-70' (Varies) BID to Gila River

Cost

Cost data from the original plan was not modified for this Candidate Assessment Report. The ADMPU estimated the cost for this portion of the plan to be \$28.2M in 2004. The cost would be significantly higher today using current land and construction costs. Costs include the earthwork, structures, right-of-way, and landscape-aesthetics. A maintenance cost equal to about 10% of the construction cost (50-year life cycle) was accounted for in the ADMPU plan costs.

Aesthetics/Multi-use

The scenery resource assessment for this project area indicated that the existing and future area is compatible with nonstructural to semi-soft structural flood control solutions. A small portion of the study area between Dunlap Road and the railroad track is compatible with a range of flood control methods from non-structural to hard structural. The area from I-10 to Dunlap Road is more of a suburban area with commercial and some remnant agricultural areas which are compatible with semi-soft structural methods. While from Dunlap Road to the UPRR tracks there are scatterings of industrial areas which are more compatible with hard structural methods. The No Action alternative proposes a structural channel with concrete lining. This flood control structure is not compatible with the landscape character assessment.

Recreation and Multi-use Assessment

The recreational resource assessment identified major existing regional open spaces, including Estrella Mountain Regional Park and the Gila River, within 5-10 mile of the project area. Goodyear's future land use plan additionally identifies several trail alignments and open space corridors in the project area.

The channel proposed by the ADMPU was a structural channel with concrete lining. This flood control structure is not compatible with the landscape character assessment. The loss of the northern basin limits the opportunities for multi-use facilities.

Landscape Themes Assessment

Landscape themes and recommendations can be found in the *Loop 303 Corridor//White Tanks ADMPU Landscape Aesthetics and Multi-Use Design Guidelines Flood Control Facilities, Level III Alternatives Analysis Report*.

Figure 5-1 is the No Action or Keep the ADMPU Channel Alternative



NO ACTION OR KEEP LOOP 303/ WHITE TANKS ADMP

LOOP 303 DRAINAGE IMPROVEMENTS



Roosevelt Irrigation District Canal



Existing Canyon Trails Channel



Existing Canyon Trails Channel



Orchard



Former Rubbermaid Facility



Buckeye Canal



Gila River



Gila River

5.2 State Land Basin Alternative

The State Land Basin Alternative proposes a new basin location and the use of an existing channel system developed by the Canyon Trails development. The southern portion of this alternative utilizes an unaltered portion of the original ADMPU plan.

Location

This alternative begins on the southern side of Interstate 10 by a connection to the proposed basins on the north side of I-10. The northern basin proposed in the ADMPU would be replaced by a basin located in the State Trust Land parcel located near the intersection of Cotton Lane and Van Buren Street. The basin would discharge into a new channel that would convey storm water across Cotton Lane and into the existing main Canyon Trails channel. The Canyon Trails Channel returns to Cotton Lane at Durango Street where the proposed channel resumes the original ADMPU channel alignment. The channel proceeds south along Cotton Lane to the southern basin adjacent to Cotton Lane just north of the UPRR. The southern basin discharges to the channel that continues southward and crosses the Union Pacific Railroad, MC-85, and the BID, eventually discharging to the Gila River near the Cotton Lane alignment.

Hydrology

This alternative provides conveyance and storage for the 100-year flood event using the ADMPU future conditions with projects in place hydrologic model. The hydrology for this alternative was modified based on the drainage features alignment. The concentration points were modified in the hydrologic model to provide discharge rates to the proposed and existing channels in this alternative. The resultant flow rates at various locations are as follows:

- 215 cfs entering the State Land Basin
- 81 Acre-Feet of storage in the State Land Basin
- 173 cfs Van Buren Street
- 300 cfs at Yuma Road
- 303 cfs at the southern basin
- 325 Acre-Feet of storage in southern basin
- 50 cfs at the railroad
- 422 cfs at the Gila River

Right-of-Way

The preliminary right-of-way requirements identified for this alternative for the various channel sections are listed below. The width typically includes a 20-foot maintenance road and a 10-12 foot vegetative buffer for the channels. The total basin ROW includes additional acreage for freeboard and multi-use features. The total channel right-of-way is 28 acres and the total basin right-of-way is 90 acres.

- 85' I-10 to North Basin

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- 82' North Basin to Canyon Trails Channel
- 89' Durango to Lower Buckeye
- 88' Lower Buckeye to South Basin
- 67' South Basin to BID Canal
- 107' BID to Gila River

Cost

The total preliminary capital cost estimated for this alternative is \$53.5M. Costs include the earthwork, structures, right-of-way, and landscape-aesthetics. A maintenance cost equal to about 10% of the construction cost (50-year life cycle) was accounted for the plan costs.

Scenery Resource Assessment

The scenery resource assessment for this project area indicates that the existing and future area landscape character is compatible with nonstructural to semi-soft structural flood control solutions. A small portion of the study area between Dunlap Road and the railroad track is compatible with a range of flood control methods from non-structural to hard structural. The area from I-10 to Dunlap Road is more of a suburban area with commercial and some remnant agricultural areas which are compatible with semi-soft structural methods. While from Dunlap Road to the UPRR tracks there are scatterings of industrial areas which are more compatible with hard structural methods. The State Land alternative proposes a soft structural method for the channel and state land basin which is compatible with the landscape character assessment.

Recreation and Multi-use Assessment

The area from I-10 to Dunlap Road is more of a suburban area with commercial and some remnant agricultural areas which are compatible with semi-soft structural methods. While from Dunlap Road to the UPRR tracks there are scatterings of industrial areas which are more compatible with hard structural methods. The State Land alternative proposes a soft structural method for the channel and state land basin which is compatible with the landscape character assessment.

Landscape Themes Assessment

There are a variety of landscape themes for this alternative. An Enhanced Desert Theme would be appropriate for the proposed basin north of Van Buren with passive and/or active recreation facilities which would be compatible with the adjacent residential and commercial developments. For the channel there are two applicable themes, Desert Oasis and Riparian Theme. The channel from Van Buren to the Gila River will have a Desert Oasis Theme matching the character of the adjacent lush residential and commercial developments. While a natural (riparian) theme would be appropriate along the southern portion of the channel within the Gila River culminating into dense riparian vegetation along the edges of the river corridor. This will enhance the recreational experience for residents as well as create a visual variety in the landscape treatment.

Environmental/Cultural Resources

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This alternative crosses within the known limits of the Morocco Ruin south of MC 85. A portion of this area has been identified, inventoried, and studied by the Maricopa County Department of Transportation.

Partnership Potential

Opportunities for partnering on this alternative include:

- ADOT – ADOT could use this system for discharging drainage from the SR 303L freeway.
- The City of Goodyear – The channel borders developments and open space along a portion of the Cotton Lane Roadway alignment, and the Canyon Trails channel in the City of Goodyear.
- The RID and BID have shown interest in the potential for utilizing the channel for an emergency wasteway. Any flows from irrigation district canals would be “post event” to prevent overtaxing the system.
- Maricopa County Department of Transportation could use the channel to discharge roadway drainage around MC-85 and Cotton Lane.

Opportunities and Constraints

Major constraints associated with this alternative include the co-use of the privately-owned Canyon Trails System. The channel in Canyon Trails is currently a park like setting adjacent to residential development. By implementing this as a regional drainage system, the multi-use opportunities could be reduced and required maintenance could increase due to more frequent flows. Stakeholder feedback has indicated that the home owner association may not be receptive to the idea of using the Canyon Trails channel as a regional drainage facility.

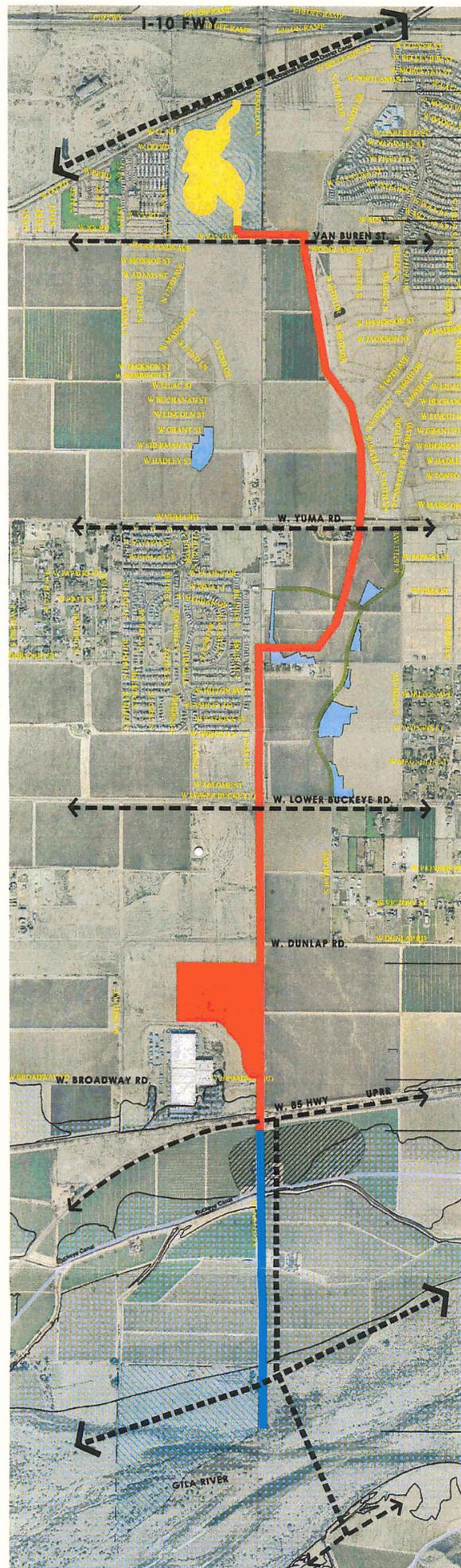
ADOT will have to construct an additional system to collect and convey runoff from SR 303L to the channel in its off-alignment location. ADOT would have less incentive to partner since a separate system would be required for a portion of the proposed SR 303L roadway. Acquisition of the right-of-way for the State Land basin may also be a challenge. The proposed south basin is located in an area zoned by the City of Goodyear for industrial development making acquisition more difficult and right-of-way costs higher.

Figure 5-2 is the State Land Basin Alternative



PRELIMINARY ALTERNATIVE STATE LAND BASIN

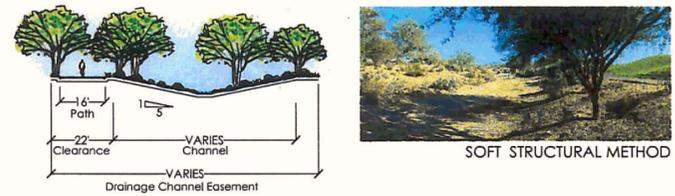
LOOP 303 DRAINAGE IMPROVEMENTS



Legend

- Enhanced Desert Theme:**
The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.
- Desert Oasis Theme:**
The design character for the Desert Oasis is a mixture of enhanced native vegetation, ornamental grasses and/or turf grass areas. The design character shall incorporate large pockets of native shade trees with free forming natural shapes and forms, complimenting the native surroundings.
- Riparian Theme:**
Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.
- Maricopa County Regional Trail**
- Goodyear Trails**

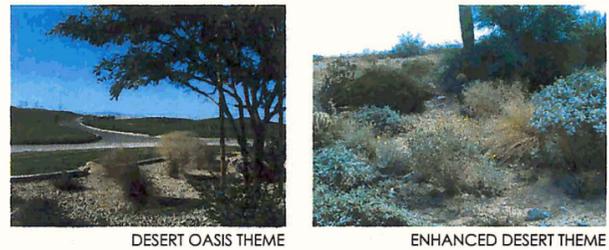
CHANNEL



CHANNEL SECTION



BASINS



5.3 Multi-Small Basin Channel Alternative

The Multi-Small Basin Channel Alternative utilizes the Canyon Trails channel and adds additional small basins to those already built by the Canyon Trails development. This alternative utilizes an alignment that is almost completely separate from Cotton Lane and the proposed SR 303L. It is unique that many small basins are used instead of a few very large regional basins.

Location

This alternative begins on the southern side of Interstate 10 by a connection to the proposed basins on the north side of I-10. This channel would be connected to the existing Canyon Trails channel. The channel would continue to the south from Canyon Trails to Highway MC-85 where the channel turns west to Cotton Lane. At Cotton Lane the channel turns south to the Gila River. This alternative makes use of multiple small basins throughout the channel corridor to minimize the size and impact of both the channel and the basins. The Canyon Trails channel returns to Cotton Lane at MC-85 where the channel returns to the original ADMPU proposed channel. The channel proceeds south along Cotton Lane and crosses MC-85 and the BID eventually discharging to the Gila River near the Cotton Lane alignment.

Hydrology

This alternative provides conveyance and storage for the 100-year flood event using the ADMPU future conditions with projects in place hydrologic model. The hydrology for this alternative was modified based on the channel alignment. The basin concentration points were modified in the hydrologic model to determine discharge rates to the channel as it is configured in this alternative. For modeling purposes, the number of basins modeled was five with an average size of 42 Acre Feet, although the number of basins could vary based on right-of-way availability, channel geometry and basin size. The resultant flow rates at various locations are as follows:

- 85 cfs south of I-10
- 76 cfs at Van Buren Street
- 80 to 90 cfs north of Yuma Road
- 265 to 300 cfs north of Durango Street
- 294 to 473 north of MC-85
- 62 to 422 cfs south of MC-85 to the Gila River

Right-of-Way

The preliminary Right-of-Way requirements identified for this alternative in various channel sections are listed below. The width typically includes a 20-foot maintenance road and a 10-12 foot vegetative buffer for the channels. This does not include the existing Canyon Trails channel which is anticipated to remain as it now exists except for the modification to construct the multiple basins. The total basin ROW includes additional acreage for freeboard and multi-use opportunities. The total channel right-of-way is 25 acres and the total basin right-of-way is 91 acres.

- 96' Lower Buckeye to Dunlap Road

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- 96' Dunlap to Basin at the Union Pacific Railroad
- 78' Railroad to BID Canal
- 107' BID to Gila River

Cost

The total preliminary capital cost estimated for this alternative is \$44.3M. Costs include the earthwork, structures, right-of-way, and landscape-aesthetics. A maintenance cost equal to about 10% of the construction cost (50-year life cycle) was accounted for in the plan costs.

Scenery Resource Assessment

The scenery resource assessment for this project area indicates that the existing and future area landscape character is compatible with nonstructural to semi-soft structural flood control solutions. A small portion of the study area between Dunlap Road and the railroad track is compatible with a range of flood control methods from non-structural to hard structural. The area from I-10 to Dunlap Road is more of a suburban area with commercial and some remnant agricultural areas which are compatible with semi-soft structural methods. While from Dunlap Road to the UPRR tracks there are scatterings of industrial areas which are more compatible with hard structural methods. The Multi-small Basin alternative proposes a soft structural method for the channel and multi-small basins which is compatible with the landscape character assessment.

Recreation and Multi-use Assessment

This alternative has great potential for multi-use opportunities because of the small chain of basins along the proposed channel. A portion of the channel with basins will be combined with the Canyon Trails Alignment. The basins could possibly be widened channel sections with retention capability. This would be similar to an overbank flow in a natural stream system. The basins would be a nice addition to the adjacent residents creating small pocket parks along the channel corridor. The channel also has great potential, with its location set back from the roadway it becomes a more tranquil trail from I-10 to the Gila River.

Landscape Themes Assessment

The landscape theme for the basin and channels from I-10 to the Gila River are applicable with the Desert Oasis and Desert Park Theme. These themes blend with the existing and future residential uses which have a more lush landscape with turf, ornamental grasses and enhanced desert vegetation. Also the pocket park basins with their small turf areas create great environments for active and passive neighborhood activities.

Environmental/Cultural Resources

This alternative crosses within the known limits of the Morocco Ruin south of MC 85. A portion of this area has been identified, inventoried, and studied by the Maricopa County Department of Transportation.

Partnership Potential

Opportunities for partnering on this alternative include:

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- ADOT - The partnering potential may be less than other alternatives. Since the channel is less accessible to the proposed SR 303L, a separate collection system with pipelines discharging to the channel at various locations will be required.
- The City of Goodyear – The channel and basins provide a regional drainage solution for the area adjacent to the Cotton Lane alignment, and provides the opportunity to implement Goodyear’s planned trail and park facilities in this area.
- The RID and BID have shown interest in the potential for utilizing the channel for emergency wasteway. Any flows from irrigation district canals would be “post event” to prevent overtaxing the system.
- Maricopa County Department of Transportation could use the channel to discharge roadway drainage around MC-85 and Cotton Lane.

Opportunities and Constraints

Major constraints associated with this alternative include the co-use of the privately-owned Canyon Trails System. The channel in Canyon Trails is currently a park-like setting adjacent to residential development. By implementing this as a regional drainage system, the multi-use opportunities could be reduced and required maintenance increased due to more frequent flows. Stakeholder feedback has indicated that the HOA may not be receptive to the idea of using the Canyon Trails channel as a regional facility.

Based on the existing discharges, with the addition of several small detention basins, the Canyon Trails Channel has sufficient conveyance capacity. This would minimize the channel right-of-way requirements. The multiple small basins can be more easily integrated into the existing multi-use corridor than large regional basins. The possible use of off-line basins may even be configured as wide-spots in the channel. Also, several small parcels of land may be easier to acquire than one or two large parcels, especially in the commercial and industrial areas along the proposed SR 303L alignment.

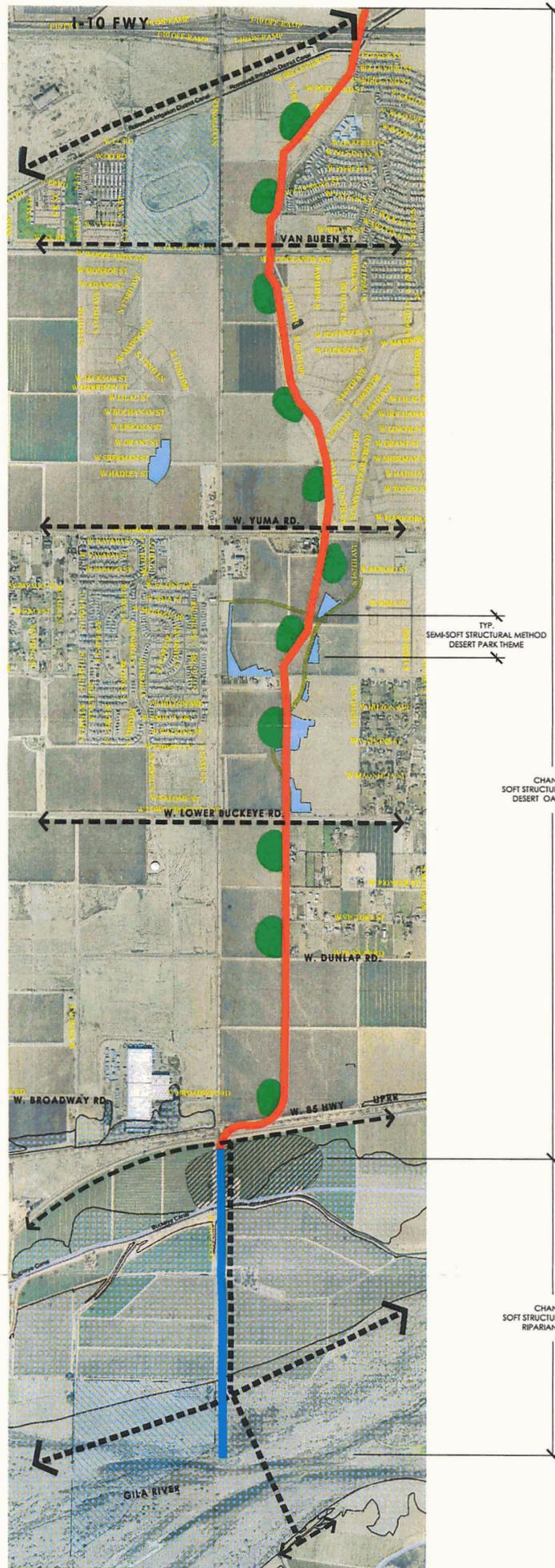
ADOT will have to construct an additional system to collect and convey runoff from the roadway to the channel in its off alignment location. ADOT would have less incentive to partner since a separate system would be required for a portion of the proposed SR 303L roadway. An additional constraint is that the Canyon Trails channel and development is existing and would require re-configuration to accommodate the additional basins and related structures.

Figure 5-3 is the Multi-Small Basin Alternative



PRELIMINARY ALTERNATIVE MULTI-SMALL BASIN CHANNEL

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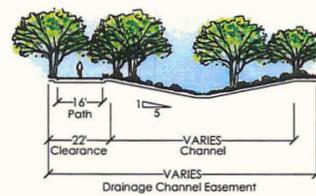


Legend

- **Desert Oasis Theme:**
The design character for the Desert Oasis is a mixture of enhanced native vegetation, ornamental grasses and/or turf grass areas. The design character shall incorporate large pockets of native shade trees with free forming natural shapes and forms, complimenting the native surroundings.
- **Riparian Theme:**
Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.
- **Desert Park Theme:**
The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods.

- Maricopa County Regional Trail
- Goodyear Trails

CHANNEL



BASINS



5.4 Dual System Alternative

Locations of two new basins are proposed in this alternative as well as curving the drainage channel to follow the recently proposed SR 303L alignment that is favored by the City of Goodyear. Between the northern basin and Durango Street, the channel splits and utilizes both the original Loop 303 Channel alignment, and the Canyon Trails Channel. The original concept was to split the flow if the original channel did not have the capacity to convey the entire flow. During modeling it was found that the flow does not require the use of the Canyon Trails Channel, if the discharge rates from the future conditions with projects in place hydrologic model are used.

Location

This alternative begins on the southern side of Interstate 10 by a connection to the proposed basins on the north side of I-10. The northern basin proposed in the original ADMPU would be replaced with a basin located in the State Trust Land parcel located near the intersection of Cotton Lane and Van Buren Street. The basin would discharge to a channel that would split the flows and allow excess flows to be diverted into the Canyon Trails System. The two channels combine along the original alignment at Durango Street. At Lower Buckeye Road, the channel curves to the west along the recently proposed SR 303L alignment. The channel then turns south at 175th Avenue. A second proposed basin would be built along 175th Avenue between Broadway Road and MC85 where an existing floodplain has been mapped behind the railroad embankment. The basin discharges to a channel that continues southward and crosses the Union Pacific Railroad, MC-85, and the BID. Just south of the BID the channel would discharge to a BID wasteway that eventually discharges to the Gila River. The BID wasteway would be improved to accommodate the additional flows.

Hydrology

This alternative provides conveyance and storage for the 100-year flood event using the ADMPU future conditions with projects in place hydrology model. The hydrology for this alternative was modified based on the channel alignment. The basin concentration points were modified in the hydrologic model to determine discharge rates to the channel as it is configured in this alternative. It should be noted that a large discharge entering the channel south of the SR 303L curve is due to flows that were cut off from reaching the Gila River. The resultant flow rates at various locations are as follows:

- 215 cfs entering the State Land Basin
- 81 Acre Feet of storage in the State Land Basin
- 70 cfs Van Buren Street
- 82 cfs at Yuma Road
- 293 cfs at Lower Buckeye Road
- 652 cfs entering the Union Pacific Railroad basin
- 50 Acre-Feet of storage in the Railroad Basin
- 134 cfs south of the railroad
- 144 cfs at the Gila River

Right-of-Way

The preliminary Right-of-Way requirements identified for this alternative for the various channel sections are listed below. The width typically includes a 20-foot maintenance road and a 10-12 foot vegetative buffer for the channels. The total basin ROW includes additional acreage for freeboard and multi-use features. The total channel right-of-way is 32 acres and the total basin right-of-way 57 acres.

- 85' I-10 to North Basin
- 73' North Basin to Van Buren Street
- 75' Van Buren Street to Yuma Road
- 75' Yuma Road to Lower Buckeye Road
- 89' Lower Buckeye Road to SR 303L
- 104' SR 303L to railroad basin
- 67' railroad basin to Gila River

Cost

The total preliminary capital cost estimated for this alternative is \$38.7M. Costs include the earthwork, structures, right-of-way, and landscape-aesthetics. A maintenance cost equal to about 10% of the construction cost (50-year life cycle) was accounted for the plan costs.

Scenery Resource Assessment

The scenery resource assessment for this project area indicates that the existing and future area landscape character is compatible with nonstructural to semi-soft structural flood control solutions. A small portion of the study area between Dunlap Road and the railroad track is compatible with a range of flood control methods from non-structural to hard structural. The area from I-10 to Dunlap Road is more of a suburban area with commercial and some remnant agricultural areas which are compatible with semi-soft structural methods. While from Dunlap Road to the UPRR tracks there are scatterings of industrial areas which are more compatible with hard structural methods. The Dual System alternative proposes a soft structural method for the channel and basins which is compatible with the landscape character assessment.

Recreation and Multi-use Assessment

Similar to the State Land Alternative the Dual System Alternative has the maximum multi-use opportunities which could include open space, parks, and trails. This channel links the I-10 corridor to the Gila River as well as creating multi-use opportunities with the proposed basin to the south and adjacent residential/commercial developments. This alternative also does not impact the Canyon Trails Alignment preserving the existing character of this alignment for the neighborhood.

The Dual System Alternative by introducing the south basin which is located in a floodplain area avoids construction on an open area for commercial and industrial uses. There is also the opportunity to implement Goodyear's planned trail and park facilities for the channel and basin.

Landscape Themes Assessment

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The landscape themes for this alternative include an Enhanced Desert Theme along the Channel from I-10 to the southern basin south of Broadway Road. This landscape theme will blend with the surrounding commercial and residential landscape character found along Cotton Lane Road. The theme then transitions into a Desert Park Theme when it meets the basin with turf and active recreational uses. The channel southbound from the basin will transition back to an Enhanced Desert Theme. Finally the channel within the Gila River takes on a Riparian Theme matching the dense vegetation along the river corridor.

Partnership Potential

Opportunities for partnering on this alternative include:

- ADOT – The channel follows the proposed SR 303L corridor and could be utilized for drainage discharge.
- The City of Goodyear – The channel and basins provide a regional drainage solution for the area adjacent to the Cotton Lane alignment, and provides the opportunity to implement Goodyear’s planned trail and park facilities in this area.
- The RID and BID have shown interest in the potential for utilizing the channel for emergency wasteway. Any flows from irrigation district canals would be “post event” to prevent overtaxing the system.

Opportunities and Constraints

This alternative takes advantage of the 75’ of ROW set aside by Goodyear between Van Buren and Lower Buckeye for the construction of the regional drainage facility. This alternative also avoids the use of the original south basin site leaving the area open for commercial and industrial use. The proposed basin would be built in an area already encumbered by floodplain caused by the railroad embankment. This alignment avoids the Morocco Cultural site by using the existing BID wasteway alignment. The BID wasteway alignment is an existing feature that discharges excess irrigation runoff to the Gila River.

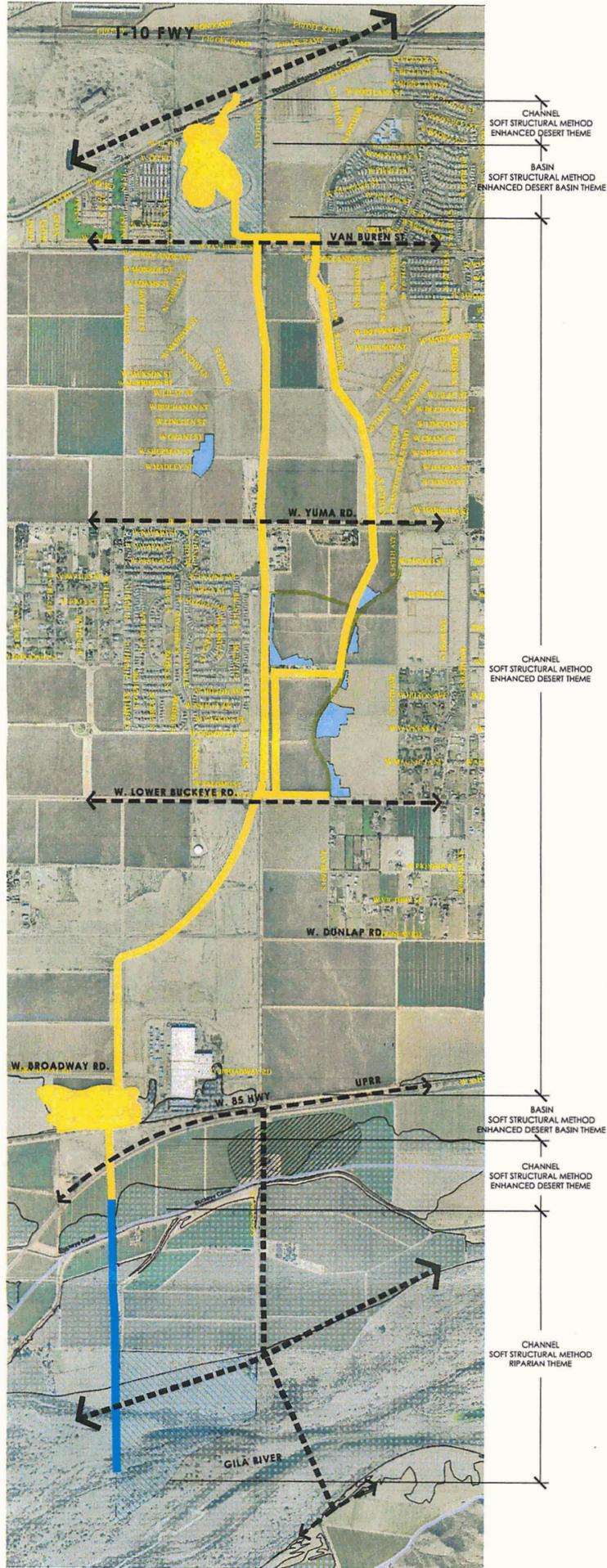
Major constraints associated with this alternative include the co-use of the Canyon Trails System (if included). The channel in Canyon Trails is currently a park like setting adjacent to residential development. By implementing this as a regional drainage system, the multi-use availability could be reduced and required maintenance increased due to more frequent flows. Acquisition of the right-of-way for the State Land basin may also be a challenge.

Figure 5-4 is the Dual System Alternative



PRELIMINARY ALTERNATIVE DUAL SYSTEM

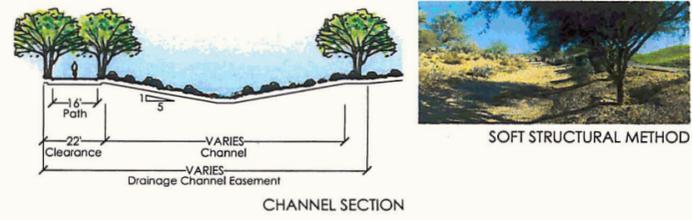
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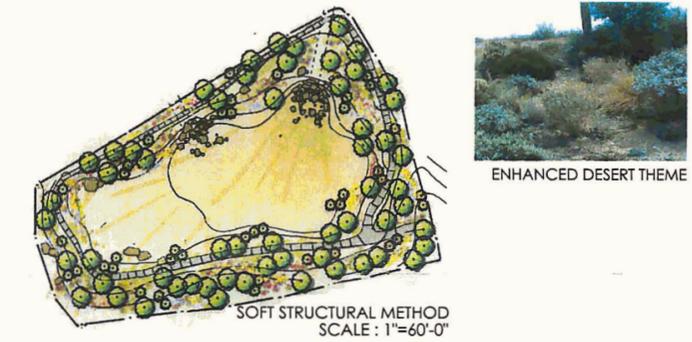
Legend

- Enhanced Desert Theme:**
The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.
- Riparian Theme:**
Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.
- Desert Park Theme:**
The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods.
- Maricopa County Regional Trail**
- Goodyear Trails**

CHANNEL



BASINS



5.5 Evaluation Criteria

On June 4, 2006 the Loop 303 CAR Team met to select a recommended alternative. The opportunities and constraints related to each of the four alternatives were discussed. To evaluate each of the alternatives, the Loop 303/White Tanks ADMPU Future Conditions (with projects in place) hydrologic analysis was modified to reflect the characteristics of each alternative. The typical channel size for each alternative was determined using the normal depth calculation method based on criteria established at the onset of the project (e.g. the application of a uniform Manning's Roughness Coefficient, $n=0.04$ – this number supports the conservative use of landscape design scheme). This included using typical cross sections, a typical roughness coefficient, the flow rate from the hydrologic model, and a general reach slope to calculate a conservative estimate of the channel width requirements. A summary of the items discussed at the recommended selection meeting are listed below.

- The “No Action Alternative”:
 - The north basin site is not available.
 - The south basin site may not be supported by Goodyear because its location makes it suitable for higher use.
 - The cost shown in the fact sheet for this alternative is lower because it is based on the 2004 cost information. The land right-of-way costs have increased substantially.
 - No estimate was done using today's costs, but the actual cost may be comparable to the other alternatives.

- The “State Land Basin Alternative”:
 - State Land Basin volume about 81 AF.
 - Negotiation needed for land acquisition from State Land Department.
 - It has an outfall to the Canyon Trails channel
 - Crossing Morocco Ruin may be an issue.
 - If the State Land parcel were not available, the channel would have to be modified to accommodate the additional discharges.

- The “Multi- Small Basin Alternative”:
 - This alternative would maximize multi-use opportunities because of the Canyon Trails channel.
 - Small basins could possibly be widened channel sections with retention capability. It would be like overbank flow in a natural stream system.
 - Use of the Canyon Trails Channel requires dealing with the HOA.
 - Crosses the Morocco Ruin site.
 - The capacity of the existing channel should be sufficient; however additional investigation would be required.
 - The proposed connector pipes between the SR 303L drainage system and the Canyon Trails channel were only evaluated for locations where the HEC-1 model has a concentration point. The number of connections and their size is unknown.
 - The hydrologic model provided for this study contained a low volume, high peak rate (215 cfs) hydrograph that apparently was not considered in the original ADMPU plan. It was decided after review by both the consultant and the FCDMC that it may be an

anomaly or a response to local runoff in the model contributing to this peak, but the volume under this peak is low and will have minimal impact on the system. In the final analysis the 215 cfs was kept in the design to be conservative.

- The “Dual System Alternative”:
 - Storm water would be split to flow along Cotton Lane and higher flows would be diverted into the Canyon Trails Channel. The analysis indicates that all the future conditions flow could be contained within the current alignment along Cotton Lane.
 - This alternative curves to the west with the SR 303L alignment.
 - Proposed basin site is in the existing floodplain.
 - BID waste way can be used as outfall. This idea has been discussed with the BID and they like the concept.

5.6 Evaluation Results

A list of positive and negative comments for each of the Four Alternatives was developed to assist the group in determining the Recommended Alternative. The rating for each alternative was determined by adding the positive comments for the alternative and subtracting the negative comments. Details of the process and additional discussions at the selection meeting are included in the meeting memorandum for the Team Meeting; June 6, 2007 in Appendix F.

No-Action	
Positive Comments	Negative Comments
Multi – use basin opportunities	North basin not available
No impact on Canyon Trails system	Larger Channel
Less ROW required	More Concrete
More efficient storm water conveyance	Impact to 801 Freeway & TI
Fits ROW	Minimal landscaping & aesthetics
	South basin not best use of land
	City may not support concrete channels
	No recharge to ground water
	Limits opportunities for trail users
	Low context sensitivity
	Impact to Morocco Ruin
Rating for No-Action (or keep the Loop 303/White Tanks ADMPU Recommended Alternative): - 6	

State-Land Basin	
Positive Comments	Negative Comments
Away from SR 303L	Additional cost and coordination for ADOT Drainage

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State land Basin "Gateway" Concept	Negative visual impact
Increased multi-use/recreation opportunities	North basin not best use of land
Increased water quality opportunities	South basin not best use of land
	Use of Canyon Trails Channel
	Uncertainty for regional trail connection
	Owners may back out of 75 ft. ROW already dedicated for "drainage"
	More public access to private Canyon Trails System
	Highest cost
	Would have to amend E.A.
	Crosses Morocco Ruin
Rating for the State Land Basin Alternative: - 7	

Multi-Small Basins	
<u>Positive Comments</u>	<u>Negative Comments</u>
Potential for increased multi-use/recreation opportunities along SR 303L/Cotton Lane	ROW complexity
Increased aesthetics opportunities in Canyon Trial Channel	Homes in potential ROW
HOA and home owners may like money received for flowage easements	Use of canyon trail channel
	Losing ROW fast (south segment of this alternative may already not be available)
	Crosses Morocco Ruin
	O & M more complex
	Additional O & M to SR 303L
Rating for Multi-Small Basins Alternative: - 4	

Dual System	
<u>Positive Comments</u>	<u>Negative Comments</u>
Following City preferred SR 303L alignment	State basin location
Uses existing floodplain for basin	Recreation close to HW
Minimizes use of canyon trails channel	Relies on Canyon Trails system
Majority of flow in acquired ROW	If relying on Canyon Trails then it is difficult to achieve context sensitivity
Lowest cost	
Uses BID wasteway	
Avoids the Morocco Ruin	
Enhances the buffer between FW and residents	
State land Basin "Gateway" Concept	

Low cost of land for basin in floodplain	
Allows use of more aesthetic channel	
Routes regional trail around Canyon Trails	
Preserves landscape character of Canyon Trails Channel	
Greatest Multi-use opportunities	
Good (second best) context sensitivity	
Not stuck with linear alignment	
More compatible with ADOT	
Opportunity for premium lots in developments	
Rating for Dual Basin Alternative: +15	

Through the partner/agency evaluation process and using the qualitative assessment of positive and negative characteristics for each, the alternative that received the highest rank was selected as the best alternative to move forward as the recommended alternative. The alternative with the highest rank is the Dual System Alternative.

5.7 Public/Stakeholder Input

Stakeholders were invited to attend two stakeholder meetings during the course of this project. Stakeholders are defined as major landowners, developers, or utility owners within the project area. At one stakeholder meeting, the initial seed ideas were presented to the stakeholders. Stakeholders gave input on the seed alternatives including the landscape aesthetic aspects of the project and the channel alignments and basin locations. This input was considered as part of the evaluation process when selecting the preliminary and recommended alternative. The stakeholders preferred a soft structural, landscaped channel. At the second stakeholder meeting, the draft recommended alternative was presented and stakeholders were asked for input to help refine the draft recommended alternative. The stakeholders expressed consensus that this was the most suitable alignment. They stated their strong support of minimizing right-of-way impacts to existing and planned residential and commercial properties.

Along with the stakeholder meetings several individual meetings were held with landowners where the draft recommended alternative was presented. Development is occurring rapidly in the area and further coordination with stakeholders will be needed during pre-design and design to ensure that their concerns continue to be addressed.

The preliminary alternatives and draft recommended alternative were presented to the public on November 15, 2007 at a joint public meeting with ADOT – who was hosting a public meeting to present the alternative corridors for the SR 303L from I-10 to the SR 801. The meeting was held at Liberty Elementary School in Buckeye. It was advertised in local papers and people in the study area also received a mailer announcing the meeting and the study. Public comments were favorable toward the recommended alignment. The public also expressed support for the soft structural channel, a trail, and a park in the basin. Appendix F contains information regarding the stakeholder and public meetings including agendas and summaries.

6.0 Recommended Alternative – Dual System

Several modifications have been incorporated in the Dual System Alternative to make it the final Recommended Alternative. The north basin in the State Trust Land was eliminated as it had limited impact on the future with projects in place hydrologic model analysis results. The original concept was to split the flow if the original channel did not have the capacity to convey the entire flow. During the hydraulic modeling it was found that the flow is contained in the Cotton Lane channel and does not require the use of the Canyon Trails Channel for the future conditions with projects in place model condition. However Canyon Trails Channel will still be required as a part of this alternative since it would be necessary in the interim to be used as an overflow channel. This is shown by modeling the flows from the existing conditions hydrologic model.

Location

This alternative begins on the southern side of Interstate 10. It will be connected to the proposed basins on the north side of the freeway. The channel continues south. At Van Buren Street the channel could split and allow excess flows to be conveyed to the Canyon Trails Channel system. The two channels would return to the original alignment at Durango Street. At Lower Buckeye Road, the channel makes a sweeping curve to the west adjacent to the proposed SR 303L alignment. Where the channel meets the UPRR alignment, a regional detention basin will be built. The basin will be on a parcel that is just east of Citrus Road, south of the Broadway Road alignment and north of the Union Pacific Railroad tracks where there is existing floodplain due to ponding behind the railroad embankment. The basin would discharge to a channel that continues southeasterly and crosses MC-85 and the BID. Just south of the BID the channel would discharge to a BID wasteway that eventually discharges to the Gila River. The BID wasteway would be improved to accommodate the additional flows.

Hydrology

This alternative provides conveyance for the 100-year flood event using the ADMPU future conditions with projects in place hydrologic model. The hydrology for this alternative was modified based on the channel alignment. The basin concentration points were modified in the hydrologic model to determine discharge flow rates at the channel as it is configured in this alternative. It should be noted that a large discharge entering the channel south of the SR 303L curve is due to flow that is cut off from reaching the Gila River. The resultant flow rates at various locations are as follows:

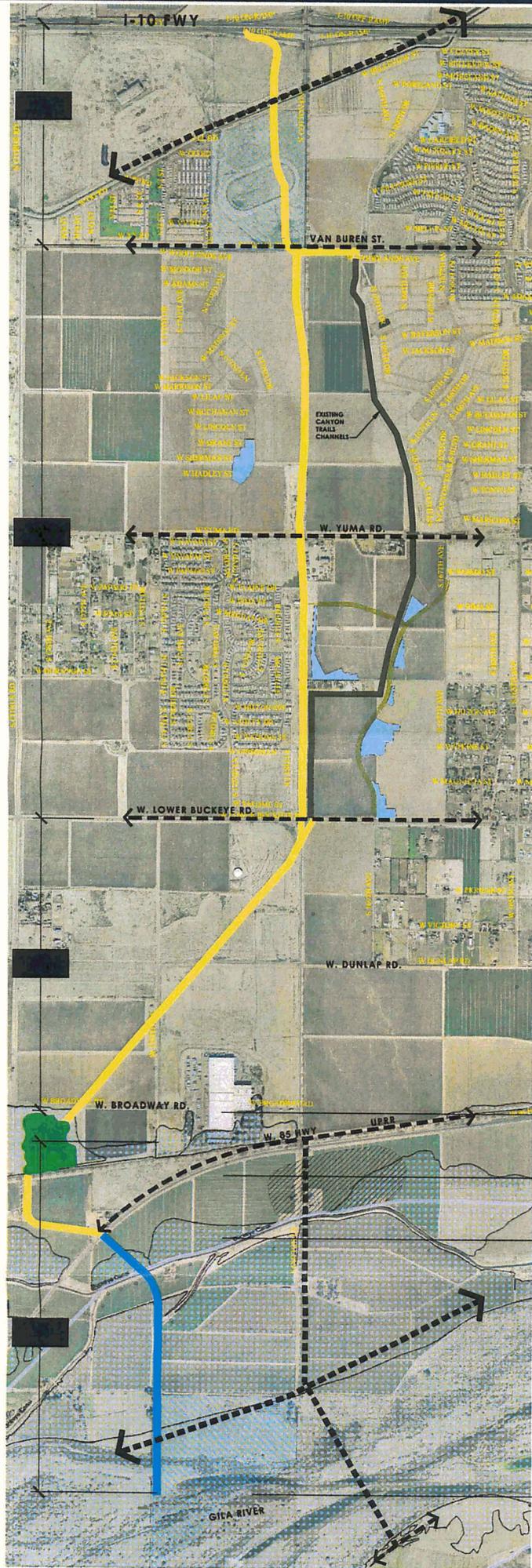
- 215 cfs between I-10 to Van Buren Street
- 175 cfs between Van Buren & Yuma Road
- 185 cfs between Yuma & Lower Buckeye
- 324 cfs between Lower Buckeye & 175th Ave.
- 676 cfs south of 175th Ave & entering the Railroad Basin
- 193 cfs south of the railroad

Figure 6-1 is the Recommended Alternative.



RECOMMENDED ALTERNATIVE DUAL SYSTEM

LOOP 303 DRAINAGE IMPROVEMENTS



Legend

Enhanced Desert Theme:
The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.

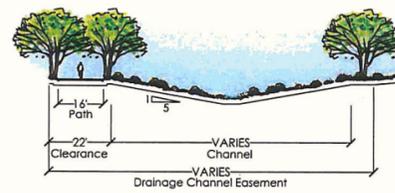
Riparian Theme:
Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.

Desert Park Theme:
The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods.

←-----→ Maricopa County Regional Trail

----- Goodyear Trails

CHANNEL



SOFT STRUCTURAL METHOD

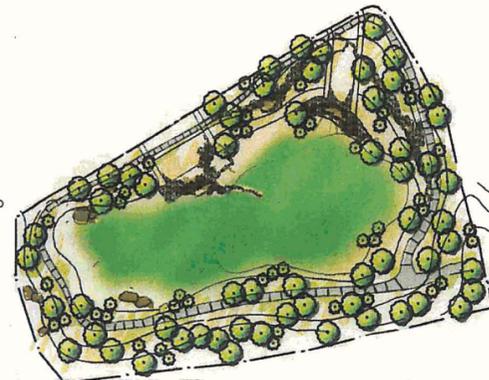


ENHANCED DESERT THEME



RIPARIAN THEME

BASINS



SEMI-SOFT STRUCTURAL METHOD
Scale: 1"=60'-0"



DESERT PARK THEME



Scale: 1"=30'-0"

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The design volume of storage used for the Railroad Basin in the hydrology model is 50 Acre-Feet. The conceptual design for the channel and basin are based on the flow rates from the Future (with projects in place) and Existing Conditions (with projects in place) hydrologic models as provided in Appendix D. Refer to Exhibit B for the conceptual design plans.

Right-of-Way

The preliminary Right-of-Way requirements identified for this alternative in various channel sections are listed below. The width typically includes a 16-foot maintenance road and a varying width vegetative buffer along the channel. The total basin ROW includes additional acreage for freeboard and multi-use features. The total channel right-of-way is 64 acres and the total basin right-of-way 35 acres.

- 85' I-10 to Van Buren Street
- 75' Van Buren Street to Lower Buckeye (with 2 locations of 55')
- 95' 175th Avenue to SR 303L
- 110' UPRR to 175th Avenue
- 135' railroad basin to Gila River

Cost

The total preliminary capital cost estimated for this alternative is \$43.8M. Costs include the earthwork, structures, right-of-way, and landscape-aesthetics. A maintenance cost equal to about 10% of the construction cost (50-year life cycle) was accounted for the plan costs. A breakdown of the estimated cost is included in Appendix G.

Aesthetics/Multi-Use

The scenery resource assessment for this project area indicates that the existing and future area landscape character is compatible with nonstructural to semi-soft structural flood control solutions. A small portion of the study area between Dunlap Road and the Union Pacific railroad tracks is compatible with a range of flood control methods from non-structural to hard structural. The recreational resource assessment identified major existing regional open spaces, including Estrella Mountain Regional Park and the Gila River, both within 5-10 miles of the project area. Within the project area, the City of Goodyear has planned local trail segments parallel to the major arterials, and along the RID Canal and MC85. Potential park locations have also been indicated on the future land use plan.

Multi-use opportunities for this alternative could include open space, parks, and trails. This channel links the I-10 corridor to the Gila River as well as adjacent residential and commercial developments. Other parks and trails within the Canyon Trails development could also be connected by the channel and would become more accessible via drainage ways discharging to the proposed channel.

Partnership Potential

Opportunities for partnering on this alternative include:

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- ADOT – The channel follows the Proposed SR 303L corridor and could be utilized for drainage discharge
- The City of Goodyear – The channel and basins provide a regional drainage solution for the area adjacent to the Cotton Lane alignment, and provides the opportunity to implement Goodyear’s planned trail and park facilities in this area.
- The RID and BID have shown interest in the potential for utilizing the channel for emergency wasteway. Any flows from irrigation district canals would be “post event” to prevent overtaxing the system.

Opportunities and Constraints

This alternative takes advantage of the 75’ of ROW (55’ in some areas) set aside by Goodyear between Van Buren Street and Lower Buckeye Road for the construction of the regional drainage facility. This alternative also avoids the use of the original south basin site leaving the area open for commercial and industrial use. The proposed basin would be built in an area already encumbered by floodplain caused by the railroad embankment. This alignment avoids the Morocco Cultural site by using the existing BID wasteway alignment. The BID wasteway alignment is an existing feature that discharges excess irrigation runoff to the Gila River.

Major constraints associated with this alternative include the co-use of the Canyon Trails System (if included). The channel in Canyon Trails is currently a park like setting adjacent to residential development. By implementing this as a regional drainage system, the multi-use availability could be reduced and required maintenance increased due to more frequent flows. Several major utilities may be a constraint to the channel crossings. These include the Kinder Morgan Petroleum pipeline and the Palo Verde Cooling Water Line. Constraints also include the two irrigation district canals. The BID and the RID are requiring that the Loop 303 Channel siphon under their canal.

6.1 Utility Impacts

As a major linear construction project in a developing region of Maricopa County the Loop 303 Channel will affect many existing utilities within its corridor. Conflicts with sewer, water, gas, telephone, electricity, and other communications utilities are common and usually can be resolved easily. The Loop 303 Channel will have these conflicts typically along roadways and at roadway crossings. However, there are several utilities that could have a greater impact on the design, construction, and operation of the channel and its appurtenances. These include canals, railroads, fiber optic cables, and major pipeline utilities.

Roosevelt Irrigation District (RID) Canal

The RID Canal is the main delivery canal for the Roosevelt Irrigation District in Western Maricopa County. The Loop 303 Channel will cross this canal at the north end of the study area, just south of I-10. The canal is gravity operated with a system of gates and check structures. The RID canal management is open to the possibility of the Loop 303 Channel crossing their facility. The RID is potentially a partner in the Loop 303 Channel project since they have discussed the possibility of using the channel as a spillway or drain for their system in this area. They are not inclined to allow the RID to be siphoned under the Loop 303 Channel due to maintenance concerns. The RID has facilities along the east side of Cotton Lane with deliveries to the east. Only one small portion of the

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RID system, a drain pipe south of Yuma Road, is on the west side and may be in conflict with the proposed Loop 303 Channel.

Buckeye Irrigation District (BID) Canal

The BID Canal impacts are very similar to those of the RID; with a few minor changes. The proposed Loop 303 Channel actually utilizes an existing BID wasteway to discharge flows to the Gila River. The BID is in favor of this since they will have an improved wasteway and will likely not have to maintain it. Like the RID, the BID also opposed to siphoning the BID under the Loop 303 Channel for similar reasons.

Union Pacific Railroad (UPRR)

The Loop 303 Channel will also cross the UPRR track between MC 85 and Broadway Road near the south end of the project. It will take a significant amount of effort to coordinate with the railroad to make a pipeline crossing. The railroad may or may not be willing to shut down the line for construction and alternate methods of construction may be required, such as jack and bore or micro-tunneling.

Fiber Optical Cables

Two major fiber optic cables will be crossed by the proposed Loop 303 Channel. The first is a Sprint Communications facility north of the RID Canal (in the RID right-of-way) and the second is a Level 3 Communications facility (Kinder Morgan owns the conduit and it is used by Level 3 Communications) cable south of the UPRR tracks (in the UPRR right-of-way). These typically have easements within the adjacent utility right-of-ways. Fiber optic cables are difficult to move since they are not just cut and spliced to make alignment changes.

Kinder Morgan Petroleum Pipeline

Along with the fiber optic conduit south of the UPRR tracks, is a 20-inch Kinder Morgan Petroleum pipeline. This pipeline is used to deliver petroleum products to the Phoenix area. It will be difficult to remove this pipeline from operation for any significant period of time to allow construction of the Loop 303 Channel. Including this pipeline there are three major utilities in a close proximity, the UPRR and the Level 3 fiber optic cable, and all require special attention during design and construction of the Loop 303 Channel.

Palo Verde Nuclear Generating Station (PVNG) Cooling Water Pipeline

The cooling water pipeline is a cooling water delivery pipeline providing reclaimed water from the City of Phoenix 91st Avenue Treatment Facility to the Palo Verde Nuclear Generating Station. This is a large pipeline north of the BID Canal alignment. Its proximity to the BID Canal and its size will require special attention during design and construction of the Loop 303 Channel.

Arizona Public Service (APS) 69KV Powerline

The APS powerline is located on the east side of Cotton Lane running north and south. It currently bears no impact on the proposed Loop 303 Channel. However ADOT's current proposal is to relocate this powerline to the west side of the SR 303L which would place it between the freeway and the proposed channel. Coordination with APS will be essential to ensure this adjacent facility will not impose additional constraints on the channel.

6.2 Channel Design & ROW Implications

Design plans for this project were developed at a feasibility or DCR level and are preliminary plans with the purpose to define a right-of-way corridor for the Loop 303 Channel. From these design plans the ROW can be estimated. The channel design included a simple hydraulic design with no backwater analysis and the use of topography that is not adequate for design. This provided a very cursory grade and alignment for the channel. Exhibit B, the concept level plans are provided at the back of the appendix.

Once the Recommended Alternative channel alignment was selected, the design of the channel was applied. The team partners at the onset of the project developed a generalized cross-section for the channel. This cross-section included a varying bottom width, five to one side slopes, and a standard "worst case" n-value. The Recommended Alternative hydrologic analysis provided the flow rates for each section of the channel. Using the cross-section and the flow rate, a flow depth was determined using the FlowMaster[®] program. A general slope for the reach was applied to the generalized cross-section agreed upon for the project to determine FlowMaster[®] input data. The cross-section water top width and freeboard were also used to determine the channel dimensions. An operation & maintenance (O & M) road and a small vegetative buffer were also accounted for in the estimated ROW width. The channel depth shown on the plans were determined using the generalized cross-section water depth and freeboard and applying it through out the channel reach. Since the ground does not follow a "generalized slope" some areas are shown much deeper than the cross section allowed, and the ground slope varies along the channel route. The ROW shown will need to be adjusted with further hydraulic analysis. Pipe and culvert sizes were determined using the flow rate and the cross-sectional area of a conduit, allowing for a three to five feet per second velocity. *A backwater analysis of this channel and culverts is essential to refine the channel size and water depths in order to determine accurate ROW needs.* The results from the hydraulic modeling of the channel should be used to design the culverts.

The channel is designed to include an O & M road on the west side of the channel. This road will also serve as a multi-use trail along the channel. Section 6.3 of this report includes more details on the design of the landscape and multi-use facilities. FCDMC standards call for O & M roads on each side of a drainage channel. The proposed freeway design includes a frontage road for the northern section of the channel. Since there is limited ROW it is intended that the frontage road would serve as an O & M road if necessary. A dual maintenance road may be feasible south of the railroad and on the State Land if necessary.

Where the Loop 303 Channel crosses the BID and the RID Canals the channel plans show an inverted siphon. Both canal managers have requested that siphons not be used for canal crossings. Siphons have two major maintenance issues; they don't completely drain and they tend to fill with sediment. It is preferable that the cleaner water be siphoned and the canal water would usually be the cleaner flows. There would have to be some negotiation with the canal management to determine if they would entertain the thought of siphons on their system. Maintenance agreements may help to ease the concerns.

The proposed channel alignment uses the BID wasteway at the southerly end of the project. Discussions with the RID also indicate that they would be interested in partnering for the channel

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design in return for allowing canal discharges into the channel as a wasteway. It is important that the discharges from these canals do not cause flow in the channel to exceed its capacity. The channel could either be designed to carry the extra flow on top of the design stormwater discharge, or agreements must be prepared to only discharge from canals when channel capacity is available. It should be noted that these irrigation canal facilities are at the lower end of the Loop 303 Channel and it is likely that emergency canal discharges will precede peak stormwater flows in the channel that have been attenuated by passing through detention facilities.

The Loop 303 Channel as it approaches the Gila River will combine with the existing BID wasteway that discharges to the river. This wasteway provides an existing location for the outfall to the river and adds another partner to the Loop 303 Channel Team. This channel has a current capacity of approximately 50 to 75 cfs.

The Loop 303 Channel was designed to collect and convey the stormwater flow in the areas draining toward the SR 303L Freeway. These flows come to the channel via local drainage systems, storm drains, and streets. Without a complete backwater analysis for the proposed channel it is not possible to say what the exact flow characteristics for the channel will be. The channel was designed to carry nearly all the flow from the existing conditions model, with projects in place in the bank full condition. The culverts shown in the plans however, will not be adequate and flows will leave the channel, temporarily flooding the roadway crossings. The basin as proposed in the plans will be inadequate to contain the existing conditions flows. Existing flows will overwhelm the basin and flood surrounding areas. Discharges used for the design in this project are from the hydrologic analysis done during the ADMPU. A current hydrology update project will provide a new hydrologic model for this area.

6.3 Landscape Design Guidelines

The landscape design guidelines shall follow the FCDMC's Aesthetic and Multi-Use Design Guidelines for Flood Control Structures, 2005. The primary goals from the FCDMC include;

- Enhance the visual appearance of flood protection facilities
- Help preserve the visual character of natural Sonoran Desert Landscapes
- Protect and enhance local community character
- Create aesthetic value

An additional goal for the FCDMC is to enhance the public value of their flood protection facilities by designing these facilities to provide opportunities for incorporating yearround recreation open space multiple-uses, by others, as an integral part of structural design.

6.3.1 General Description & Design Criteria

This alternative begins on the southern side of Interstate 10 with a channel. The channel heads south on Cotton Lane Road and then splits and utilizes both the original Loop 303 Channel alignment and the Canyon Trails Channel Alignment. The channel from Van Buren to Lower Buckeye follows the Cotton Lane Road alignment and then travels

southwest past Broadway Road into a basin. This proposed basin would be built between Broadway Road and the railroad. The basin then discharges to a channel as it meanders southward to the Gila River.

The design criteria for this alternative shall follow the FCDMC's premise to incorporate;

- Open space multi-uses through grading designs providing safe year round accessibility
- Provision of useable areas for outdoor recreation activities at elevations above nuisance flows and frequent storms
- Design of O & M roads and other structural components as multi-use facilities

6.3.2 Channel

Configuration and Shape

The overall configuration of the channel should be curvilinear and it should meander back and forth throughout the right-of-way. Due to the lack of right-of-way the channel can only meander slightly. There should also be warping of the side slopes creating a more natural character.

Overbank Area Treatments

On one side of the channel from the top of the slope the overbank area treatment shall provide a multi-use area combined with the O & M road. This area at the top of the channel would minimally include;

- 8' wide concrete multi-use path on the west side of the channel with a 2' clearance on each side of the path, creating a 12' trail width.
- There will be 2' minimum on each side of the 12' wide trail for landscaping creating a minimum clearance width of 16' for a travelway easement for the O & M Road and multi-use trail including landscape.
- Access points to/from adjacent communities/neighborhoods on the west side of the channel.

Planting and Surface Treatments

The planting and surface treatment along the channel should respond to the Enhanced Desert Theme with a Riparian Theme at the Gila River. Both themes are natural and blend with the adjacent developments and environment. This will create a greenway from I-10 to the Gila River and enhance the visual character of the area.

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Enhanced Desert Landscape Theme

The Enhanced Desert Landscape Theme focuses on using native sonoran desert vegetation with desert adapted/low water use vegetation existing in the adjacent developments. The Enhanced Theme should use natural construction materials which include boulders, river rock and gravel surface treatment in combination with vegetation for pathways, trails, and dust control. The vegetation



within this theme would typically be 80% native with 20% enhanced native that may include the following species; Jojoba, Agave, Brittle Bush, Desert Spoon, Penstemon, Yucca, Prickly Pear, Cholla, Sugar Bush, Mormon Tea, Mesquite, Ironwood, Palo Verde, Hackberry, Acacia and Desert Willow.

Riparian Theme



The Riparian Theme is based on natural features to be implemented in areas along the Gila River and can be reinforced with riparian vegetation. The Gila River is dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense

vegetation matching in form color and texture.

Connection to Adjacent Developments

The recreational resource assessment identified major existing regional open spaces, including Estrella Mountain Regional Park and the Gila River, within 5-10 miles of the project area. Goodyear's future land use plan additionally identifies several trail alignments and open space corridors in the project area. Overall access to and from adjacent trails, parks, and development needs to be considered during the layout of the multi-use path.

Connection to Basin

A basin is located between Broadway Road and the railroad just under a mile west of Cotton Lane Road. The landscape theme applied to this area is a Desert Park Theme with the edges of the basin having a seamless treatment that blend with the channel.

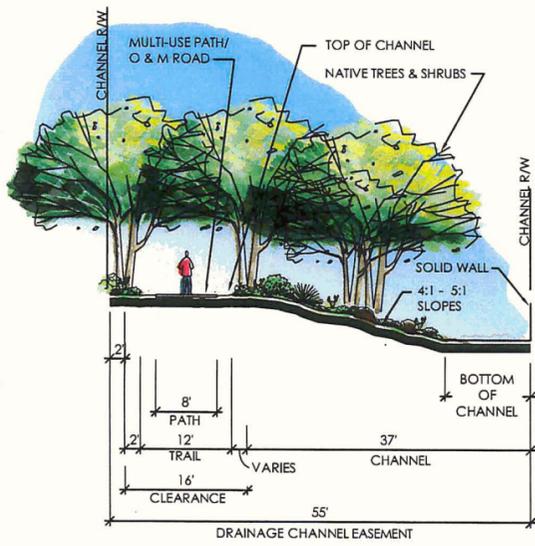
Connection to Trails

The channel creates great opportunities for pedestrian access which links the I-10 corridor to the Gila River as well as adjacent residential and commercial developments. At a local level Goodyear has defined several trails traveling north/south which cross the channel. These trails also link the channel with the Canyon Trails development and the El Rio Project along the Gila River. Pedestrian access at roadways will be above grade at crosswalks or may connect into Goodyear's defined trails. At utility crossings such as the Roosevelt Irrigation District Canal and Buckeye Irrigation District Canal we would recommend pedestrian bridge crossings. Unfortunately at the UPRR tracks clearance for pedestrian crossing is not possible along the channel and would be very costly as well as a safety hazard. At the basin there are two pedestrian access areas from the channel. Pedestrian access along the channel connects to the basin at the northeast corner and wraps around the northwest side of the basin connecting to the O & M road heading south and to Goodyear's trail along the railroad.

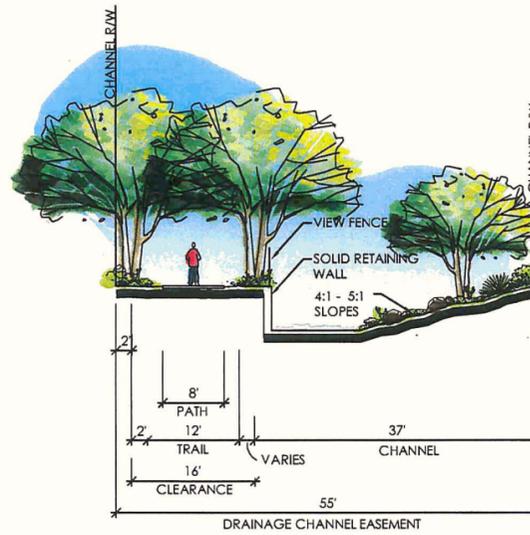
Figures 6-2 through 6-5 present conceptual cross-sections for the Recommended Alternative including multi-use and landscape features.



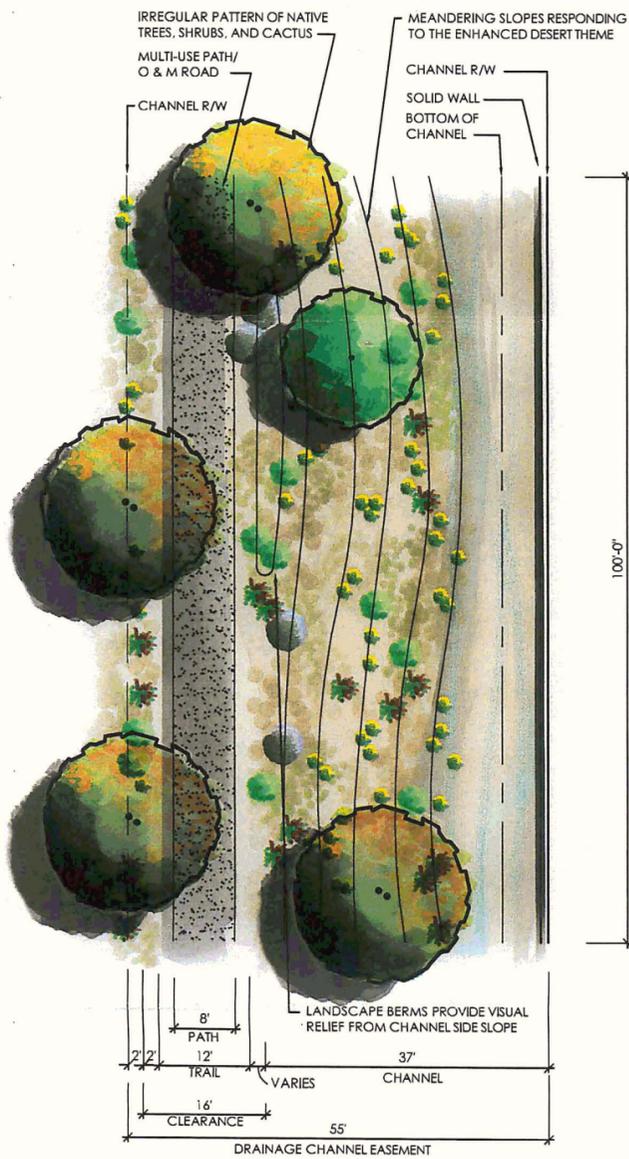
YUMA ROAD - LOWER BUCKEYE ROAD - TYPICAL 55' R/W LOOP 303 DRAINAGE IMPROVEMENTS



Section

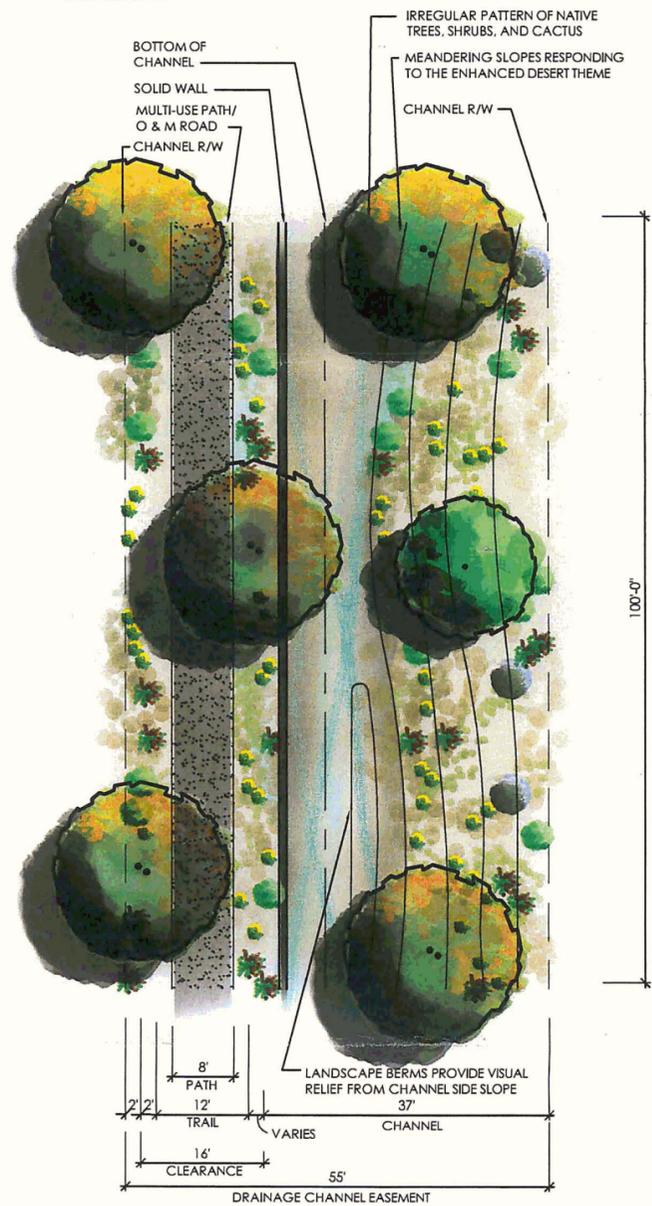


Section



Plan view

Yuma - Lower Buckeye Rd 55' ROW
Option A

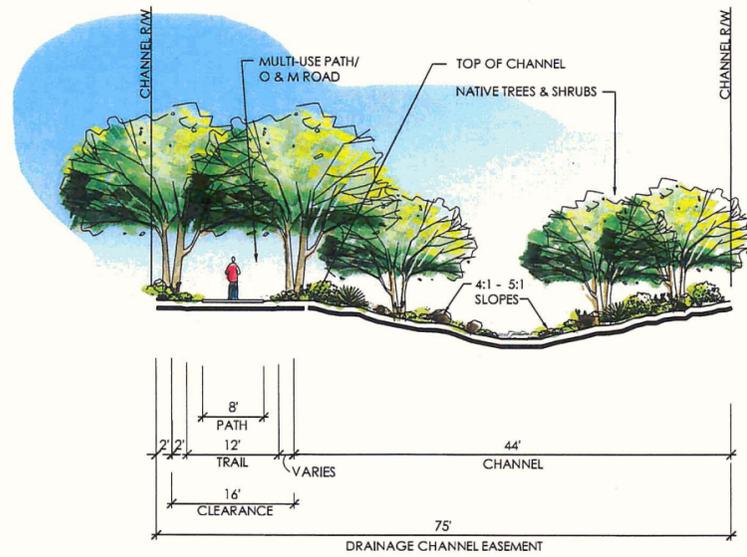


Plan view

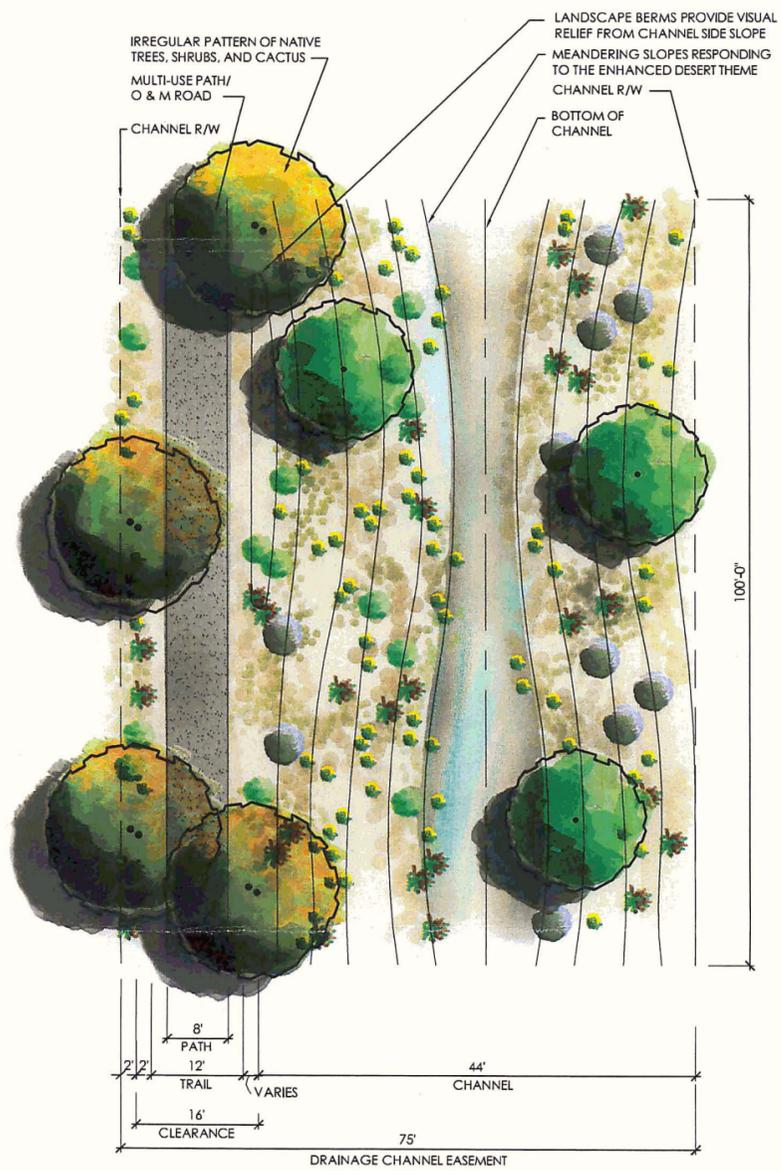
Yuma - Lower Buckeye Rd 55' ROW
Option B



VAN BUREN STREET TO LOWER BUCKEYE ROAD - TYPICAL 75' R/W LOOP 303 DRAINAGE IMPROVEMENTS



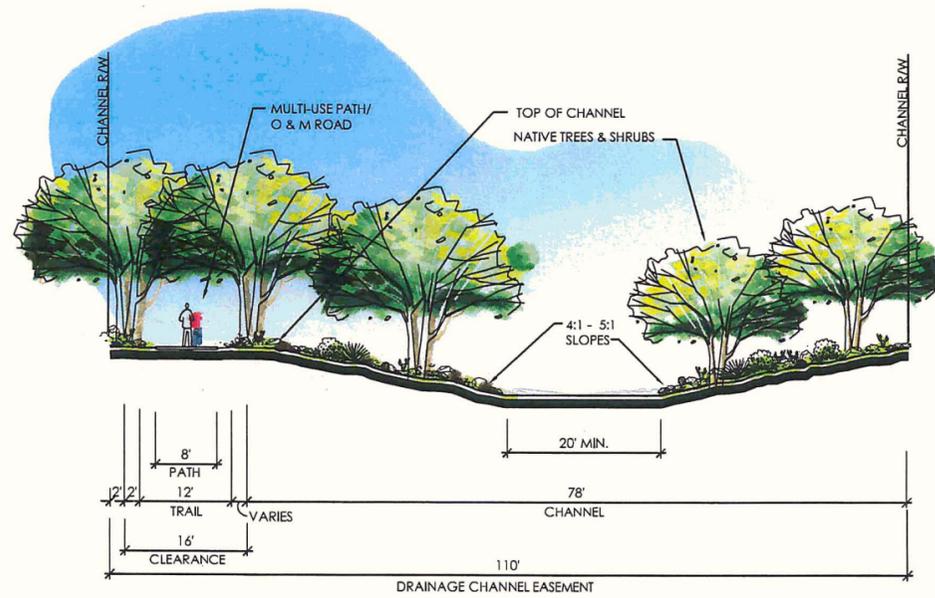
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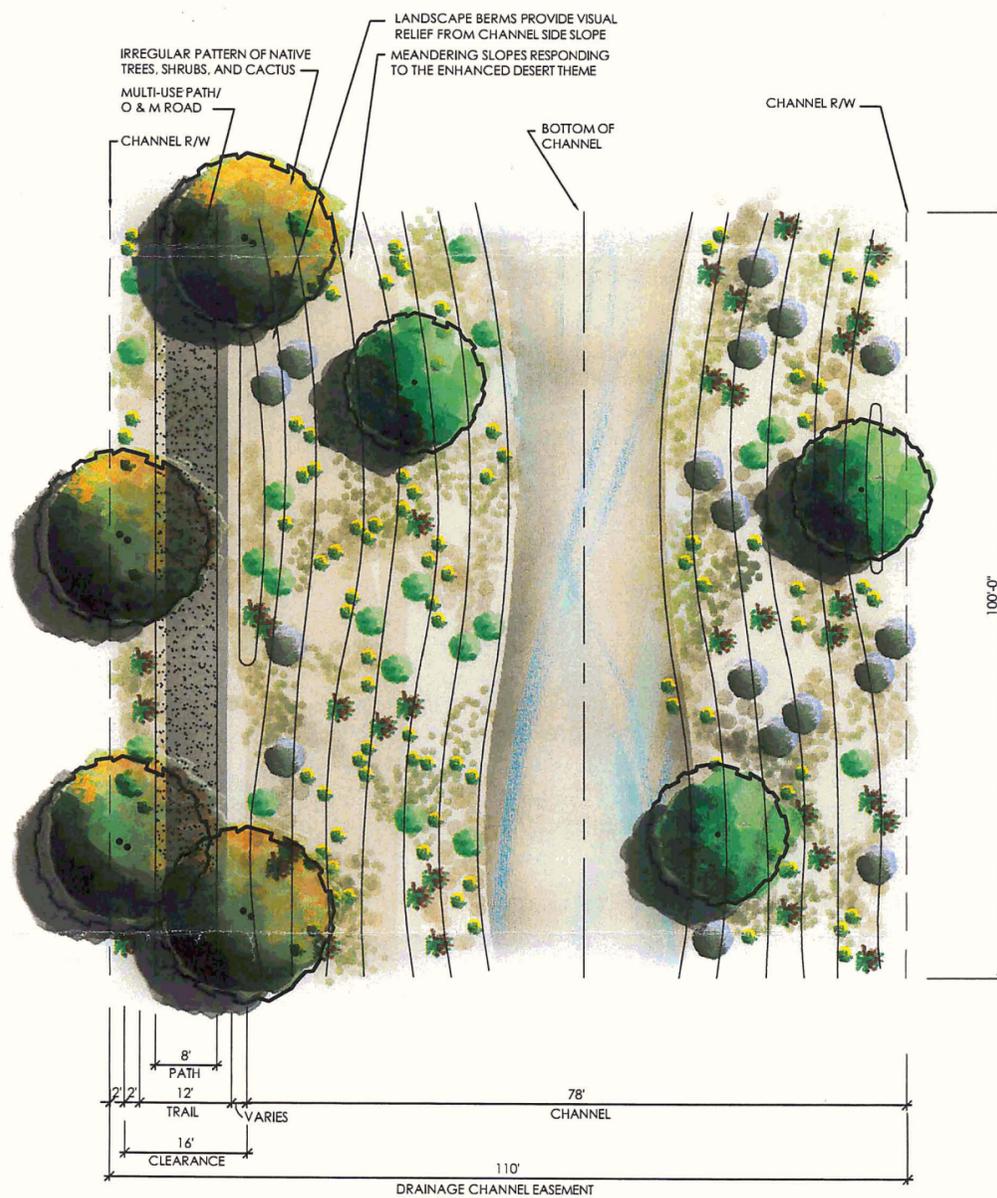
Plan view



175th AVENUE TO BROADWAY ROAD - TYPICAL 110' R/W LOOP 303 DRAINAGE IMPROVEMENTS



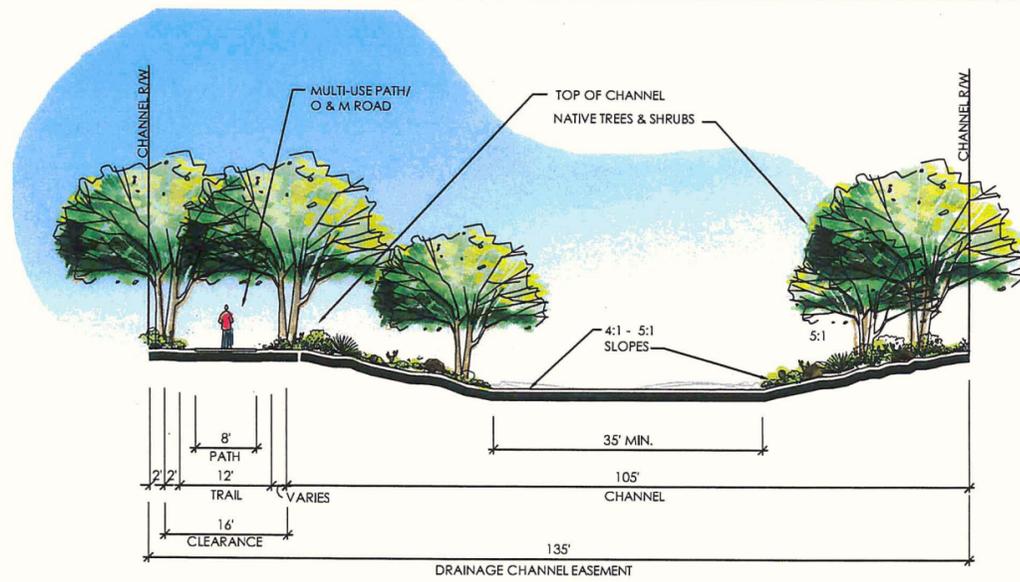
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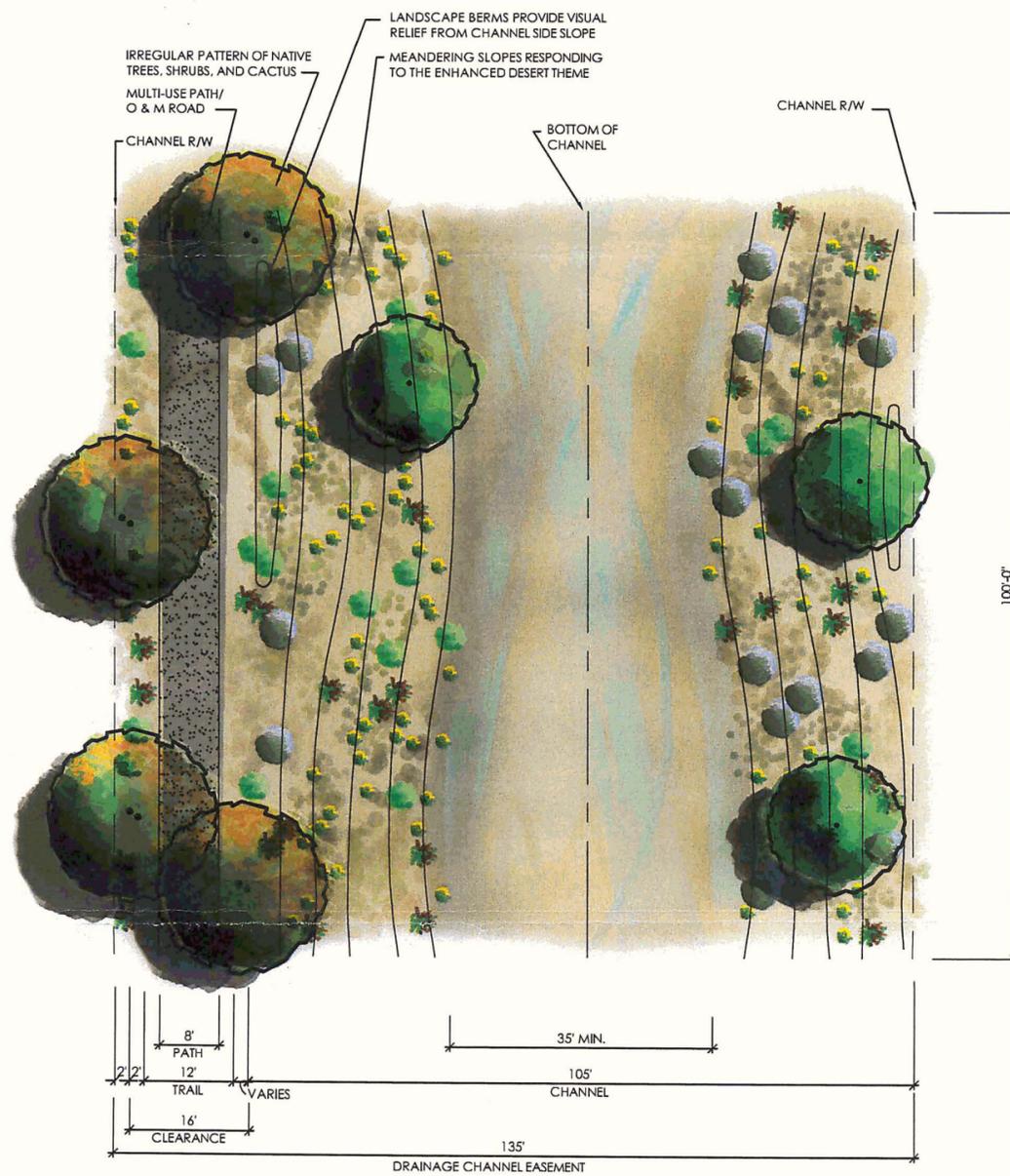
Plan view



RAILROAD BASIN TO GILA RIVER - TYPICAL 135' R/W LOOP 303 DRAINAGE IMPROVEMENTS



Section



Plan view

6.3.3 Basin

Configuration and Shape

The basin side slopes should vary from 5:1 at the steepest to as flat as 12:1. This warping of the side slopes would provide an overall curvilinear/freeform for the slope and when combined with berming in the overbank area would provide visual relief to the pedestrian.

Terrace levels should be integrated into the side slopes when practical. Terraces should be randomly placed and be of various sizes and shapes.

Overbank Area Treatment

The overbank area should maintain a minimum of 30% of the total basin footprint around the perimeter of the basin from top of slope for various overbank area treatments. This area at the top of the basin would minimally include;

- 8' wide concrete multi-use path on the west side of the channel with a 2' clearance on each side of the path, creating a 12' trail width.
- There will be 2' minimum on each side of the 12' wide trail for landscaping creating a minimum clearance width of 16' for a travelway easement for the O & M Road and multi-use trail including landscape.
- Access points to/from adjacent communities/neighborhoods on the west side of the channel.

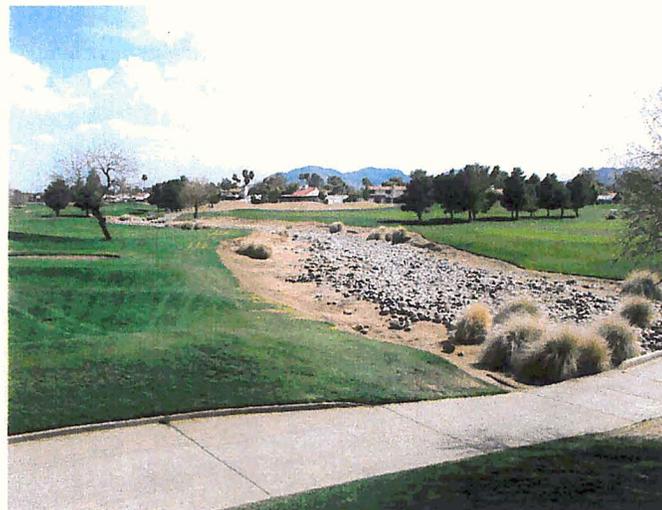
Planting and Surface Treatments

The planting and surface treatment within the basin should respond to the Desert Park theme. This theme is recommended for active recreation uses with large turf areas for active play and an enhanced desert palette along the edges blending with the adjacent properties.

Landscape Themes

Desert Park Theme

The Desert Park theme is associated with developments that match the desert along their edges but incorporate shade trees and open turf areas. The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basin remains natural with native vegetation and pockets of oasis planting for shade and screening of visible structures.



Possible Recreation Components

The possible recreation components include large areas of turf used for open play/recreation supporting the surrounding neighborhoods and the community due to the large scale of the basin with an approximate area of 20 acre feet. Due to the large scale of the basin the City of Goodyear will have the opportunity to add recreational elements which may include but are not limited to soccer fields, parking, restroom facility, shade structures, seating/picnic areas and lighting fixtures.

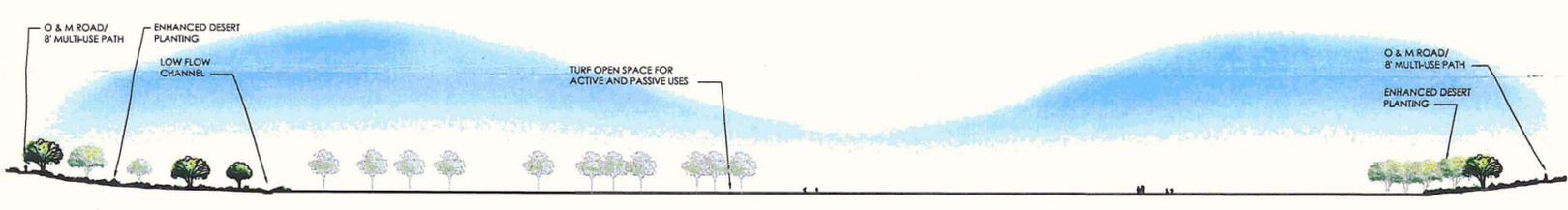
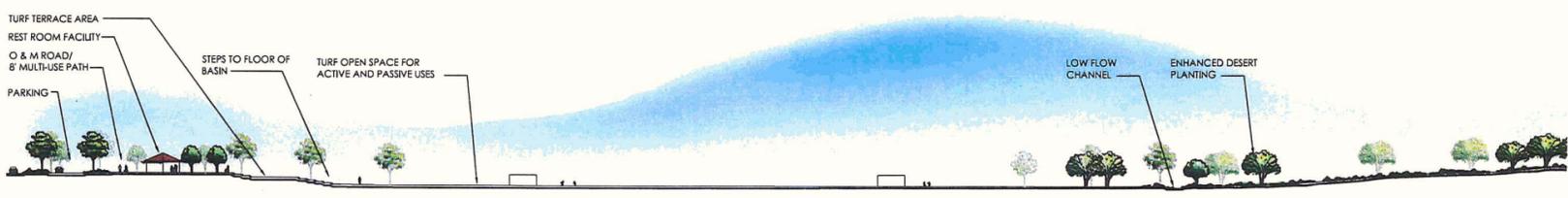
Connection to Adjacent Developments

Connections include incorporating the O & M Road with a multi-use path for connectivity to adjacent developments and trails planned regionally and locally. Regionally there is a major connection east and west which includes the El Rio project area along the Gila River. At a local level the City of Goodyear has identified a local trail along MC-85. Both are trails which shall be incorporated into the design of the basin.

Figure 6-6 and 6-7 show conceptual basin design including multi-use and landscape features.



BASIN LOOP 303 DRAINAGE IMPROVEMENTS



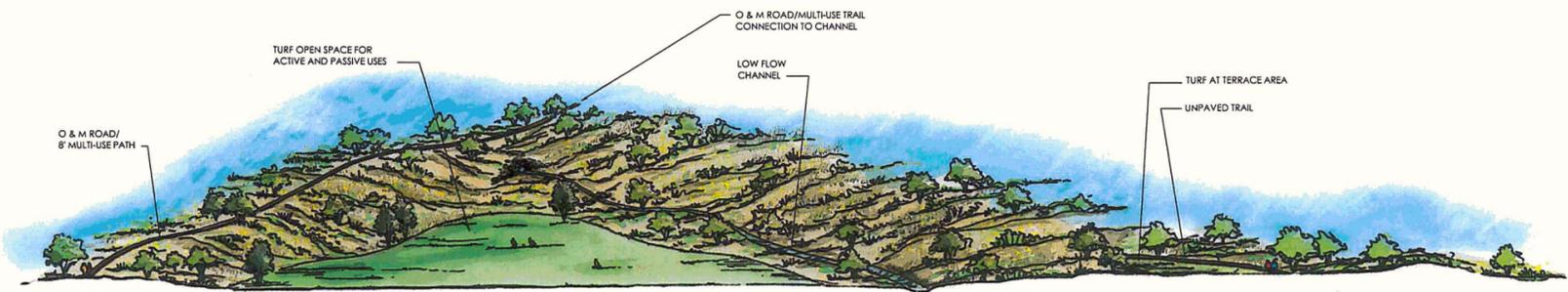
NOTE:
ALL ARCHITECTURAL ELEMENTS WILL NOT BE DESIGNED BY THE FLOOD CONTROL DISTRICT. THE FLOOD CONTROL DISTRICT IS RESPONSIBLE FOR FLOOD PROTECTION STRUCTURES ONLY.



BASIN LOOP 303 DRAINAGE IMPROVEMENTS



BASIN PLAN VIEW
0 40 80 160
SCALE: 1"=80'



BASIN PERSPECTIVE LOOKING NORTHEAST
N.T.S.

NOTE:
ALL ARCHITECTURAL ELEMENTS WILL NOT BE DESIGNED BY THE FLOOD CONTROL DISTRICT. THE FLOOD CONTROL DISTRICT IS RESPONSIBLE FOR FLOOD PROTECTION STRUCTURES ONLY.

7.0 Future Design Issues and Considerations

7.1 IGAs and Permits

The Loop 303 Channel south of I-10 to the Gila River will require several permits and agreements to meet the requirements of the various agencies the channel will cross. Inter-Governmental Agreements (IGAs) will be required with the City of Goodyear for the construction and operation of the channel. IGAs will be required with the Roosevelt Irrigation District and the Buckeye Irrigation District to cross their canal facilities. Permits will be required from ADOT, MCDOT, the Union Pacific Railroad, the Kinder Morgan Petroleum Pipeline, APS, and Level 3 and Sprint Communication companies. One of the goals of the project was to minimize the right-of-way and thereby minimizing the impact to adjacent facilities both planned and existing. During the pre-design phase of the project this also should be kept as a goal and potentially decrease the impact even further.

AZPDES Permit

The Loop 303 Channel will require an Arizona Pollution Discharge Elimination System (AZPDES) storm water discharge permit. This permit is based on the use of Best Management Practices (BMPs) in the watershed to prevent polluted storm water from entering the receiving waters of the US. The FCDMC has an erosion control manual that outlines the methods to be used as BMPs for this project. These will include the adjacent communities requiring on-site retention of first-flush runoff to discharge to the Loop 303 Channel, keeping the channel as non-structural as possible, and retaining first flush in the railroad detention basin.

Flowage Easements

There are flowage easements on the privately-owned land between the property boundary line and the expected inundation limits on which the FCDMC would have to purchase in order to flood the property. This property is located below the outfall of the existing BID wasteway and is currently owned by Dos Rios Materials LLC, in several parcels. The concept of a flowage easement is to give the landowner the limited use of their property which otherwise would have been purchased by the FCDMC. Therefore, land that has a flowage easement on it is different than other private owned land. Typically a land owner may:

- a. Fence flowage easement to the boundary line, and/or along the property boundary line at his/her discretion.
- b. Plant grass, shrubs, trees, or gardens on flowage easement at his/her discretion.
- c. Mow, trim underbrush, or cut trees on flowage easement at his/her own discretion.
- d. Apply for a permit to construct or place storage buildings, garages, etc., on flowage easements. Houses, trailers, and other structures suitable for human habitation are not allowed.
- e. Apply for a permit to drill a water well or place utility lines on flowage easement.

7.2 Next Steps

Survey & Mapping

Two items which this CAR project did not include are critical next steps in the design process for the Loop 303 Channel. The first is to survey and tie down the location of the proposed project and the second is to obtain mapping for the entire length of the project. The CAR used mapping from several projects to complete the DCR Level design. This created some challenges that new survey and mapping will quickly overcome.

Hydraulic Analysis

Once the survey and mapping is available, a hydraulic analysis can be developed for the Loop 303 Channel. A project hydraulic model will provide a much better picture of the flow characteristics of the channel, the culverts, and the inverted siphons. Areas of high velocity can be identified and drop structures can be designed to reduce the possibility of erosion and minimize the length of required hardened portions of the channel. The project hydraulic model will also provide information on design that would allow for variations in the cross-section configurations; i.e. meandering banks etc. This model should incorporate the Gila River flow elevation as the tailwater for a boundary condition. The Gila River water surface elevation for the 100-year and 10-year flows are typically used to evaluate the proposed channel hydraulics.

Railroad Crossing

During communications with the UPRR, they did not state a preference for crossing their alignment and would require the project to go through the railroad's permitting process. This process can be found on their web site and should be resolved during a pre-design. The permit process will be required during design phases of the project.

Inverted Siphons

Where the Loop 303 Channel crosses the BID and the RID canals the preliminary channel plans show an inverted siphon. Both canal managers have requested that their canals not be siphoned. Siphons have two major maintenance issues; there is always water in the bottom of them and they tend to fill with sediment. It is preferable that the cleaner water be siphoned and the canal water would usually be the cleaner flows. There would have to be some negotiation with the canal management to determine if using siphons would be acceptable. Maintenance agreements may help to ease their concerns. At the BID the Loop 303 Channel will siphon under the PVNG pipeline also. Further discussions with APS are also necessary regarding siphoning of PV line. APS has not provided clear-cut input on treatment of pipe for this crossing. As with most major wet utility crossings they will most likely expect the pipe to be reinforced and/or upgraded at the crossing site. These issues should be resolved during pre-design.

Geotechnical Analysis

A geotechnical analysis is also a next step for the Loop 303 Channel. Sub-surface investigations should be performed along the channel route and at the basin site. The geotechnical report will provide information on what materials may be used in the soil as well as information on the soil characteristics and structural bearing capacities where canal appurtenances are proposed. At the basin site and at several locations along the channel route the depth to groundwater needs to be determined. ADWR's 2006 records indicate that groundwater at a well near Cotton Lane and the Gila River is approximately 21 feet below ground.

Pothole Utilities

Utilities that will be crossed should be located using potholes or the use of a subsurface utility engineer. These investigations will provide the location of the utility vertically and horizontally and help to identify where conflicts would exist and how to design the channel to minimize its impact. It will also assist the utility company in reviewing the proposed plans and identifying solutions for the system conflicts.

Utilize new project information

The FCDMC is currently contracting with another consultant to update the hydrology for the entire Loop 303/White Tanks ADMPU hydrologic analysis. There is a high potential for the flow rates to change in the area of this project, requiring changes to the channel sizes. The basin right-of-way is not likely to change much. It would be prudent to wait to purchase the majority of the channel right-of-way until the new hydrologic analysis is completed to determine the impact of the new discharges and the location of the freeway is set so that the channel size and location would not have to be re-designed again later.

Development Coordination

Development is occurring rapidly in the area and is expected to continue. This will require further coordination with stakeholders during pre-design and design phases to ensure that their concerns continue to be addressed. Allowances for drainage easements should be discussed whenever possible to avoid loss of potential channel corridor locations.

ADOT Coordination

Another next step would be to incorporate ADOT's selected alternative for the SR 303L into the channel plans. However ADOT has not selected a final alignment for the freeway. ADOT is currently working on this selection from I-10 south, and has narrowed it down to two alignments. A design concept report will not be completed until 2009. Currently the Loop 303 Channel follows the route of the current freeway corridor as presented at their public meeting held November 15, 2007. Final design of the channel will have freeway corridor alignment changes that will need to be integrated into the design. There is currently discussion of additional right-of-way need for the freeway which would cause the channel to move further to the west in some locations. There have also been discussions of utilizing the channel right-of-way as a location for relocated utilities. Channel right-of-way may not be compatible for some utilities because of its proposed use as a trail and because of the types of vegetation proposed in the buffer area. This would require discussions between the utility owner and the FCDMC maintenance staff and the City of Goodyear. Under the current scenario, there are several issues that will have to be resolved during the pre-design phase:

- The channel is in conflict with the proposed roadway from just north of Elwood/Dunlap to approximate Sta. 275+00 (North of Van Buren Street) for both alternatives currently under consideration.
- The channel is in conflict with new right of way required for the 303L facility.

Loop 303 Drainage Improvements CAR

Final Report for

Flood Control District of Maricopa County, Arizona

- A public utility easement paralleling the west side of SR 303L may be required. Location of and right-of-way needs for the channel, PUE and SR303L should be determined as a whole to insure minimum impacts to existing and proposed development.
- Coordination with ADOT regarding the future location of the 801 should take place during design.

Additional coordination during the pre-design and design phases will be required to ensure that the FCDMC facility is located to minimize future impact.

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

APPENDIX A

Scope of Work



FLOOD CONTROL DISTRICT of Maricopa County
 2801 West Durango Street
 Phoenix, Arizona 85009
 (602) 506-1501
 Fax (602) 506-4601

LETTER OF TRANSMITTAL

TO: Larry Maldonado
 Project Engineering Consultants, Ltd.
 2310 W. Mission Lane Suite 4
 Phoenix, AZ 85021

September 26, 2006

SUBJECT: Contract No. 2005C022
 Assignment No. 2 CAR
 Loop 303 Drainage Improvements - Phase II

WE ARE SENDING YOU THE FOLLOWING ITEMS:

() Enclosed () Under separate cover

	Shop Drawings	Prints	Legal Description	Samples
	Specification	Change Order	Copy of Letter	Plans
X	Notice to Proceed			
X	Certificate of Performance			
X	Scope of Work			

THESE ARE TRANSMITTED:

	For Approval	Approved as submitted
X	For your use	Approved as noted
	As requested	Returned for corrections
	Resubmit () copies for approval	For review and comments
	Submit () copies for distribution	Return () corrected prints
	FOR ESTIMATE DUE:	Borrowed prints being returned

Remarks: Please specify assignment number on all correspondence.

SIGNED:

Jennifer Rokorski
 Jennifer Rokorski
 Associate Project Manager



FLOOD CONTROL DISTRICT of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501
Fax (602) 506-4601

NOTICE TO PROCEED

TO: Larry Maldonado
Project Engineering Consultants, Ltd.
2310 W. Mission Lane Suite 4
Phoenix, AZ 85021

September 26, 2006

SUBJECT: PCN 470.04.20 Low Org 6961
FCD Contract No. 2005C022
Assignment No. 2

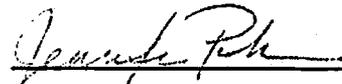
Loop 303 Drainage Improvements - Phase II

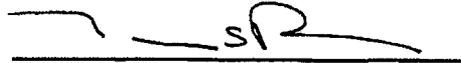
Your not-to-exceed cost estimate of \$180,044.00 for Assignment No. 2 has been received and accepted for this project with a completion date of 4/30/2007. You are hereby authorized to proceed with the work for the referenced project as originally described in the Scope of Work. Please specify the contract title, contract number, assignment number, and the dates of the completed service on all related correspondence, including the invoice. Send the invoices and certificates of performance to the attention of Finance Department, Flood Control District of Maricopa County. The certificate of performance must be dated on or after the final invoice date and must accompany the final invoices.

This work assignment is for professional engineering and landscape architectural services to develop a Candidate Assessment Report (CAR) to identify drainage facilities, right-of-way and cost estimates associated with the SR 303 Loop from I-10 south to the Gila River. Tasks completed under this assignment will include alternative analysis which incorporates aesthetics and multi-use opportunities, updating of hydrologic models, selection of a preferred alternative, identification of right-of-way needs, and documentation of the findings in a final report.

If at any time during the project assignment a material change in the scope of services to be provided occurs, causing an increase in the original cost estimate shown here, you must provide the District with a written explanation of the additional work along with an estimate of additional costs. No additional work shall commence prior to written authorization by the District. No claims for additional work shall be accepted that have not received prior District approval.

SIGNED:


Jennifer Pokorski
Associate Project Manager


Timothy S. Phillips, P.E.
Chief Engineer and General Manager

Copy to: LRH (Finance)

COORD: CWW MBA DAW GLJ *2/21/00*

INFO: KLP

FILE: 2005C022

CWW 9/25/06

2/21/00
1-25-00

**Certificate of Performance of Engineering Open Order Contract
and Payment of All Claims**

I, _____, hereby certify to the Flood Control District of Maricopa County (FCDMC) that all lawful claims for labor, rental of equipment, material used, and any other claims by company, or its subcontractors in connection with the specific assignment described below and as authorized by the terms of the FCDMC Contract 2005C022 have been paid.

Company understands that with receipt of payment for previously invoiced amounts plus any retained funds, that this is a settlement of all claims of every nature and kind against the FCDMC arising out of the performance of the FCDMC's specific assignment through FCDMC Contract 2005C022 for Assignment No. 2 relating to the material, equipment, and work covered in and required by the contract.

The undersigned hereby certifies that to his/her knowledge, no contractual disputes exist in regard to this contract and that he/she has no knowledge of any pending or potential claims in regard to this contract.

Upon submission of this document and a separate invoice for any retained funds to the FCDMC, invoice processing will be completed within forty-five (45) calendar days.

Signed the ____ day of _____, 200__.

Signature

Title: _____

Project Engineering Consultants, Ltd.

EXHIBIT A

SCOPE OF WORK

**CONTRACT FCD 2005CO22
Work Assignment #2**



**Loop 303 Drainage Improvements: I-10 to the Gila River
Candidate Assessment Report
Phase II**

September, 2006

1. GENERAL DESCRIPTION

1.1 PROJECT DESCRIPTION

- 1.1.1 This scope of work is for professional engineering and landscape architectural services to develop a Candidate Assessment Report (CAR) to identify drainage facilities, right-of-way and cost estimates associated with the SR 303 Loop from I-10 south to the Gila River.
- 1.1.2 The CAR was broken into two phases. Phase I was completed on August 30, 2006, and involved data collection and development of seed alternatives. In this Phase, the CONSULTANT will perform alternative analysis which incorporates aesthetics and multi-use opportunities, update hydrologic models, select a preferred alternative, identify right-of-way needs, and then document the findings in a final report. This scope of work is for Phase II.

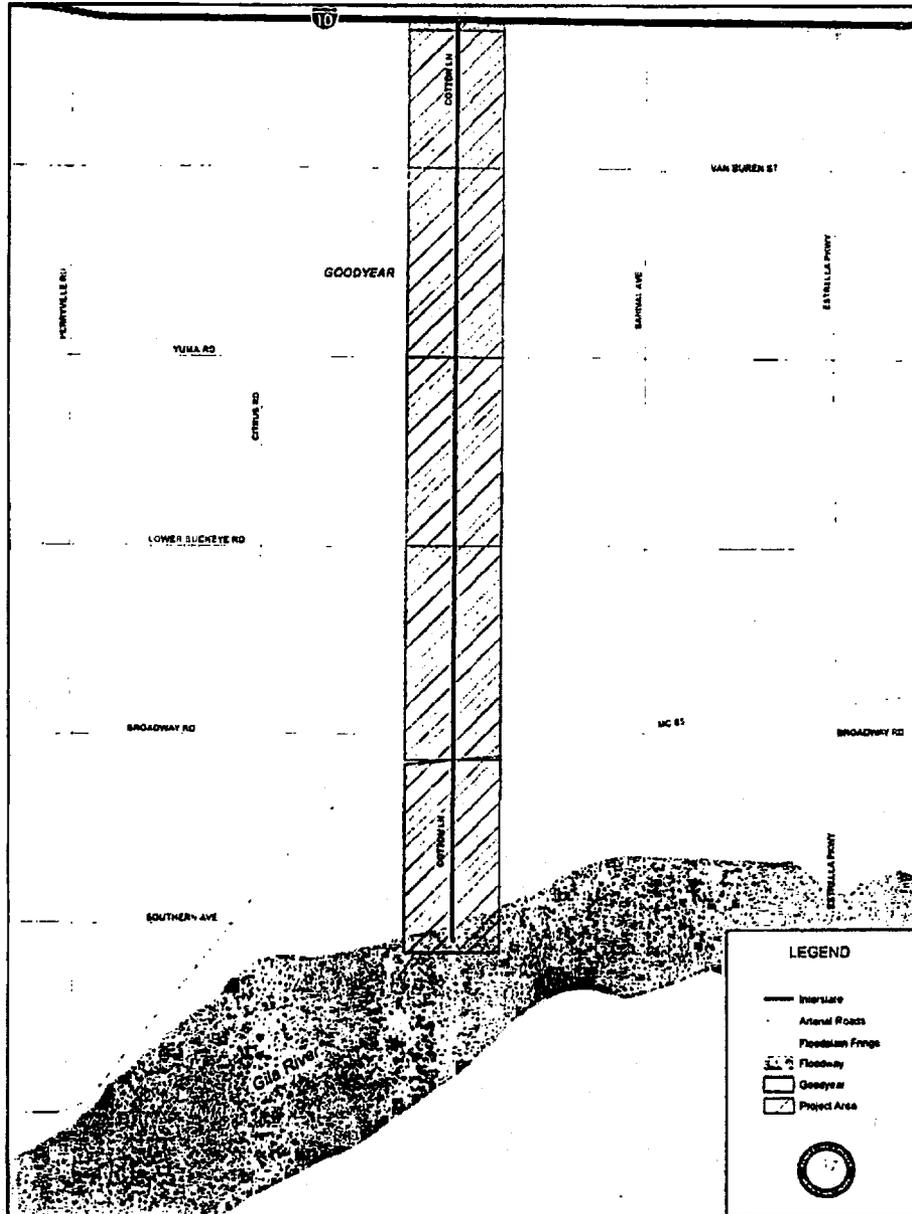
1.2 PURPOSE & NEED

- 1.2.1 SR 303L is a proposed freeway in the western portion of the Greater Phoenix Metropolitan Area.
- 1.2.2 The Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU) evaluated and developed solutions to mitigate flooding hazards in the White Tanks drainage area. The ADMP was completed by the Flood Control District of Maricopa County (DISTRICT) in 2005. The ADMP recommended locating a regional channel and basins adjacent to the proposed SR 303L from approximately Greenway Road to the Gila River. These channel and basins would intercept the storm water flows and provide a regional outfall to the Gila River.
- 1.2.3 Since completion of the ADMPU, development has occurred in the channel and basin locations proposed in the ADMPU south of I-10. This development has necessitated additional examination of channel and basin sites.
- 1.2.4 The purpose of this study is to evaluate and select new channel and basin(s) locations and produce detailed cost estimates (DCR level) and right-of-way acquisition recommendations. An additional study objective is to consider stakeholder and community expectations regarding aesthetic and multi-use functions of the flood control facilities.

1.3 LOCATION

The study limits are I-10 south to the Gila River and approximately 1/4 mile east and west of the Cotton Lane alignment. See Figure 1.

Figure 1



1.4 PARTICIPANTS

1.4.1 Coordination with the following persons/organizations is expected for information and input into the study:

Jen Pokorski, Associate Project Manager, Flood Control District of Maricopa County
David Ramirez, City Engineer, City of Goodyear
Monica Baiza, Project Coordinator, Arizona Department of Transportation
Keith Brown, Assistant City Engineer, City of Goodyear
Bill Hahn, Regional Transportation Program Manager, Maricopa Department of Transportation
Steve Beasley, Senior Project Manager, Arizona Department of Transportation
Mike Bruder, Arizona Department of Transportation
Jackie Meck, Buckeye Water Conservation and Drainage District
Stan Ashby, Roosevelt Irrigation District
Developers/Landowners of Adjacent Properties
Michael Bouche, Arizona Public Service
Randy Butler, Arizona Public Service, Palo Verde Water Line
Union Pacific Railroad

1.5 SCHEDULE

1.5.1 The CONSULTANT is expected to complete the CAR within 225 days from issue of the notice to proceed. The milestones shall be as follows in weeks (dates are approximate) from notice to proceed (NTP):

Notice to Proceed

Partner Agency Meeting #1 – 2 weeks from NTP

Present project schedule and receive input from partner agencies on seed ideas and preliminary selection of four (4) alternatives.

HEC-1 Modeling (4 alternatives) – 7 weeks from NTP

Submit revised HEC-1 future conditions with projects in place model for District review.

Stakeholder Meeting #1 – 11 weeks from NTP

Preliminary channel and basin size and location and an associated cost estimate will be presented for each alternative. A matrix of this information (and environmental and landscape concerns) will also be presented. Receive input from the stakeholders on the four (4) alternatives, including suggestions for recommended alternative.

Partner Agency Meeting #2 – 11 weeks from NTP

Receive input on alternatives and select draft Recommended Alternative. Preliminary channel and basin size and location, environmental and landscape issues, and an associated cost estimate will be presented for each alternative.

Public Meeting #1 – 13 weeks from NTP

views of the entire system for each, and blow-ups of a typical regional basin and a neighborhood basin. Typical sections will be integrated with engineers' drawings and derived from graphics that have already been created in Phase 1. Landscape themes shall be used to define aesthetic treatment, land requirements and cost for each alternative.

- 2.1.7 The CONSULTANT shall develop a cost estimate and required right-of-way requirements for each of the four (4) selected alternatives. For each of the alternatives, the right-of-way requirements and costs associated with implementing the proposed landscape design for each alternative should be incorporated in the cost estimate.
- 2.1.8 The CONSULTANT shall refine the evaluation matrix developed in Phase I for each of the four (4) alternatives which shall show/describe, at the minimum, the preliminary cost, location, environmental impacts, land uses/development information and landscape/multi-use considerations, subject to revision and addition by the DISTRICT. The landscape/multi-use evaluation should incorporate information from the DISTRICT's "Policy for the Aesthetic Treatment and Landscaping of Flood Control Facilities."
- 2.1.9 The CONSULTANT shall refine the graphic for the Draft Recommended Alternative as selected by the DISTRICT and stakeholders.
- 2.1.10 Following coordination with stakeholders and partner agencies, the CONSULTANTS shall develop the Final Recommended Alternative Graphic as selected by the DISTRICT and stakeholders.
- 2.1.11 The CONSULTANT shall modify the HEC-1 models created for the Loop 303/White Tanks ADMPU for the recommended alternative. These models include the existing conditions with projects in place and future conditions with projects in place.
- 2.1.12 The CONSULTANT shall prepare a revised hydrology map for future conditions with the Recommended Alternative in place.
- 2.1.13 The CONSULTANT shall determine the preliminary size of channels using normal depth calculations. No backwater modeling will be done.
- 2.1.14 The CONSULTANT shall prepare design level plans equivalent to the current Loop 303 DCR plans. These plans shall include a cover sheet, preliminary plan and profile drawings for channels and basins, one typical section for each major reach of the channel (up to five sections), major structure locations, major utility locations, preliminary right-of-way plan sheets, and cost estimates.
- 2.1.15 The CONSULTANT, in coordination with the DISTRICT, shall prepare landscape design guidelines for the selected alternative.

- 2.1.16 The CONSULTANT shall develop a conceptual landscape contour grading plan integrated with engineers grading input for up to two regional basins and one neighborhood basin for the DCR level plans. The CONSULTANT shall also develop one typical section for each major reach of the channel (up to five sections) in the recommended alternative. The grading plan and sections shall show the desired landscape and aesthetic treatments. A final recommended alternative exhibit shall include final landscape themes, design guidelines and cost for the final recommended alternative.
- 2.1.17 The CONSULTANT shall develop a baseline cost for a concrete channel along the alignment of the recommended alternative. This baseline cost shall include an additional 10% of the cost for aesthetics and landscaping. The costs for construction and right-of-way acquisition for the recommended alternative (if different from a concrete channel) should be compared to the baseline costs in order to determine the appropriate cost-share for project partners.
- 2.1.18 The CONSULTANT shall investigate and identify the permits, approvals, easements, and cultural and environmental investigations that may be required during final design. This task includes the evaluation of the necessity for flowage easements to identify the impacts of diverted flows directed by this project onto previously non-impacted properties, or properties that would be impacted differently. This scope is limited to identifying the above items but does not include preparing legal descriptions, surveying or obtaining the permits. This information will be included in the Summary Report.
- 2.1.19 and cultural and environmental investigations that may be required during final design. This task includes the evaluation of the necessity for flowage easements to identify the impacts of diverted flows directed by this project onto previously non-impacted properties, or properties that would be impacted differently. This scope is limited to identifying but does not include performing this work. This information will be included in the Summary Report.
- 2.1.20 Project Documentation. The CONSULTANT will develop the following documentation for this CAR:
- 2.1.20.1 Telephone contacts and personal contacts made during the course of the project.
- 2.1.20.2 Summary Report: The CONSULTANT shall prepare a Final Report for the Loop 303 Drainage Improvements CAR. This report shall include an executive summary, documentation of all the plans, reports, maps, and documents collected for this project, any findings/recommendations, and any issues that need further investigation. The CONSULTANT shall base the Report on the following suggested table of contents:

- PART 1 Executive Summary
- PART 2 Introductions
 - Overview
 - Purpose and Need
- PART 3 Existing Condition
 - Opportunities and Constraints
- PART 4 Future Conditions
 - Opportunities and Constraints
- PART 5 Landscape Aesthetics/Multi P use Analyses
 - Landscape Character Units
 - Landscape Themes
- PART 6 Alternatives Analysis
- PART 7 Recommendations and Next Steps
 - Requirements for Permits and approvals

APPENDIX

- Project Exhibits
- Project Contacts
- Meeting Minutes
- Contact Logs
- ROW/DCR Level Plans
- Cost Estimates

2.1.20.3 The CONSULTANT shall submit all modeling output as a Supplementary Hydrology Report separate from the Summary Report. A CD with the digital models will be included in a pocket as a part of this report.

2.1.21 Meetings. Consultant shall prepare, attend, and keep the minutes for the following meetings:

2.1.21.1 Up to four (4) progress meetings and other meetings with the DISTRICT as required to coordinate the progress of the project.

2.1.21.2 Up to five (5) partner agency and stakeholder meetings to solicit input from stakeholders. Stakeholder input shall be documented and included in the final report.

2.1.21.3 Up to two (2) public meetings. The first public meeting will present the four alternatives and draft recommended alternative. The purpose of the second public meeting is to present the final recommended alternative. The CONSULTANT

shall provide graphics and exhibits for the public meetings developed in previous tasks. The DISTRICT will advertise the meeting, secure the meeting location, and mount the graphics provided by the Consultant. Copies of all advertisements/notices, and any public comments shall be included in the final report.

2.1.22 Deliverables. The CONSULTANT shall prepare and deliver to the DISTRICT for review five (5) hard copies of the Draft Summary Report and 3 CD's with the digital hydraulic and hydrology models that have been used. Upon conclusion of the project, five hardcopies (5) of the Final Summary Report and Exhibits will be delivered to the DISTRICT. The CONSULTANT shall also deliver a separate CD containing electronic copies of the report and exhibits in PDF format and a CD containing the models and documents/graphics/drawings in the original format in which the documents were developed. The CONSULTANT shall provide the following deliverables to the DISTRICT:

2.1.22.1 DCR level plans developed for the recommended alternative. Plans shall be 11" X 17" size plans.

2.1.22.2 Design data and cost estimates for alternatives

2.1.22.3 Summary Report for the Loop 303 Drainage Improvements CAR.

2.1.22.4 Exhibits created for Phase II of this study include one (1) exhibit for each of the four alternatives (including integrated landscape cross-sections), one (1) exhibit for the draft recommended alternative, a revised hydrology map, and an exhibit depicting the recommended alternative. Exhibits shall be a minimum of 24"x 36" color plots.

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

APPENDIX B

General Documentation



**MEETING AGENDA: LOOP 303 DRAINAGE IMPROVEMENTS
12/15/06 PROGRESS MEETING**

Date: December 15, 2006, 1:30-3:30 PM

Place: Flood Control District, Adobe Room

- 1. Introductions**
- 2. Project Schedule**
- 3. Discussion Items**
 - a. Four Alternatives**
 - b. Landscape Themes**
 - c. HEC-1 Modeling**
 - i. Share Preliminary Results**
 - d. Integrated Cross-Sections**
 - e. Right-of-way Cost**
 - f. Evaluation Matrix**
 - i. What format?**
 - g. Next Stakeholder and Partner Meetings**
 - h. Public Meetings**
 - i. Critical Path Calendar**
- 4. Other**



MEETING SUMMARY: LOOP 303 DRAINAGE IMPROVEMENTS 12/15/06 PROGRESS MEETING

Date: December 15, 2006, 1:30-3:30 PM

Place: Flood Control District, Adobe Room

Attendees: Dennis Holcomb, Flood Control District
Pedro Melo-Rodriguez, Flood Control District
John Holmes, Flood Control District
Jennifer Pokorski, Flood Control District
Greg Jones, Flood Control District
Nicole Kelley, Flood Control District
Mike Heaton, Project Engineering Consultants
Ying Xu, Project Engineering Consultants
Jay Hicks, EDAW
Jack Ankrom, EDAW
Monina Ramirez, EDAW
Jay Hicks, EDAW
Chris Moore, Parsons-Brinckerhoff
Jay Koesters, Parsons-Brinckerhoff
Don Smith, EcoPlan

Meeting Purpose

- Progress meeting regarding the Loop 303 Phase 2

Discussion:

- Jen briefly went over the project schedule. Hydrology and landscape architecture deliverables will be sent to the District for review the first week of January
- Mike reviewed the four selected alternatives and answered questions.
- Mike then reviewed the results of the hydrological analysis for the four alternatives and what the flows were predicted for channels at different locations.
- The hydrology revealed that there was a unique peak at the very north end of the project and PEC requested that the District look at it and provided comment or direction.
- It was recommended that the concrete channel alternative (Alt 2) not be a part of the public meeting and not shown to public since it is only being used as a baseline for cost estimate for the MOU/IGA with ADOT.
- Basin configurations were discussed. The depth of the "state land basin" was a concern if it is deep. People usually don't like basins over 3-ft deep although there are some 3-ft neighborhood basins in the City of Goodyear.

- There is no restriction on depth for regional basins.
- Groundwater may become a concern if the basin has to be too deep.
- Diversion pipes (conveying water from western side of Cotton Lane to the eastern side) should be added to the Alt 3 graphic.
- Keep in mind that the chain of small basins (Alt 9) could be shaped as wide spots along the channel, and make the basins less distinctive from the channel. It was also noted that these basins are also “new” basins and not just using the existing basins from existing developments.
- Concentration points should be added to Alternative 9 graphic. Diversion pipes are also needed for Alt 9 graphic. Use dashed lines to show how off-site drainage is handled.
- Concern was expressed that there may be additional or different drainage areas contributing to the Alt 13 basins and channels.
- The northwestern watershed would contribute storm water to the “railroad basin” if it were in place.
- The outfall of the basin was also discussed. This basin would likely be drained using inverted siphon under the railroad, MC85, the PVNG pipeline, and the BID canal to the south.
- The outfall discharges to the existing BID wasteway ditch (about one mile short to the river). This ditch should be added to the Alt 13 graphic.
- The capacity of this ditch is not known. There may be some 1’ topo available and the District will get it for use on this project. Will need to consider the costs to upgrade the BID facility.
- It is not known if there is a continuous low flow in the ditch. If there is, this will have some effects on landscaping design.
- There is an existing channel along side of Cotton Lane to intercept the storm water from the east. PEC should check the plans to know what the impact of moving the channel away from the Cotton Lane alignment will have.
- The future 801 will have a different alignment from the one shown in the current alternative exhibits. The probable alignment will be to the south of MC85 and will not cross the BID.
- The ROW dedication for the Loop 303 also needs to include 30-foot frontage road on each side of the freeway.
- The interchange will likely be about ½ mile east of Cotton Lane. It was asked if there was a potential for the interchange to drain to the east to the Loop 303

outfall channel. It is a possibility, but it would depend on grade. It may have to be pumped.

- Some discussion was had that the existing conditions should be considered for the construction of the channels, for the final or selected alternative. i.e. the channels may be able to be constructed larger than necessary for the future conditions so enable them to convey the interim flows. This could help prevent damage due to undersized facilities. PEC will check the existing condition HEC-1 modeling (2004).
- PEC raised a question about the basins in the HEC-1 model. They were modeled as retention basins. If, in the future, they are detention basins, the flows in the channels will be larger than they are in the model. As a note, it was indicated that there is no restriction about the drain time for regional basins. For instance some of the Districts FRS do not drain in 36 hours.
- During a discussion regarding the generic cross sections used at this point it was noted that a side slope of 6 to 1 is about the maximum for any turf area due to maintenance issues. PEC noted that this was merely a preliminary look at the cross section. These will be presented to EDAW and modified according to the LS requirements.
- PEC will provide a constant side slope (5 to 1) for all channels for the first go-around on the channels. From this, the channels can be re-shaped as long as the flow areas are roughly maintained.
- The landscape themes were presented to the group. Three types were discussed. Two were natural or "faux desert" it was noted and one was agricultural in nature. Both of the desert themes could be used as a transitional section from the basin to channel.
- It was pointed out that the communities in a recent workshop had forgone the agriculture concept for LS in their areas.
- The District policy encourages natural desert themes, or themes that relate to adjacent landscape.
- It was also noted that it might be appropriate if the "ag" theme was used in a limited way with mountain vistas in the background.
- The evaluation matrix was discussed and will be developed by the District and PEC and sent out for comment.
- The public meeting critical path was discussed as well as other public meetings.
 - Stakeholder Mtg 1-24-07 (Week of)
 - Partner Agency Mtg 2-2-07 (Week of)
 - Public Meeting 2-12-06 (Week of)

- The District will provide land value information for PEC to use to determine ROW cost.
- Next Progress Meeting 3-14-07



MEETING SUMMARY: LOOP 303 DRAINAGE IMPROVEMENTS 4/12/07 PROGRESS MEETING

Date: April 12, 2007, 1:30-3:00 PM

Place: Flood Control District, Adobe Room

Attendees: Dennis Holcomb, Flood Control District
John Holmes, Flood Control District
Jon Loxley, Flood Control District
Jennifer Pokorski, Flood Control District
Greg Jones, Flood Control District
Nicole Kelley, Flood Control District
Mike Heaton, Project Engineering Consultants
Monina Ramirez, EDAW
Keith Brown, City of Goodyear
Mark Yalung, Parsons Brinckerhoff (for ADOT)
Gary Sun, Parsons Brinckerhoff (for ADOT)

Meeting Purpose

Update on project status and revised project schedule, discuss possibility of canceling first public meeting and review work completed to date.

Schedule Update

- ADOT planned public meeting in early June; but will now be delayed to August or later due to revisions to EA
- ADOT is reviewing the EA and waiting for a Change of Access Report
- CoA Report to accompany the EA to the FHWA for review
- Loop 303 CAR public meetings will need to be further delayed to accommodate ADOT's EA process

Public Meeting Discussion

- Basically two options: Cancel or postpone the first public meeting
- Could cancel and move forward and just present the recommended alternative at the fall public meeting
 - District committed to the public process
 - Would not be good to move forward without public review
 - Could meet one on one
 - Could meet with Goodyear Council
- Could let the meeting float and have it late in the summer or fall when ADOT and FHWA has reviewed and accepted the EA
- At this point, the District will let the public meeting float, and hopefully take options to the public in late summer

Recommended Alternative Selection

- Much discussion on what ADOT or FHWA would consider a “public meeting”
- Council meeting would be considered public
- Groups of landowners would possibly be considered public
- There was some thought that individual meetings with landowners could be considered public
- Need a meeting with ADOT to determine how a “public meeting” is defined.
- Goodyear could be invited to a meeting with the District and ADOT
- Stakeholders may want to meet and select the alternative and move forward with the knowledge that if the public outcry is loud enough, it may be in vain.
- District to schedule meeting with ADOT and Goodyear to discuss next steps.

Other

- Hydrology spike just below I-10 being reviewed by the District
 - Something looks odd, but reason has not been determined
 - Spike is double expected flow rate, but not much volume
 - District should check if the model includes the projects in place along Jackrabbit Trail
- EDAW reviewed the latest version of the landscape themes and methods
- Goodyear would like the ROW to begin to work with developers on ROW issues
- Discussion on the large flow rate on the south end of the study
 - This is due to the channel picking up additional flow that used to travel south to the river.
 - Las Brisas has a channel planned that may intercept some of this runoff

Action Items

- District to set up meeting with ADOT to discuss definition of “public” related to EA process
- District to continue reviewing issue with hydrology spike south of I-10
- District will schedule a meeting to select a recommended alternative for mid-May
- District to provide ROW for the alternatives to Goodyear



**PROGRESS MEETING AGENDA: LOOP 303 DRAINAGE
IMPROVEMENTS: I-10 TO GILA RIVER CAR PHASE 2
PROGRESS MEETING**

Date: April 12, 2007 1:30-3:00

Place: FCDMC Adobe Room

- 1. Introductions**
- 2. Schedule Update** (Jen; 5 minutes)
- 3. Public Meeting Discussion** (All; 15 minutes)
 - a. Pros and cons of cancelling the first public meeting
- 4. Recommended Alternative Selection Process** (District/EDAW; 20 minutes)
 - a. Selection Meeting
 - b. Review of Work Completed To Date
- 5. Other** (All, 20 minutes)
 - a. Hydrology Issue (John)
 - b. Issues/Concerns
- 6. Next Steps** (5 minutes)



PROGRESS MEETING AGENDA LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER

Date: August 16, 2007

Place: FCDMC

Attendees: Jack Ankrom, EDAW
Keith Brown, Goodyear
Mike Duncan, FCD
Mike Heaton, PEC
John Holmes, Flood Control District
Greg Jones, Flood Control District
John Louis, Parsons Brinckerhoff
Jon Loxley, FCD
Amir Motamedi, FCD
Jen Pokorski, Flood Control District
Gary Sun, Parsons Brinckerhoff

Purpose of Meeting

- To present updated hydrologic analysis – existing & future
- To present channel & basin sizing (using Goodyear alignment)
- To discuss impact of south side channel
- To discuss ADOT alignment and schedule

Recommended Alternative Hydrology

- PEC presented hydrology and exhibits
- Discussed the locations where the ADMP hydrology was modified to match the Recommended Alternative Alignment
- LP13 is the concentration point upstream of the state land basin.
- Flow attenuates at 81 ac-ft basin for the future conditions
- Flow doesn't attenuate at the basin for the existing conditions.
- For existing conditions 40% of the outflow from the state land basin is diverted to the Canyon Trails System, with the remaining 60% within the ADMP channel following along the west side of the Cotton Lane.
- The discharges re-combine at point LP15 on the northwest corner of the Cotton Lane and the Lower Buckeye Road.
- Flows from the northeast of the Cotton Lane merge at CP331.
- Discussed the size of the basin on the south end near the railroad.
 - For existing conditions the basin would require 750 AF to attenuate the flow across the RR and MC85 to about 150 cfs
 - Existing inflow to RR basin is 1350 cfs
 - Future conditions basin requires 50 AF
 - Plans show 21 acres for the 50 AF basin

- Takes most of parcel, should probably take all
- Discussed size of the north basin on state land
 - For existing conditions the basin would remain 81 AF and the outflow split between the Canyon Trails Channel and the ADMP Channel
 - Existing inflow is 661 cfs
 - Future conditions basin volume required 81 AF
 - Future conditions inflow 215 cfs
 - Basins north of freeway may be enlarged to eliminate the State Land Basin. ..Suggested to look at eliminating State Land Basin
- The drainage basins were modified to reflect the modified location of the channel based on the Recommended Alternative
- Hydrologic analysis will be provided to the District for review.

Channel Alignment Plans

- Channel was developed using the pieced together topo files from various projects
- Plans are not “tied down” by survey.
- Channel sized to accommodate the Existing Conditions with Projects in place
- Design will actually be for Future Conditions with Projects in place
- Preliminary plans reviewed
- How do the Canyon Trails System and the ADMP Channel connect?

Loop 303 Alignment

- Reviewed the proposed alignment of 303 through El Cidro
- Desire an alignment that will lessen impact to pre-plat
- This proposed alignment does not work since it does not take into account the 801 TI impact
- The 303 will most likely take a bend south at 175th Street and head in a southerly direction.
- This alignment will impact the currently proposed basin site so additional land will be required
- Could bridge the site, but not that far along in the planning yet
- Initial selection report is due in the fall
- Final selection won't be until the spring next year
- Freeway mostly elevated and within a very narrow section
- Will be elevated with retaining walls most likely.
- Will be near grade between arterial crossovers – never below grade.



**PROGRESS MEETING AGENDA: LOOP 303 DRAINAGE
IMPROVEMENTS: I-10 TO GILA RIVER CAR
PROGRESS MEETING**

Date: August 16, 2007 1:30-3:00

Place: FCDMC New River Room

- 1. Introductions**
- 2. Recommended Alternative Hydrology**
 - a. Existing Conditions
 - b. Future Conditions
- 3. Preliminary Channel Alignment**
- 4. Loop 303 Alignment**
 - a. Impacts on channel/basin locations
 - b. Impacts on project schedule
- 5. Early ROW Acquisition**
- 6. Next Steps**



PROGRESS MEETING AGENDA LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER

Date: December 11, 2007 10:00 – 11:30 a.m.

Place: FCDMC Buckhorn-Mesa Room

Introductions

Project Schedule

Stakeholder Meeting	11/6/07 (Completed)
Public Meeting	11/15/07 (Completed)
Plan Sheet Submittal	12/3/07 (Completed)
Plan Sheet Review Comments Due	12/19/07
Draft Final Report to FCD	12/21/07
Final Report Comments Due.....	1/14/08
Project Close-out	1/24/08

Project Updates

- Hydrology
- Feasibility Level Plans
- Landscape Aesthetics
 - Basin/Park Design
 - Cross-sections

Final Report

- Table of Contents
- Review Process

Other



PROGRESS MEETING AGENDA LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER

Date: December 11, 2007 10:00 – 11:30 a.m.

Place: FCDMC Buckhorn-Mesa Room

Attendees: Keith Brown, Goodyear
Mike Heaton, PEC
John Holmes, Flood Control District
Greg Jones, Flood Control District
Velvet Li, ADOT
Jon Loxley, FCD
Jen Pokorski, Flood Control District
Monina Ramirez, EDAW
Debbi Shortal, Flood Control District
Valerie Swick, Flood Control District
Farhad Tavassoli, Goodyear

Project Schedule

- The stakeholder meeting to present the recommended alternative was held on November 6. The stakeholders positively received the recommended plan.
- Questions were raised as to how developers could tie in to channel. The final report should address how adjacent development can tie in to channel.
- Goodyear has told them that the channel can be used for discharge of roadway runoff and for their on-site runoff sans the first flush (need to define first flush).
- Goodyear will coordinate these tie-ins with the FCD for discharges.
- Goodyear is also considering in-lieu payments for development.
- The public meeting was held Nov. 15. Few public comments were received. The public was favorable toward a landscaped channel and a park in the basin site.
- The Plan Sheets were submitted for review on Dec. 3. Review comments are due Dec. 17.
- PEC pointed out the 55' section and how it included a vertical wall along the roadway and *not the trail side*.
- The draft Final Report is due to FCD on Dec. 21, with final comments due on Jan. 14. Project close-out is Jan. 24, 2008.

The first public meeting will present the four alternatives and draft recommended alternative.

Partner Agency Meeting #3 – 23 weeks from NTP

Present final recommended alternative to the Partner Agencies and receive input.

Draft Summary Report Due – 24 weeks from NTP

Stakeholder Meeting #2 – 25 weeks from NTP

Present recommended alternative.

Public Meeting #2 – 26 weeks from NTP

Present recommended alternative.

Final Report – 28 weeks from NTP (for review)

End of Project/Comments Resolved – 32 weeks

2.0 Tasks

- 2.1.1 The CONSULTANT, in coordination with the DISTRICT, shall develop a brief narrative describing the qualitative advantages and disadvantages of each of the seed ideas identified in Phase I. The CONSULTANT shall participate in the presentation and selection of four (4) alternatives for further consideration, one of which shall be the no-action alternative.
- 2.1.2 The CONSULTANT shall develop four (4) exhibits, one for each of the alternatives to define the critical elements of each plan.
- 2.1.3 The CONSULTANT, in coordination with the DISTRICT, shall develop landscape themes for the project area based upon a review of the District's Existing and Planned Landscape Character Assessment for Maricopa County, the Landscape Aesthetics Assessment and Multi-Use Opportunities Assessment for the Loop 303/White Tanks ADMPU, and the landscape themes developed in the Loop 303/White Tanks ADMPU
- 2.1.4 The CONSULTANT shall modify the HEC-1 future conditions with projects in place model developed in the Loop 303/White Tanks ADMPU for each of the four (4) alternatives to determine flow rates and basin volumes.
- 2.1.5 The CONSULTANT shall determine the preliminary size of channels using normal depth calculations. No backwater modeling will be done.
- 2.1.6 The CONSULTANT shall develop integrated cross-sections with functional requirements and aesthetics, including right-of-way needed for aesthetics in order to adequately compare alternatives. Exhibits for the 4 alternatives shall include, plan

Project Updates

Hydrology

- PEC pointed out that the final design ignored the "215 cfs" anomaly and designed for the flow rate adjacent to the anomalous section. New hydrology will eliminate the problem.
- PEC also pointed out that the ROW has been shown in the past at the "neat lines" and for the feasibility plans the ROW was shown in 5 foot increments.
- These should be clearly written up in the final report

Landscape Aesthetics

- Basin/Park Design
 - Parcel is 30 acres and the basin is 20 acres.
 - 20 acres is not really large enough for a regional park facility. If City buys the adjacent parcel then the regional park is more of an option.
 - FCD will work with Goodyear to determine needs and requirements.
 - Perhaps park should be "generic" and if the other parcel works then it could change.
 - Freeway final design anticipated in 2016.
 - Perhaps basin can be an elevated bypass design... maybe 150 cfs bypass.
 - The outlet culvert is too long and too short to adequately accommodate pedestrian access. Look into possibly providing bat habitat in culvert.

Final Report

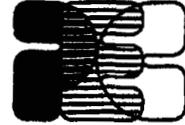
- Table of Contents
 - Need to separate future design issues/considerations
 - FCD will provide comments to PEC on the TOC.
 - Should find a place to highlight stakeholder comments from meeting memos.
 - Need to add a paragraph or sentence or two about the FCD spending limitation for amenities. Funding will allow for some design consideration for future use and elements, but there are spending guidelines the have to be followed.

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

APPENDIX C

Survey Field Notes

Project Engineering Consultants, Ltd.



Loop 303 CAR Phase 2

Basis of Datum: Accuracy and Order

The unit of measurement for this project is International Feet as defined by executive order of the United States on July 1, 1959 and as mandated by Arizona Revised Statute 33-132.

The vertical datum is based on NAVD88 and meets the 95% accuracy standard as defined in the "Geospatial Positioning Accuracy Standards, Part 2: Standards for Geodetic Networks", Federal Geodetic Control Subcommittee, Federal Geographic Data Committee, 1998.

The horizontal datum is based on NAD83 (with 1992 adjustment) Arizona State Plane Coordinates (Central Zone), which complies with Arizona Revised Statutes 33-131 and 33-132 and meets the 95% accuracy standard as defined in the "Geospatial Positioning Accuracy Standards, Part 2: Standards for Geodetic Networks", Federal Geodetic Control Subcommittee, Federal Geographic Data Committee, 1998.

Coordinate and elevation values are on the Maricopa County Geodetic Densification and Cadastral Survey (GDACS) control system (NAD83 with 1992 adjustment horizontally and NAVD88 vertically). All coordinate and elevation values are within 0.2' relative to valid NAVD88 benchmarks and GDACS control stations.

The work for this portion of the project was performed in April 2007. Fieldwork was performed using realtime kinematic GPS methods, utilizing a Leica GX1230 unit.



Expires 6-30-09

Engineers • Planners • Surveyors

2310 W. Mission Lane, Suite 4, Phoenix, Arizona 85021 Tel: (602) 906-1901 Fax: (602) 906-3080 e-mail: pec@pecaz.com

10	873145.26	542771.66	900.56	NAIL
100	873178.10	542842.48	901.35	TOP
101	873173.66	542844.01	901.07	ER
102	873162.00	542849.96	900.53	ER
103	873138.67	542818.58	900.78	ER
104	873152.50	542809.40	900.94	ER
105	873156.93	542805.90	902.01	TOP
106	873142.65	542784.96	899.60	HW
107	873149.18	542773.66	899.62	HW
108	873149.12	542775.84	899.63	CONC
109	873145.10	542784.20	899.73	CONC
11	872503.27	542457.13	894.22	NAIL
110	873148.47	542752.58	900.60	TOP
111	873142.28	542753.27	900.14	ER
112	873126.59	542753.32	899.69	ER
113	873112.68	542744.45	898.65	WW
114	873119.84	542757.17	898.41	WW
115	873123.40	542759.35	898.31	WW
116	873118.83	542767.19	898.09	WW
117	873117.94	542766.82	898.04	WW
118	873111.70	542769.91	898.02	WW
119	873117.88	542769.12	899.48	HW
120	873124.67	542757.74	899.53	HW
121	873106.95	542784.15	898.99	ER
122	873100.92	542797.04	898.60	ER
123	873086.94	542820.30	896.16	NG
124	873046.97	542791.37	896.00	NG
125	873053.88	542776.92	896.11	NG
126	873059.12	542767.48	897.81	ER
127	873067.09	542754.99	897.48	ER
128	873069.26	542751.27	897.63	TOP
129	872930.73	542644.73	897.50	TOP
130	872930.12	542647.61	896.90	ER
131	872922.23	542659.27	896.85	ER
132	872917.93	542664.79	896.97	NG
133	872909.20	542677.48	894.81	NG
134	872706.34	542511.32	896.13	TOP
135	872705.28	542514.36	895.48	ER
136	872699.48	542525.91	895.68	ER
137	872695.58	542533.19	896.47	NG
138	872683.60	542550.35	895.00	NG
139	872542.49	542429.38	895.97	TOP
140	872541.29	542432.40	895.34	ER
141	872534.89	542447.03	895.02	ER
142	872529.27	542458.58	894.08	NG
143	872524.72	542466.09	894.07	NG
144	872254.33	542256.60	895.50	TOP
145	872252.73	542259.30	894.75	ER
146	872242.60	542271.23	894.00	ER
147	872234.84	542281.17	892.07	NG
148	872224.79	542293.06	891.91	NG

150	872046.85	542066.17	894.40	ER
151	872036.78	542076.12	894.03	ER
152	872027.26	542085.92	892.11	NG
153	872016.14	542096.78	891.90	NG
154	871920.66	541933.36	895.25	TOP
155	871918.44	541935.46	894.14	ER
156	871907.21	541945.37	893.74	ER
157	871901.11	541950.32	892.26	NG
158	871889.74	541960.59	891.73	NG
159	873082.28	542731.36	896.26	TOP
160	873110.22	542712.70	897.15	ER
161	873119.09	542703.32	897.68	ER
162	872974.74	542583.16	897.89	ER
163	872966.74	542596.15	897.97	ER
164	872955.98	542610.61	896.27	NG
165	872946.08	542625.55	896.36	TOP
166	872738.57	542456.06	897.45	ER
167	872732.26	542468.57	896.89	ER
168	872729.27	542474.32	895.97	NG
169	872718.72	542493.71	895.13	TOP
170	872573.49	542371.74	897.39	ER
171	872567.31	542383.34	897.10	ER
172	872563.02	542390.78	895.30	NG
173	872552.97	542412.12	894.66	TOP
174	872299.92	542203.26	895.12	ER
175	872289.43	542214.10	895.60	ER
176	872275.59	542229.58	893.40	NG
177	872270.16	542238.89	894.02	TOP
178	872097.89	542013.59	894.67	ER
179	872085.30	542024.54	894.73	ER
180	872071.81	542037.51	892.26	NG
181	872064.09	542046.01	893.89	TOP
182	871979.85	541885.48	894.52	ER
183	871968.85	541894.59	894.70	ER
184	871957.22	541904.89	893.02	NG
185	871938.70	541920.04	892.57	TOP
186	871785.22	541775.96	894.24	TOP
187	871783.30	541777.76	893.76	ER
188	871770.98	541789.14	893.29	ER
189	871762.46	541796.71	891.93	NG
190	871752.70	541806.15	891.73	NG
191	871649.76	541677.77	893.54	TOP
192	871649.15	541685.08	893.16	ER
193	871648.03	541701.47	893.57	ER
194	871645.89	541727.75	893.21	ER
195	871420.05	541689.88	892.73	TOP
196	871420.42	541695.77	892.93	ER
197	871420.76	541711.78	892.97	ER
198	871420.94	541720.38	893.71	TOP
199	871420.39	541741.82	892.90	NG
200	871099.80	541683.07	891.30	TOP

149	872049.22	542063.56	895.33	TOP
202	871098.75	541706.02	892.20	ER
203	871096.92	541736.92	892.01	ER
204	870700.44	541669.38	891.36	TOP
205	870700.08	541672.63	890.64	ER
206	870699.39	541683.98	890.14	ER
207	870699.44	541695.47	891.57	NG
208	870699.70	541721.14	890.08	NG
209	870591.88	541717.87	889.92	NG
210	870590.92	541693.68	890.70	NG
211	870590.62	541687.20	889.78	ER
212	870592.73	541669.10	890.40	ER
213	870592.02	541656.84	891.14	TOP
214	870569.38	541656.94	890.17	BC
215	871839.75	541725.95	894.34	ER
216	871827.75	541735.24	894.72	ER
217	871815.74	541744.90	892.70	NG
218	871797.46	541759.65	891.52	TOP
219	871656.76	541595.95	893.84	ER
220	871656.01	541608.29	893.32	ER
221	871653.67	541636.16	891.55	NG
222	871650.60	541653.78	892.67	TOP
223	871424.45	541596.92	893.71	ER
224	871424.67	541608.55	893.65	ER
225	871425.62	541633.51	890.61	NG
226	871426.27	541654.46	890.14	NG
227	871422.26	541671.15	891.18	TOP
228	871093.39	541592.31	894.67	ER
229	871093.20	541606.71	894.85	ER
230	871093.00	541611.17	895.15	NG
231	871089.91	541624.46	890.81	NG
232	871090.33	541644.73	888.52	NG
233	871089.04	541664.62	889.84	TOP
234	870702.08	541651.27	889.35	TOP
235	870701.92	541639.70	887.81	NG
236	870701.20	541617.18	888.90	NG
237	870592.91	541632.50	889.38	TOP
238	870594.04	541622.77	889.05	NG
239	870591.50	541606.14	892.17	NG
240	870591.60	541599.68	894.54	ER
241	870592.60	541584.90	893.72	ER
242	870699.18	541586.89	895.30	ER
243	870700.76	541598.23	895.27	ER
244	870701.03	541603.45	895.75	NG
245	873072.84	542746.95	893.26	BOTTOM
246	873087.20	542741.81	891.95	BOTTOM
247	872939.60	542631.86	891.39	BOTTOM
248	872715.00	542496.94	891.76	BOTTOM
249	872711.44	542504.75	891.22	BOTTOM
250	872550.42	542418.54	890.76	BOTTOM
251	872548.98	542423.76	890.24	BOTTOM

201	871099.86	541693.75	891.96	ER
254	872053.60	542049.83	888.94	BOTTOM
255	872051.12	542053.46	888.64	BOTTOM
256	871927.79	541917.70	888.97	BOTTOM
257	871794.04	541765.04	888.17	BOTTOM
258	871791.76	541768.20	887.97	BOTTOM
259	871651.74	541660.34	888.50	BOTTOM
260	871650.96	541666.30	888.28	BOTTOM
261	871420.10	541682.28	888.22	BOTTOM
262	871419.17	541677.28	888.00	BOTTOM
263	871098.95	541671.16	887.62	BOTTOM
264	871099.32	541676.24	887.31	BOTTOM
265	870699.32	541660.63	885.95	BOTTOM
266	870698.04	541657.84	885.57	BOTTOM
267	870584.48	541644.26	885.27	BOTTOM
268	870585.46	541640.10	885.09	BOTTOM
269	869385.36	541721.68	885.93	ER
270	869382.90	541687.70	884.84	ER
271	869380.46	541677.63	884.64	ER
272	869378.59	541671.50	884.34	TOP
273	869685.87	541660.94	888.02	TOP
274	869686.69	541664.26	887.69	ER
275	869686.45	541672.94	887.82	ER
276	869685.49	541682.12	892.61	NG
277	869830.32	541682.68	892.15	NG
278	869830.84	541672.32	888.27	ER
279	869831.42	541663.60	888.23	ER
280	869831.61	541659.84	888.97	TOP
281	870042.06	541658.25	889.88	TOP
282	870042.51	541662.01	889.23	ER
283	870042.03	541669.72	889.13	ER
284	870042.01	541681.15	891.22	NG
285	870288.32	541680.09	891.97	NG
286	870288.11	541671.80	889.30	ER
287	870288.12	541660.89	889.30	ER
288	870287.98	541657.45	889.88	TOP
289	870288.26	541649.20	884.08	BOTTOM
290	870288.63	541646.39	883.82	BOTTOM
291	870042.98	541649.78	883.31	BOTTOM
292	870043.67	541645.67	883.49	BOTTOM
293	869830.12	541610.37	888.07	NG
294	869830.61	541633.43	889.57	NG
295	869829.77	541637.02	888.63	TOP
296	869834.95	541644.79	883.21	BOTTOM
297	869836.19	541649.31	882.79	BOTTOM
298	869690.33	541624.21	888.61	NG
299	869689.37	541633.11	888.05	NG
300	869687.39	541636.92	889.20	TOP
301	869686.32	541646.16	883.02	BOTTOM
302	869685.93	541651.16	882.19	BOTTOM
303	869380.03	541660.15	881.44	BOTTOM

252	872266.06	542246.14	889.98	BOTTOM
253	872258.84	542250.38	889.63	BOTTOM
306	869384.08	541631.30	884.34	NG
307	869304.73	541597.43	882.30	NG
308	869298.58	541628.49	880.81	NG
309	869294.31	541669.07	881.61	NG
310	869215.30	541605.05	881.14	NG
311	869209.60	541633.21	881.31	NG
312	870287.39	541635.61	890.27	TOP
313	870285.28	541627.08	889.23	NG
314	870043.90	541623.21	889.04	NG
315	870043.93	541632.89	889.04	NG
316	870043.61	541633.86	890.22	NG
317	870043.51	541638.34	889.17	TOP
4AC1	866674.69	557399.92	927.06	NEWRW
4AE1	866245.90	520688.81	869.18	GDACS
4BD1	881160.93	533562.49	944.68	GDACS
SERV	909132.61	660198.47	1156.03	-----

304	869380.05	541655.93	881.14	BOTTOM
305	869380.80	541645.14	884.56	TOP

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

APPENDIX D

Hydrology

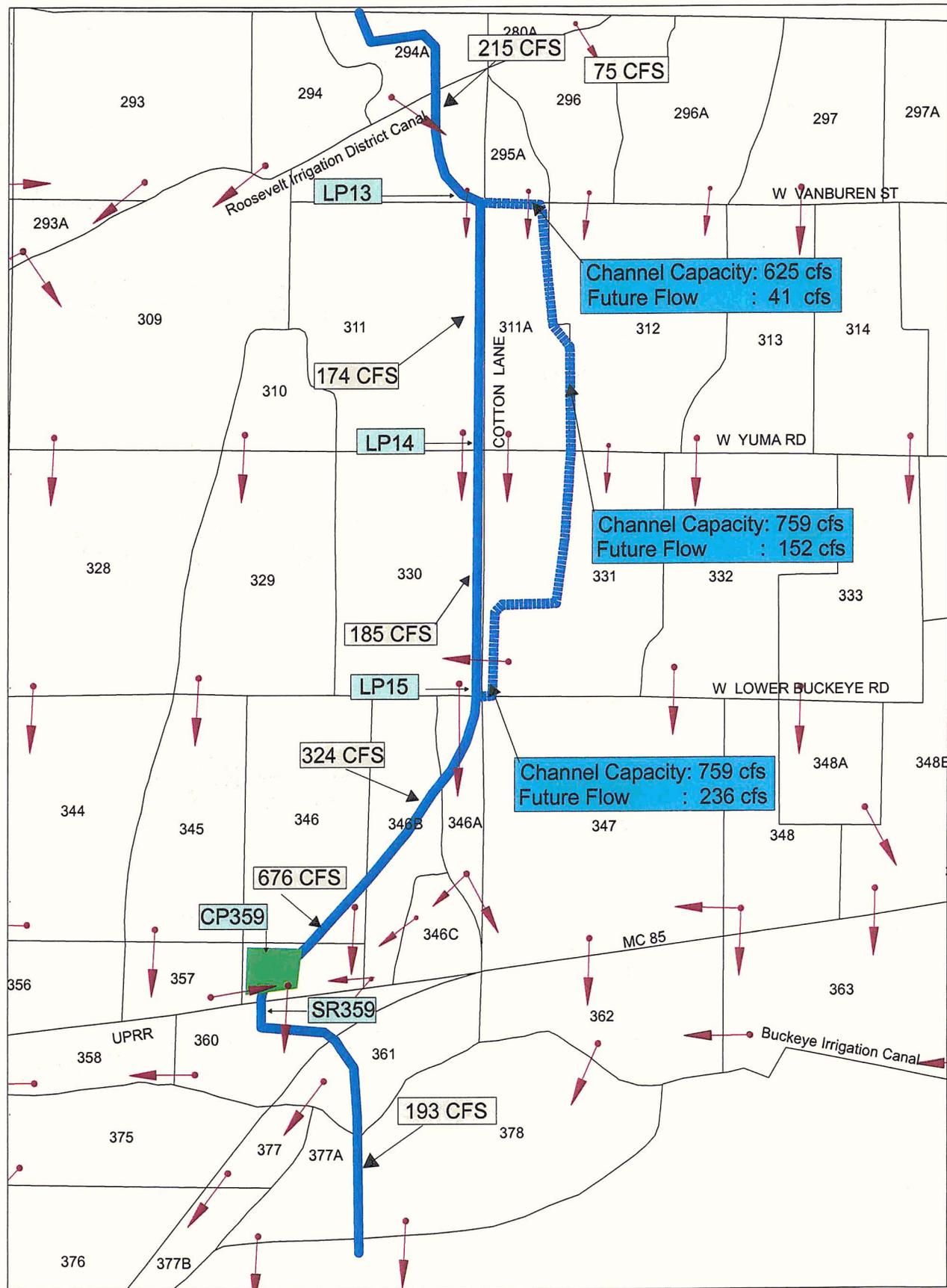


Exhibit 1: Future Hydrology with Projects in Place
Flood Control District of Maricopa County



Project Engineering Consultants
2310 W. Mission Lane, Ste 4,
Phoenix, AZ 85021

Design: PK

Drawn: PK

Checked: MDH

Scale:

0 1,000 2,000 4,000
Feet

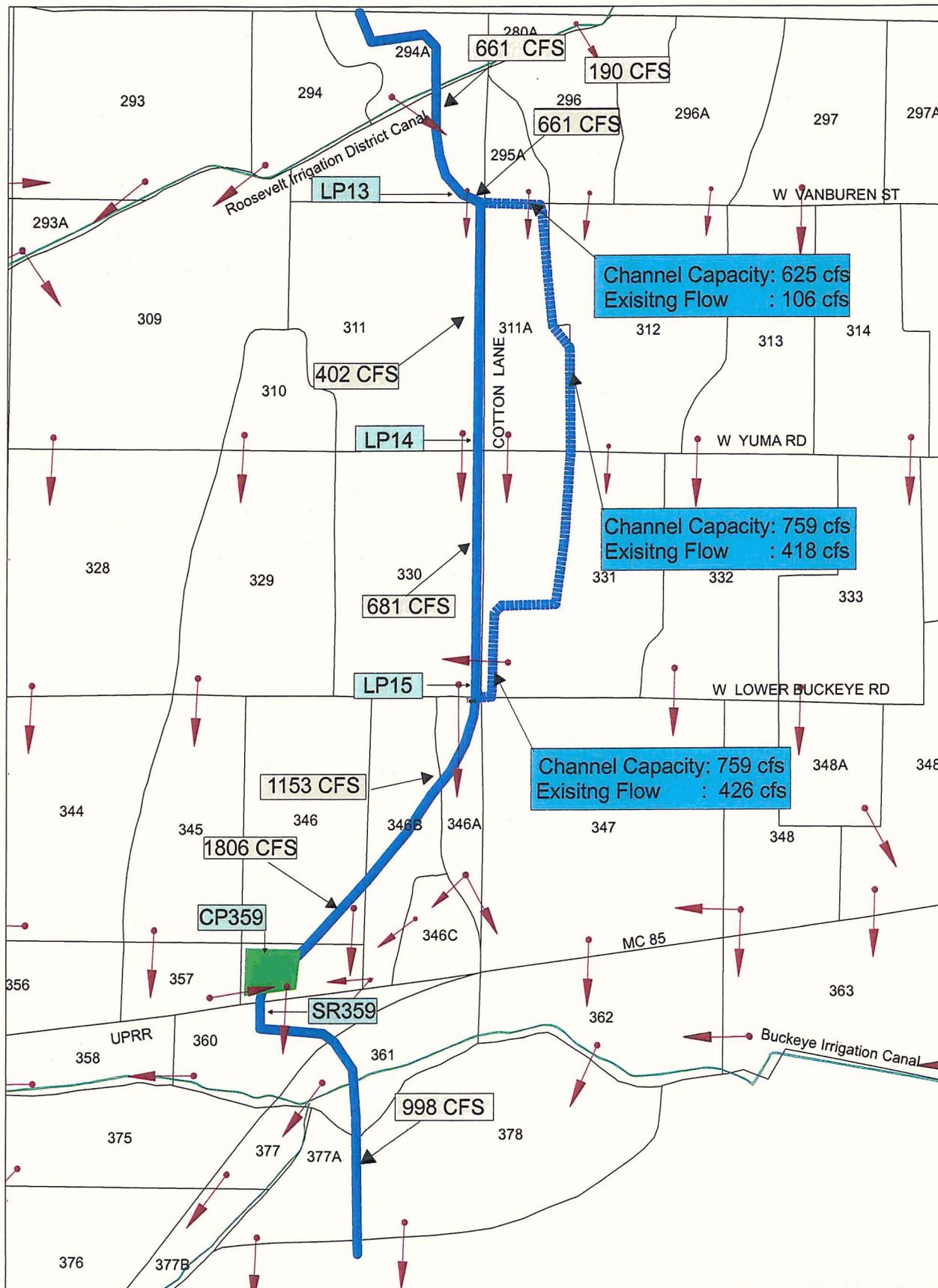


Exhibit 2: Existing Hydrology with Projects in Place
Flood Control District of Maricopa County



Project Engineering Consultants
2310 W. Mission Lane, Ste 4,
Phoenix, AZ 85021

Design: PK

Drawn: PK

Checked: MDH

Scale:

0 1,000 2,000 4,000
Feet

Railroad Basin Alternative:

Future Hydrology:

This alternative is all about replacing basin "B" in the original ADMP to the north of the railroad at MC 85, on the east of the Cotton Lane. Basin "A" in the original ADMP model is removed from this alternative. As the discharge at the intersection of the Van Buren Street and the Cotton Lane is 70 cfs, flow is not diverted along the Canyon Trails Channel to the east of the Cotton Lane.

The Discharge at the upstream of the basin "B" (LP16) in the original ADMP model is diverted along the loop 303 alignment and is combined with the runoff coming from the northwest (TO359) to form the new inflow hydrograph (CP359) to the railroad channel. The outfall coming out of the railroad basin (SR359) is combined with the flows coming from the basins East and West side of the outfall channel of the recommended alternative to form the new outfall (CP360) to the Gila River.

Existing Hydrology

The modeling concept of the existing conditions hydrology remains the same as that of the future conditions hydrology for the Railroad Basin Alternative except for 40% of the runoff diverted to the east side of the Cotton Lane (along Canyon Trails Channel) at the intersection of the Vanburen Street and the Cotton Lane (13OUT). The diverted flow along the Canyon trails channel is retrieved to the west side of the Cotton Lane at northwest intersection of the West Lower Buckeye and the Cotton Lane (LP15).

Concrete Channel Alternative

Regional basin "A" was removed from the model. This alternative is about constructing a concrete channel along the Cotton Lane. The Manning's "n" value for all the routing channels along Cotton Lane is changed from 0.013 to 0.016 to be more realistic for the concrete channels. Hydrologically, this change did not make any visible effect on the HEC-1 modeling.

State Land Basin.

This model is about replacing the basin "A" to the state land on the northwest corner of the Cotton Lane and the Vanburen Street and diverting all the outfall to the Canyon Trails Channel to the east. The outfall from the state land basin (LP13OU) is diverted to the east of the Cotton Lane along Canyon Trails Channel. The routed flows from the diverted flow to the Canyon Trails and the runoff from the basins on the northwest corner (311) and the northeast corner (CP311A, CP312) of the intersection of the Yuma Road and Cotton Lane are combined to form the flows under the Yuma Road (LP14). The routed flows from the Yuma road combine with the flow from the basins northwest corner (1I330) and the northeast corner (331) of the intersection of the Lower Buckeye Road and the Cotton Lane to form the runoff (LP15) which route through the original ADMP channel along the west side of the cotton lane to the Gila River.

Multi-Small Basin Channel.

This model is about to provide five small basins on the whole area, atleast one on the north of each one mile street. The two basins "A" and "B" were removed from the original ADMP model with the volume compensated by the five small basins in the recommended alternative. The volume of the basin is around 42 ac-ft for each of the basins. The runoff coming on the northwest intersection of the Interstate-10 and the Cotton Lane is diverted to the east side of the Cotton Lane, which is combined with the flow from the basins on the east side of the Cotton Lane (RETDIV). The flow is then routed through the first small basin far north of Vanburen Street (STR280). The runoff that is coming on to the northwest intersection of the Vanburen Street (LP13) and the Cotton Lane is routed to the east side of the Cotton Lane through a circular channel(1RLP13) which in turn is combined with the outfall coming from the first storage basin (Point1). This flow is routed through the second storage basin immediately upstream of the Vanburen Street (280AOU). The flow coming out of the basin is routed through and combined with the flows coming from the basins on the northeast intersection of the Yuma Road and the Cotton Lane (CP312, CP311A) and the flows routed from the basins on the northwest intersection of the Yuma Road and the Cotton Lane (311) to finally form the inflow hydrograph (point2) for the third small basin north of the Yuma road, east of the Cotton Lane. The outfall coming of the third storage basin

is combined with the flows coming from the basins on the northwest corner (330) and the basins on the northeast corner (331) of the intersection of the Lower Buckeye Road and the Cotton lane to form the inflow (LP15) into the fourth small basin north of the Lower Buckeye Road, east of the Cotton Lane. The runoff coming out of the fourth small basin combines with the flows coming from the northeast basins on the MC85 to form the inflow (CP347) into the fifth small basin north of MC85, east of the Cotton Lane. The outflow coming out from the fifth small basin (SR347) is routed to the west side of the Cotton lane combined with the basins south of MC 85 to form the final inflow into the Gila River (LP17).

Railroad Channel

This alternative is all about replacing basin "B" in the original ADMP to the north of the railroad at MC 85, on the east side of the Cotton Lane. Basin "A" in the Original model is removed from this alternative. As the discharge at the intersection of the Van Buren Street and the Cotton Lane is 70 cfs, flow is not diverted along the Canyon Trails Channel on the east side of the Cotton Lane.

The Discharge at the upstream of the basin "B" (LP16) in the original ADMP model is diverted along the loop 303 alignment and is combined with the runoff coming from the Northwest (TO359) to form the new inflow hydrograph (CP359) to the railroad channel. The outfall coming out of the railroad basin (SR359) is combined with the flows coming from the basins East and West side of the outfall channel of the recommended alternative to form the new Outfall (CP360) to the Gila River.

Issues with the HEC-1 models

In the original ADMPU HEC-1 model for future condition with project in place as well as for the alternatives, the hydrograph at “!LP14” (Yuma) is the combination of the routed flow from van Buren (RLP13) and local sub-basin runoff (311OUT). The peak flows shown in the output file are:

RLP13	82 cfs
311OUT	174 cfs
!LP14	93 cfs

To be conservative, PEC used 174 cfs to design the channel.

The hydrograph at “1I330” which is the combination of RLP14 and 330OUT has a similar problem.

RLP14	58 cfs
330OUT	185 cfs
1I330	61 cfs

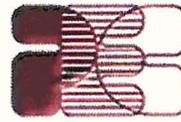
PEC used the higher value (185 cfs) for the channel design.

The FCDMC agrees with the conservative flows in both of the cases mentioned. The FCDMC further noted that the lower flows at the two concentration points (!LP14 and 1I330) are due to aerial reduction. The larger basin areas that are “hard” coded on the HC cards at the two concentration points which result in the lower peaks.

Rating Table Report RR Culverts

Discharge (cfs)	HW Elev. (ft)
0.00	891.28
20.00	892.21
40.00	892.61
60.00	893.02
80.00	893.52
100.00	894.06
120.00	894.67
140.00	895.37
160.00	896.06
180.00	896.67
200.00	896.97
220.00	897.29
240.00	897.63
260.00	897.98
280.00	898.35
300.00	898.74
320.00	899.14
340.00	899.56
360.00	900.00
380.00	900.45
400.00	900.92
420.00	901.41
440.00	901.91
460.00	902.04
480.00	902.06
500.00	902.09
520.00	902.11
540.00	902.12
560.00	902.14
580.00	902.16
600.00	902.17
620.00	902.19
640.00	902.20
660.00	902.22
680.00	902.23
700.00	902.24
720.00	902.26
740.00	902.27
760.00	902.28
780.00	902.29
800.00	902.31
820.00	902.32
840.00	902.33
860.00	902.34
880.00	902.36
900.00	902.37
920.00	902.38
940.00	902.39
960.00	902.41
980.00	902.42
1,000.00	902.43

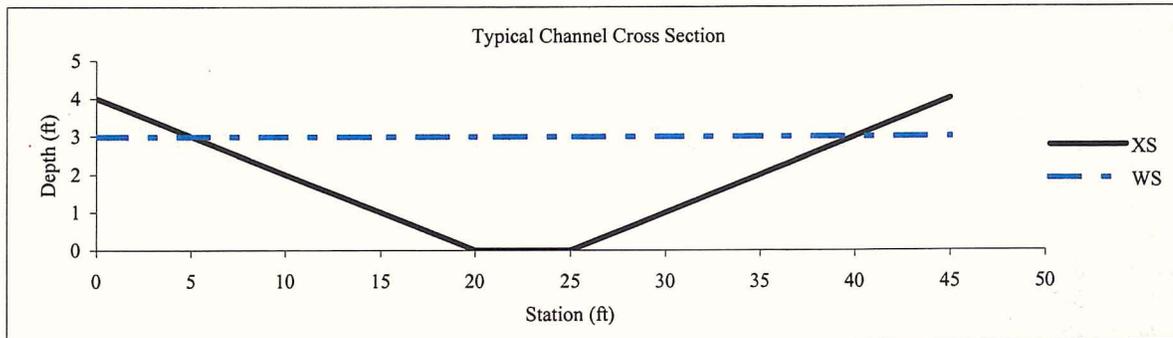
Typical Channel Cross Section
 Recommended Alternative
 Above the RID Channel



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	10	15	20	25	30	35	45
Y		4	2	1	0	0	1	2	4
Z (WS)		2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99



Discharge: 215 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 2.99 ft
 Top Width: ³ 34.92 ft
 Flow Area: ¹ 59.7 sq.ft
 Velocity: 3.6 ft/s
 Froud Number: 0.49
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

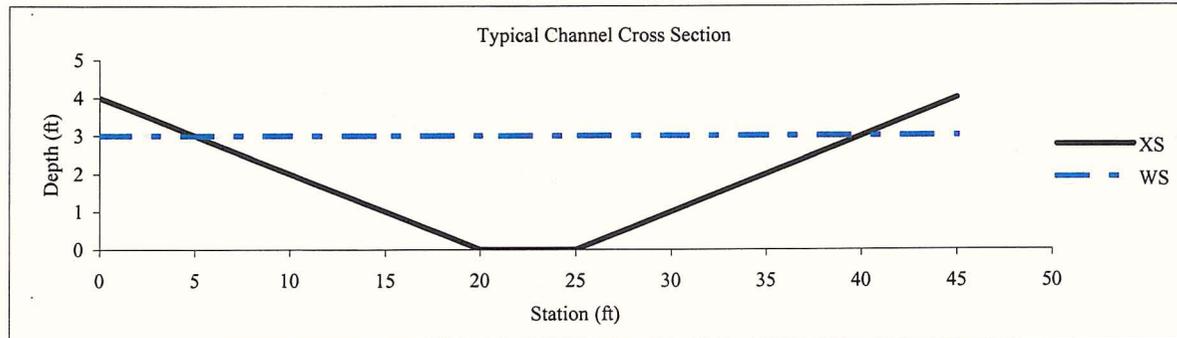
Typical Channel Cross Section
 Recommended Alternative
 RID - Van Buren



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	10	15	20	25	30	35	45
Y		4	2	1	0	0	1	2	4
Z (WS)		2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99

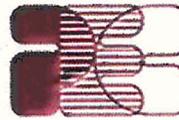


Discharge: 215 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 2.99 ft
 Top Width: ³ 34.92 ft
 Flow Area: ¹ 59.7 sq.ft
 Velocity: 3.6 ft/s
 Froud Number: 0.49
 Flow Type: Subcritical

NOTES:

- 1 Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- 2 Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- 3 This is the width of the water surface.

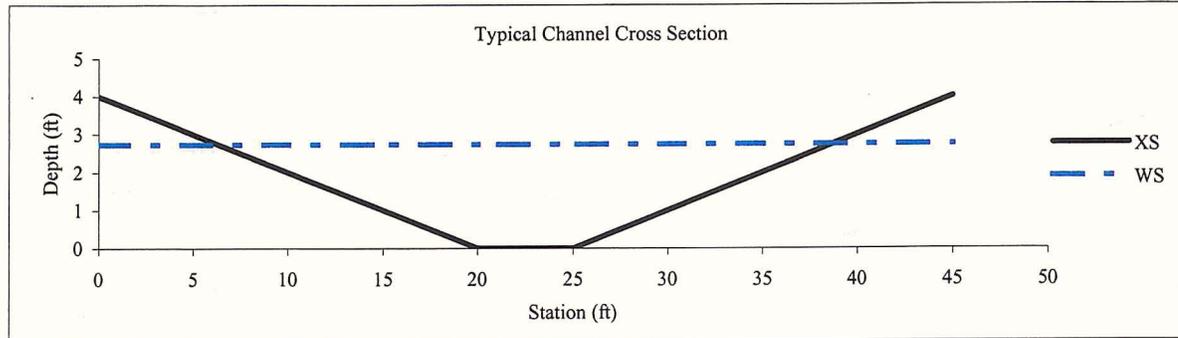
Typical Channel Cross Section
 Recommended Alternative
 Van Buren - Yuma



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	10	15	20	25	30	35	45
Y		4	2	1	0	0	1	2	4
Z (WS)		2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73

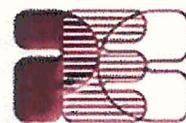


Discharge: 174 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 2.73 ft
 Top Width: ³ 32.32 ft
 Flow Area: ¹ 51 sq.ft
 Velocity: 3.41 ft/s
 Froud Number: 0.48
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

Typical Channel Cross Section
 Recommended Alternative
 Yuma - L Buckeye



Project Engineering Consultants, Ltd.

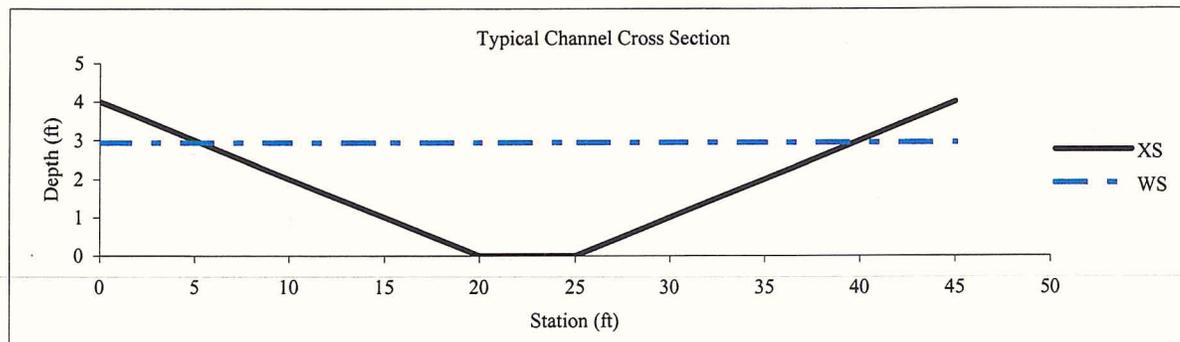
Design: YX

Check: MDH

Date: 12/20/2007

Channel Geometry:

X		0	10	15	20	25	30	35	45
Y		4	2	1	0	0	1	2	4
Z (WS)		2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94



Discharge: 185 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0038 ft/ft
 Water Depth: ² 2.94 ft
 Top Width: ³ 34.36 ft
 Flow Area: ¹ 57.8 sq.ft
 Velocity: 3.2 ft/s
 Froud Number: 0.44
 Flow Type: Subcritical

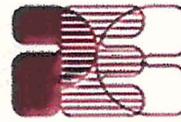
NOTES:

¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.

² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.

³ This is the width of the water surface.

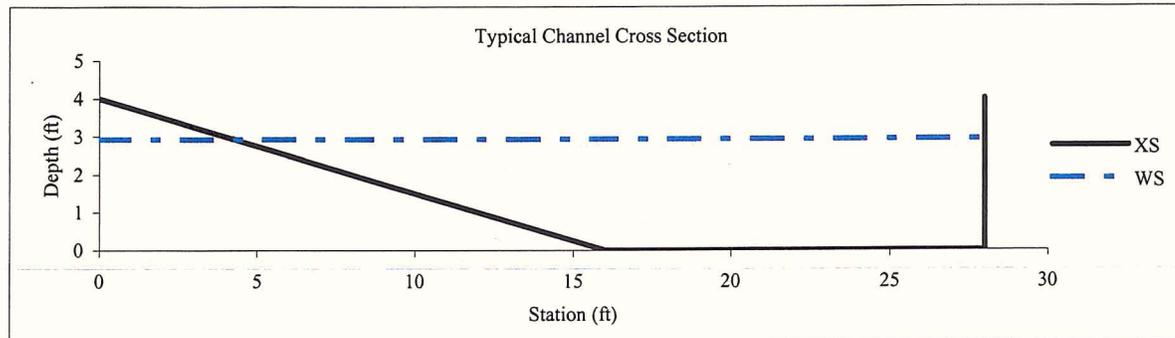
Typical Channel Cross Section
 Recommended Alternative
 Yuma - L Buckeye



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	8	16	28	28		
Y		4	2	0	0	4		
Z (WS)		2.92	2.92	2.92	2.92	2.92		

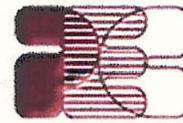


Discharge: 185 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 12 ft
 Side Slope: ¹ 4 :1
 Channel Slope: 0.0038 ft/ft
 Water Depth: ² 2.92 ft
 Top Width: ³ 23.7 ft
 Flow Area: ¹ 52.1 sq.ft
 Velocity: 3.55 ft/s
 Froud Number: 0.42
 Flow Type: Subcritical

NOTES:

- 1 Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- 2 Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- 3 This is the width of the water surface.

Typical Channel Cross Section
 Recommended Alternative
 L Buckeye - 175th



Project Engineering Consultants, Ltd.

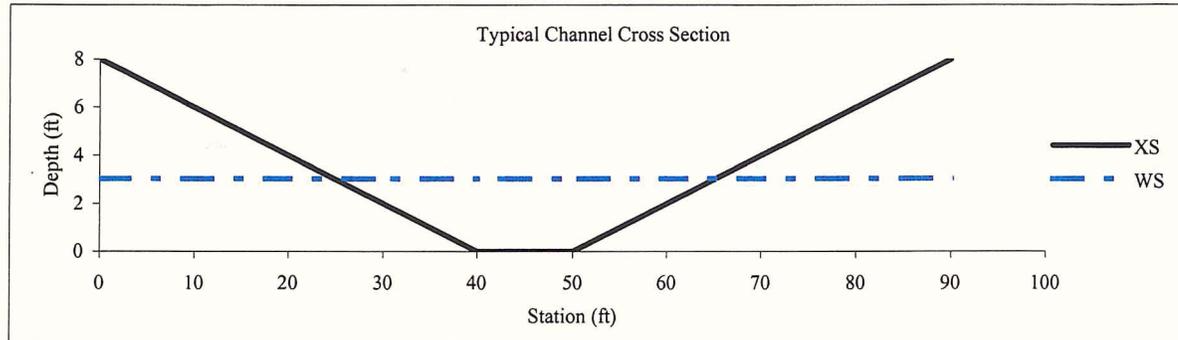
Design: YX

Check: MDH

Date: 12/20/2007

Channel Geometry:

X		0	20	30	40	50	60	70	90
Y		8	4	2	0	0	2	4	8
Z (WS)		3.04	3.04	3.04	3.04	3.04	3.04	3.04	3.04



Discharge: 324 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 10 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0056 ft/ft
 Water Depth: ² 3.04 ft
 Top Width: ³ 40.44 ft
 Flow Area: ¹ 76.8 sq.ft
 Velocity: 4.22 ft/s
 Froud Number: 0.54
 Flow Type: Subcritical

NOTES:

¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.

² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.

³ This is the width of the water surface.

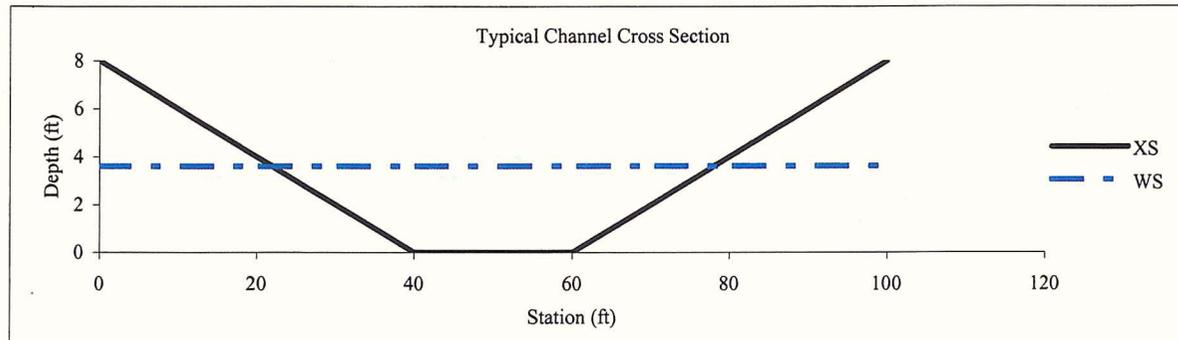
Typical Channel Cross Section
 Recommended Alternative
 175th to Basin



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	20	30	40	60	70	80	100
Y		8	4	2	0	0	2	4	8
Z (WS)		3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6



Discharge: 676 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 20 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0055 ft/ft
 Water Depth: ² 3.6 ft
 Top Width: ³ 55.95 ft
 Flow Area: ¹ 136.5 sq.ft
 Velocity: 4.95 ft/s
 Froud Number: 0.56
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

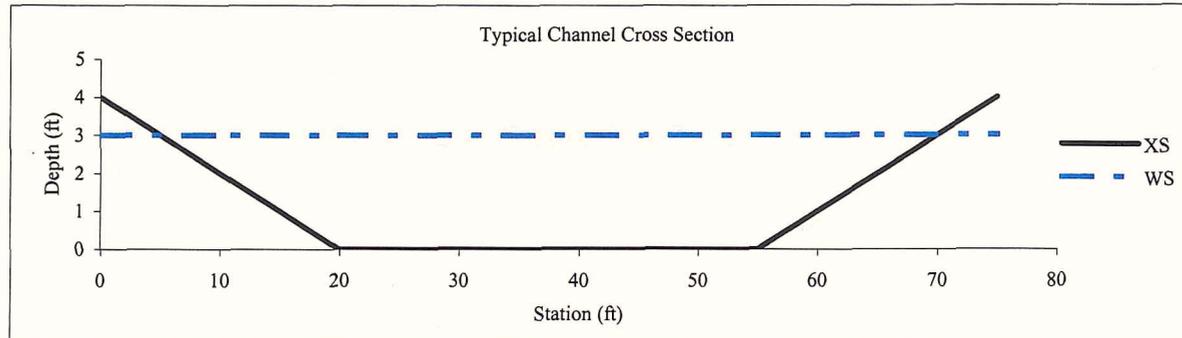
Typical Channel Cross Section
 Recommended Alternative
 Below RR Basin



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	10	15	20	55	60	65	75
Y		4	2	1	0	0	1	2	4
Z (WS)		3	3	3	3	3	3	3	3

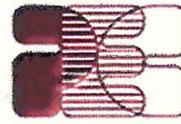


Discharge: 193 cfs
 Mannings n: 0.04
 Bottom Width: ¹ 35 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0004 ft/ft
 Water Depth: ² 3 ft
 Top Width: ³ 64.96 ft
 Flow Area: ¹ 149.8 sq.ft
 Velocity: 1.29 ft/s
 Froud Number: 0.15
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

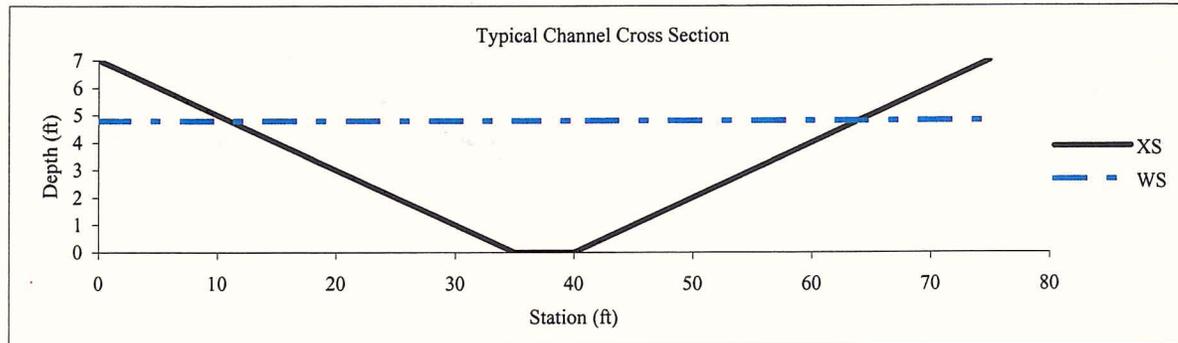
Typical Channel Cross Section
 Recommended Alternative
 RID - Van Buren



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	35	40	75
Y		7	0	0	7
Z (WS)		4.78	4.78	4.78	4.78

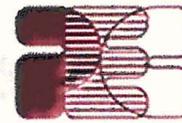


Discharge: 661 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 4.78 ft
 Top Width: ³ 52.82 ft
 Flow Area: ¹ 138.3 sq.ft
 Velocity: 4.78 ft/s
 Froud Number: 0.52
 Flow Type: Subcritical

NOTES:

-
- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
 - ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
 - ³ This is the width of the water surface.

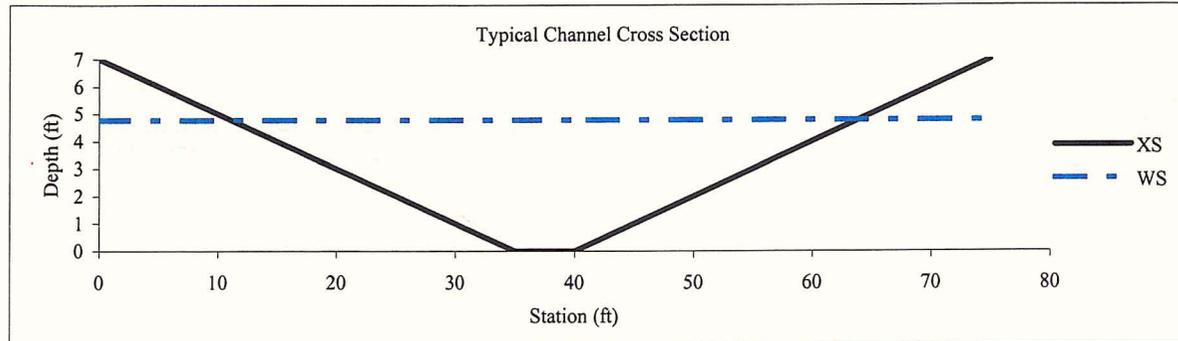
Typical Channel Cross Section
 Recommended Alternative
 Above the RID Channel



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	35	40	75
Y		7	0	0	7
Z (WS)		4.78	4.78	4.78	4.78

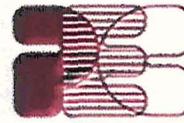


Discharge: 661 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 4.78 ft
 Top Width: ³ 52.82 ft
 Flow Area: ¹ 138.3 sq.ft
 Velocity: 4.78 ft/s
 Froud Number: 0.52
 Flow Type: Subcritical

NOTES:

-
- 1 Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
 - 2 Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
 - 3 This is the width of the water surface.

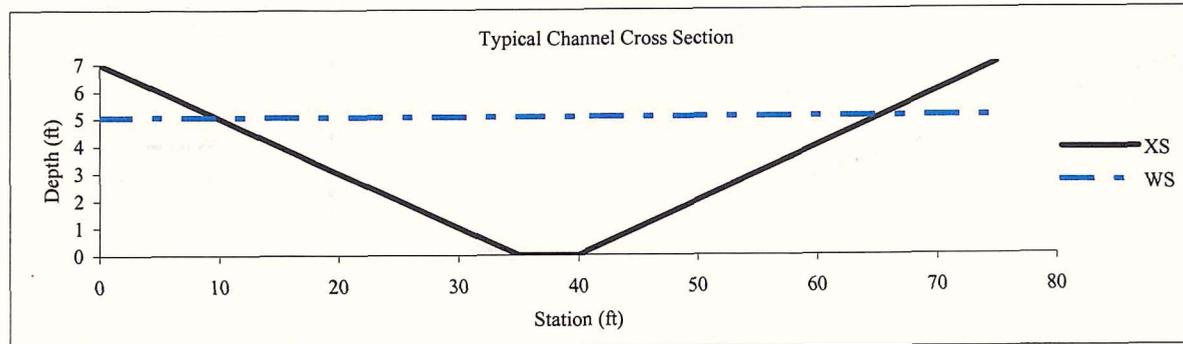
Typical Channel Cross Section
 Recommended Alternative
 Yuma - L Buckeye



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	35	40	75
Y		7	0	0	7
Z (WS)		5.06	5.06	5.06	5.06

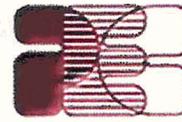


Discharge: 681 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope ¹ 5 :1
 Channel Slope: 0.0038 ft/ft
 Water Depth: ² 5.06 ft
 Top Width: ³ 55.56 ft
 Flow Area: ¹ 153.1 sq.ft
 Velocity: 4.45 ft/s
 Froud Number: 0.47
 Flow Type: Subcritical

NOTES:

- 1 Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- 2 Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- 3 This is the width of the water surface.

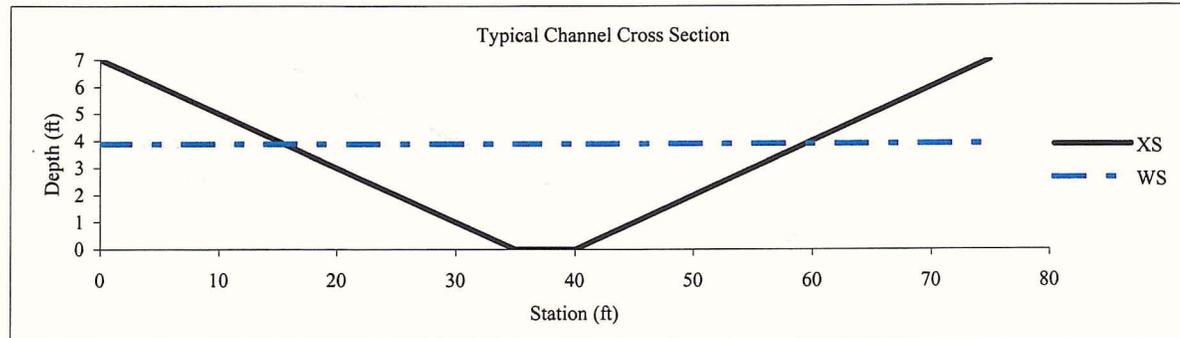
Typical Channel Cross Section
 Recommended Alternative
 Van Buren - Yuma



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	35	40	75
Y		7	0	0	7
Z (WS)		3.89	3.89	3.89	3.89

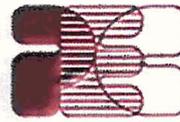


Discharge: 402 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 5 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0047 ft/ft
 Water Depth: ² 3.89 ft
 Top Width: ³ 43.94 ft
 Flow Area: ¹ 95.3 sq.ft
 Velocity: 4.22 ft/s
 Froud Number: 0.5
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

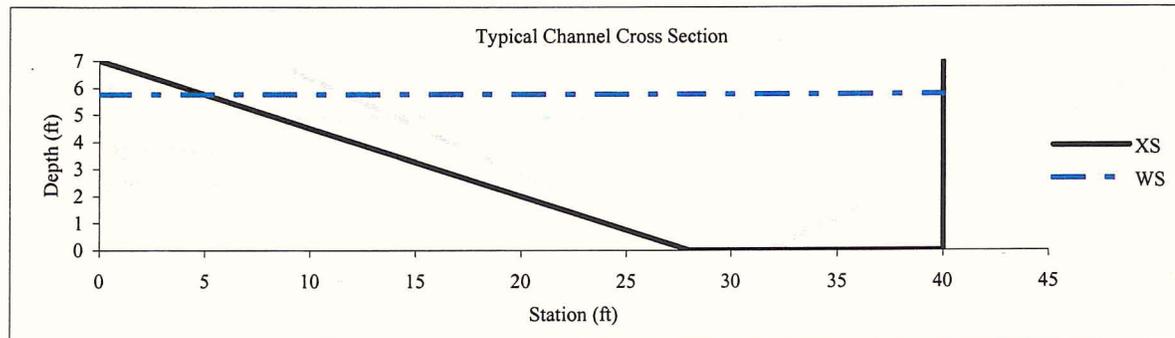
Typical Channel Cross Section
 Recommended Alternative
 Yuma - L Buckeye



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	28	40	40
Y		7	0	0	7
Z (WS)		5.75	5.75	5.75	5.75

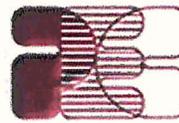


Discharge: 681 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 12 ft
 Side Slope: ¹ 4 :1
 Channel Slope: 0.0038 ft/ft
 Water Depth: ² 5.75 ft
 Top Width: ³ 35.05 ft
 Flow Area: ¹ 135.2 sq.ft
 Velocity: 5.04 ft/s
 Froud Number: 0.45
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

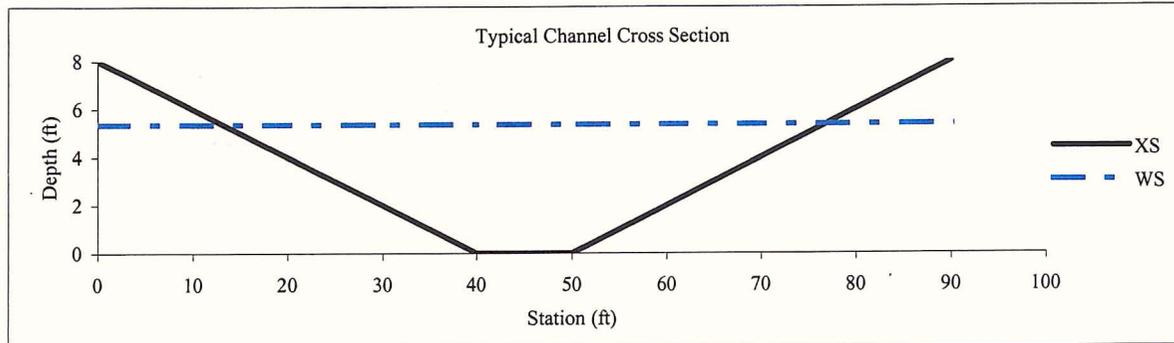
Typical Channel Cross Section
 Recommended Alternative
 L Buckeye - 175th



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	20	30	40	50	60	70	90
Y		8	4	2	0	0	2	4	8
Z (WS)		5.36	5.36	5.36	5.36	5.36	5.36	5.36	5.36

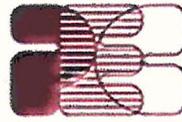


Discharge: 1153 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 10 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0056 ft/ft
 Water Depth: ² 5.36 ft
 Top Width: ³ 63.59 ft
 Flow Area: ¹ 197.2 sq.ft
 Velocity: 5.85 ft/s
 Froud Number: 0.59
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

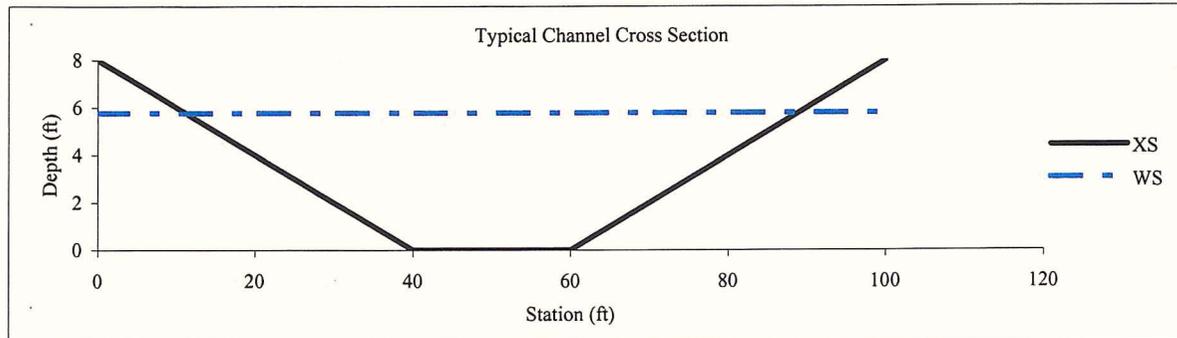
Typical Channel Cross Section
 Recommended Alternative
 175th to Basin



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	20	30	40	60	70	80	100
Y		8	4	2	0	0	2	4	8
Z (WS)		5.76	5.76	5.76	5.76	5.76	5.76	5.76	5.76

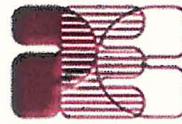


Discharge: 1806 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 20 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0055 ft/ft
 Water Depth: ² 5.76 ft
 Top Width: ³ 77.56 ft
 Flow Area: ¹ 280.8 sq.ft
 Velocity: 6.43 ft/s
 Froud Number: 0.6
 Flow Type: Subcritical

NOTES:

- 1 Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- 2 Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- 3 This is the width of the water surface.

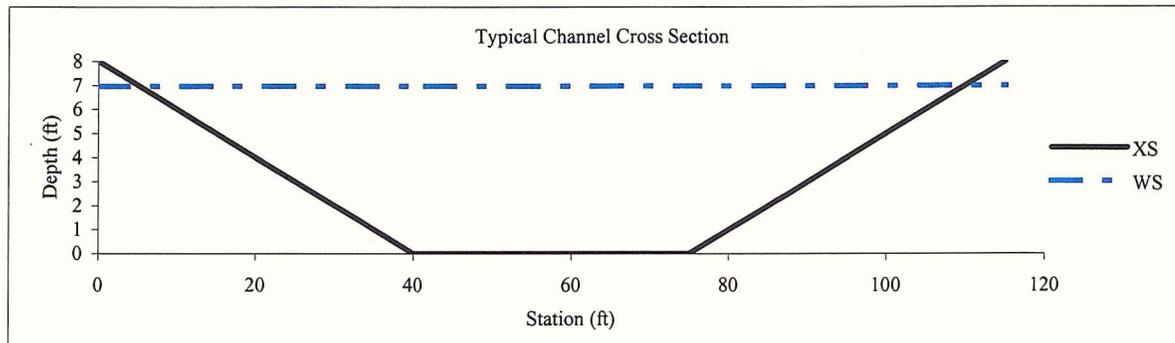
Typical Channel Cross Section
 Recommended Alternative
 Below RR Basin



Project Engineering Consultants, Ltd.
 Design: YX
 Check: MDH
 Date: 12/20/2007

Channel Geometry:

X		0	40	75	115
Y		8	0	0	8
Z (WS)		6.97	6.97	6.97	6.97



Discharge: 998 cfs Existing Conditions Modeling
 Mannings n: 0.04
 Bottom Width: ¹ 35 ft
 Side Slope: ¹ 5 :1
 Channel Slope: 0.0004 ft/ft
 Water Depth: ² 6.97 ft
 Top Width: ³ 104.67 ft
 Flow Area: ¹ 486.5 sq.ft
 Velocity: 2.05 ft/s
 Froud Number: 0.17
 Flow Type: Subcritical

NOTES:

- ¹ Cross Section can be modified (to meet the free board and other requirements), but the flow area should be maintained to convey the storm water.
- ² Free board (1-ft for subcritical flow, 2-ft for supercritical flow) is required.
- ³ This is the width of the water surface.

Loop 303 Drainage Improvements CAR
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APPENDIX E

Landscape Design Themes



BASIN FLOOD PROTECTION METHODS



Scale: 1"=40'-0"



Scale: 1"=20'-0"



1 SOFT STRUCTURAL METHOD



Scale: 1"=40'-0"



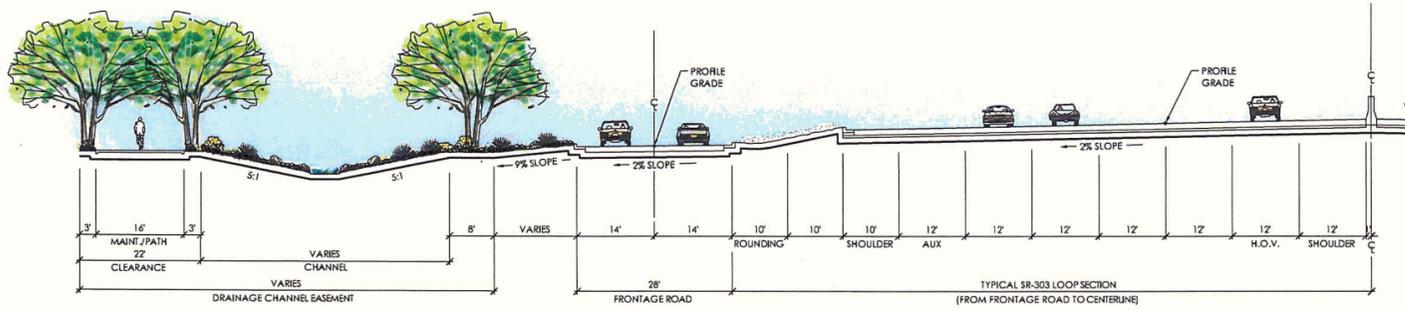
Scale: 1"=20'-0"



2 SEMI-SOFT STRUCTURAL METHOD

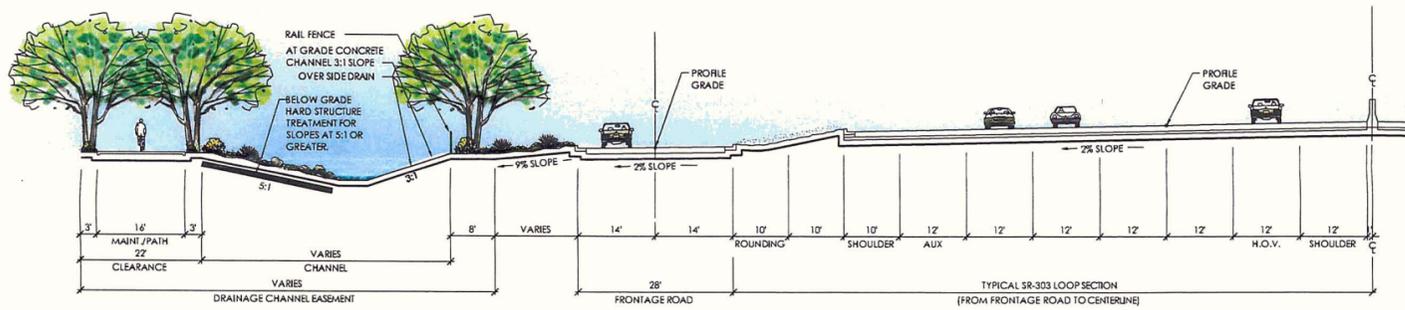


CHANNEL FLOOD PROTECTION METHODS



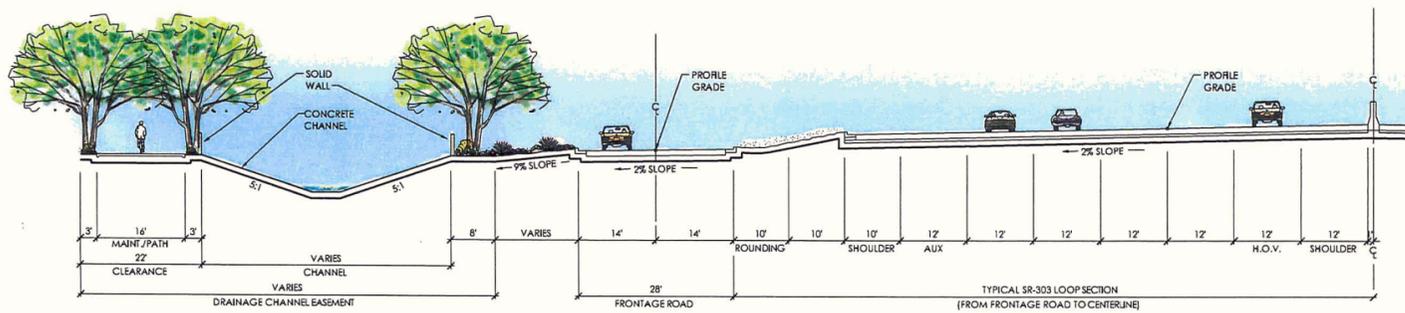
1 SOFT STRUCTURAL METHOD

Scale: 1" = 10'-0"



2 SEMI-SOFT STRUCTURAL METHOD WITH AESTHETIC TREATMENT

Scale: 1" = 10'-0"



3 HARD STRUCTURAL METHOD WITH AESTHETIC TREATMENT

Scale: 1" = 10'-0"



BASIN LANDSCAPE DESIGN THEMES

Enhanced Desert Theme

Enhanced Desert Theme:

The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.

The planting shall be 80% native species with 20% enhanced species planting. Form, line, and texture shall match the natural vegetation. Typical planting includes: Creosote, Brittle bush, Cholla, Palo verde and Saguaros. The basins shall have a natural landform complimenting the adjacent landforms to include: grading, boulders and aggregate.



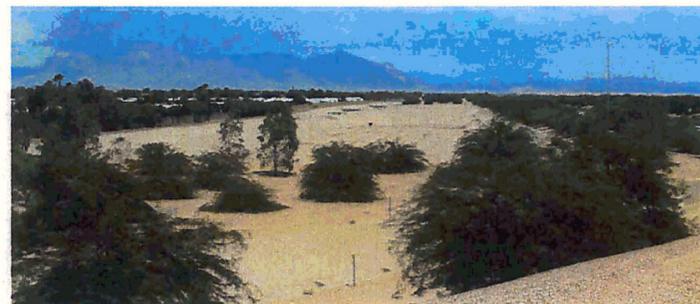
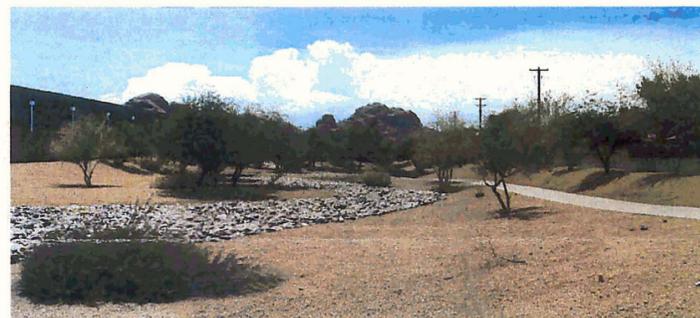
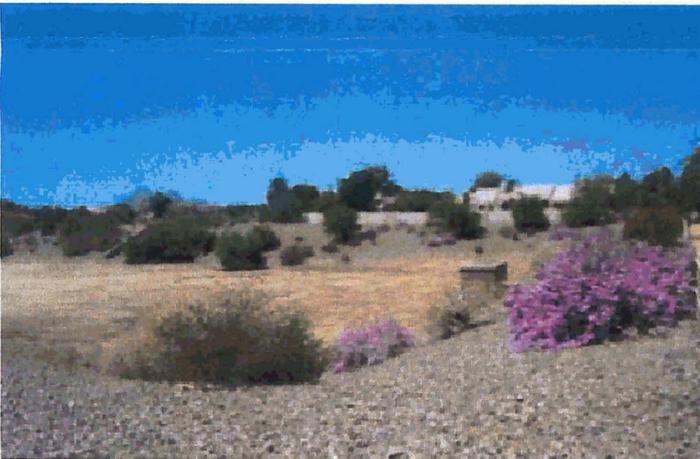
Desert Oasis Theme

Desert Oasis Theme:

The design character for the Desert Oasis is a mixture of enhanced native vegetation, ornamental grasses and/or turf grass areas. The design character shall incorporate large pockets of native shade trees with free forming natural shapes and forms, complimenting the native surroundings.

The vegetation shall be 70% native with 30% non-native vegetation blending with future landscape developments, species may include: Palm trees, Mesquite trees, oleanders, desert grasses (muhlenbergia), acacia species and leucophyllum. The material shall be complimentary to adjacent development in form, color and texture.

The landform edges along the basin shall blend to native, accenting grades with large native boulders and aggregate.



Desert Park Theme

Desert Park Theme:

The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods. Typical planting will include: Turf, Lantana and Leucophyllum, also shade trees such as Eucalyptus, Elm and Ash.





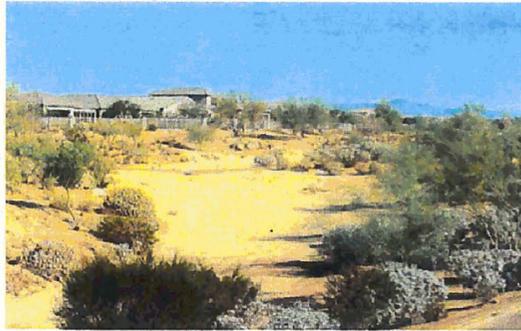
CHANNEL LANDSCAPE DESIGN THEMES

Enhanced Desert Theme

Enhanced Desert Theme:

The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.

The planting shall be 80% native species with 20% enhanced species planting. Form, line, and texture shall match the natural vegetation.

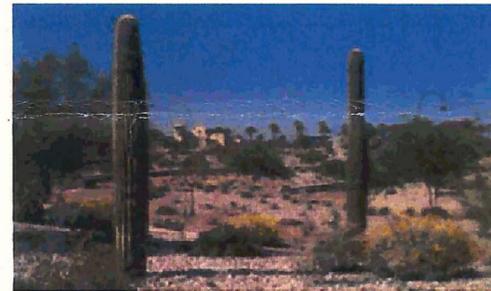


Desert Oasis Theme

Desert Oasis Theme:

The design character for the Desert Oasis is a mixture of enhanced native vegetation, ornamental grasses and/or turf grass areas. The design character shall incorporate large pockets of native shade trees with free forming natural shapes and forms, complimenting the native surroundings.

The vegetation shall be 70% native with 30% non-native vegetation blending with future landscape developments, species may include: Palm trees, Eucalyptus trees and oleanders. The material shall be complimentary to adjacent development in form, color and texture.



Riparian Theme

Riparian Theme:

Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.



Loop 303 Drainage Improvements CAR
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APPENDIX F

Stakeholder/Public Correspondence



LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER

AGENDA

LOCATION: Flood Control District
South Operations Building

TIME: Tuesday, October 31, 2006
1:00 – 3:00 PM

1) Meeting Purpose

- a. Obtain feedback and gather input on the importance of project elements

2) Project Background

3) Project Schedule

4) Presentation of Seed Ideas

- a. Comments
- b. Additional Ideas

5) Ideas, Suggestions, Questions

6) Next Steps



MEETING SUMMARY: LOOP 303 DRAINAGE IMPROVEMENTS STAKEHOLDER MEETING #1

Date: October 31, 2006

Place: Flood Control District

Attendees: Steve Beasley, ADOT VPM
Keith Brown, Goodyear
Mike Bruder, ADOT VPM
Dave Coble, CVL
Brent Emmerton, CVL
Pete Eno, ADOT ROW
Nathan Ford, RBF Consulting
Mike Heaton, Project Engineering Consultants
Bruce Hilby, Coldwater Properties/Canyon Trails
John Holmes, Flood Control District
Greg Jones, Flood Control District
Kevin Kugler, RBF Consulting
Nicholas Lees, Mirriah/Canyon Trails
L. Steve Miller, Project Engineering Consultants
Scott Moore, BET Investments
Bossem Norbor, CVL
Jen Pokorski, Flood Control District
Todd Roles, Roles Inn of America, Inc.

Meeting Purpose

- Provide an overview of the Loop 303 Drainage Improvements Candidate Assessment Report
- Present the project schedule
- Obtain feedback on initial "seed ideas" to help inform the selection of four alternatives for further study
- Gather input on the importance of possible project elements

Project Background

The Loop 303 Drainage Improvements CAR is a refinement of a portion of the Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU). The ADMPU recommended locating a regional channel and basins adjacent to the proposed SR 303L from approximately Greenway Road to the Gila River. Since completion of the ADMPU in 2005, development has occurred in the channel and basin locations proposed in the ADMPU south of I-10.

The purpose of the CAR is to:

- Evaluate and select new channel and basin locations
- Produce detailed cost estimates and ROW acquisition recommendations
- Consider stakeholder and community expectations regarding aesthetic and multi-use functions of the facilities

Project Schedule

The CAR will be conducted in two phases: Data Collection and Alternatives Analysis. The Data Collection phase started in June 2006, and was completed in September 2006.

The Alternatives Analysis kicked off in October 2006. Project milestones include:

- Early Nov. - Selection of four alternatives for further study
- End of Dec. - Complete analysis of four alternatives
- January – Stakeholder Meeting & Public Meeting
- End of Jan. – Selection of draft preferred alternative
- Late March/April – Stakeholder Meeting & Public Meeting to present preferred alternative
- End of April – Final Report and Recommendations

Comments on Seed Ideas

- Flood Control should consider the following options or comments when selecting four alternatives for further evaluation:
 - N. Lees suggested a combination of the north portion of Alternative 3 (state land basin and use of Canyon Trails channel) with the south portion of Alternative 6 (basin in floodplain near railroad), including a small channel on the west side of the road, if needed. D. Coble suggested that a maintenance agreement could be worked out which would possibly lower HOA fees.
 - Goodyear may have some concerns with using a private (HOA's) channel for regional drainage. The team should evaluate an alternative that utilizes the 75 feet of existing ROW from Van Buren to Lower Buckeye, and use the Canyon Trails channel as an overflow.
 - Try to avoid parcels with high economic development potential such as the area surrounding the Rubbermaid plant or the parcels identified for the "Mesquite Basin" in Alternative 6.
 - B. Hilby suggested either the "No Action" alternative on the north portion or putting a basin on state land and crossing the road south of Van Buren to tie in with the development's existing channel, if we can resolve HOA issues.
 - ADOT suggests a concrete channel, and trying to stay on the west side of the road within the existing ROW. The combination of Alternative 3 and 6 is also worth further exploration; Alternative 6 is compatible with the future alignment of SR 303L. Alternative 3, however, would require ADOT to build and maintain a separate drainage system from RID to Durango. ADOT would expect their contribution to be reduced proportionally.
 - T. Roles prefers Alternative 7 and 9. Roles also asks the team to evaluate locating drainage features within the ROW that is already dedicated to the stack associated with the I-10 widening.
 - K. Kugler stated that his client would be opposed to Alternative 9 and 10. The team should look into the possibility of easements on the State Land parcel.

Additional Comments

- The capacity for the Canyon Trails channel is approximately 750-1000 cfs. Need to determine how much capacity is already used.
- The majority of respondents to the *Flood Control Method Preferences* rating form selected "semi-soft structural" or "hard structural with aesthetic treatment" as appropriate for the area.

Next Steps

- The team will select four alternatives for further study in early November.
- The next stakeholder meeting will be in early January.



**MEETING AGENDA: LOOP 303 DRAINAGE IMPROVEMENTS
PARTNER AGENCY MEETING #1**

Date: November 6, 2006, 1:30-3:30

Place: Flood Control District, New River Room

Meeting Purpose

Review of Data Collection Report

Evaluation Matrix Review

Seed Idea Evaluation

Other



MEETING SUMMARY: LOOP 303 DRAINAGE IMPROVEMENTS PARTNER AGENCY MEETING #1

Date: November 6, 2006, 1:30-3:30

Place: Flood Control District, New River Room

Attendees: Monica Baiza, ADOT VPM
Keith Brown, Goodyear
Katie Wilken, Goodyear
Mike Heaton, Project Engineering Consultants
L. Steve Miller, Project Engineering Consultants
Jay Hicks, EDAW
Jack Ankrom, EDAW
John Holmes, Flood Control District
Greg Jones, Flood Control District
Jen Pokorski, Flood Control District
Amir Motamedi, Flood Control District
Dennis Holcomb, Flood Control District
Jon Loxley, Flood Control District
John Louis, Parsons Brinckerhoff
Gary Sun, Parsons Brinckerhoff
Jay Koesters, Parsons Brinckerhoff

Meeting Purpose

- Reach consensus on the four alternatives for further analysis

Review of Data Collection Report

- The Loop 303 Drainage Improvements CAR is a refinement of a portion of the Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU). The ADMPU recommended locating a regional channel and basins adjacent to the proposed SR 303L from approximately Greenway Road to the Gila River. Since completion of the ADMPU in 2005, development has occurred in the channel and basin locations proposed in the ADMPU south of I-10. The Data Collection Report collected the information required to move forward in the selection of a new or revised alternative for the drainage for the Loop 303.

Discussion included:

- Hydrology
- Existing and Future Facilities
- Landscape Character and Scenic Resources
- Opportunities and Constraints

Evaluation Matrix Review

- The decision matrix was reviewed and discussion held to make sure the criteria was understood. Land use compatibility was added as an evaluation description. The alternative No. 13 (State Land Dual System) was added as an option.

Seed Idea Evaluation

- The Seed Ideas were described and discussed one at a time. The group was then asked to evaluate the ideas. As the evaluation began there was much discussion on how to rate the alternatives. Several suggestions were given to change the evaluation. Eventually several of the ideas were eliminated and it was decided to rate the north half and the south half of each alternative separately. When the halves were looked at it was apparent that several were the same. These were grouped (north portions and south portions) and voted on separately. The results of the voting are shown below:

Alternative	1		2		3		4		5		6		7		8		9		10		11		12		13	
N or S Half	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S	N	S
No. of Votes	0	0	0	0	13	8	1	1	1	8	2	13	3	8	6	8	6	4	13	6	13	13	2	2	10	13

- The Seed Ideas that were selected for further consideration and analysis include:
 - Alternative No. 1 (Do Nothing)** – This was required by the scope but since development has already begun in portions of this alternative, do nothing is no longer an option.
 - Alternative No. 2 (Concrete Channel)** – This alternative is to use a channel designed to ADOT typical design. This alternative is also required by the scope to help determine cost sharing options.
 - Alternative No. 3 (State Land Basin)** – This alternative utilizes an outfall channel along the existing Canyon Trails channel.
 - Alternative No. 9 (Multiple Small Basins)** – This alternative used the Canyon Trails channel with multiple small basins along the way to minimize channel size.
 - Alternative No. 13 (State Land, 303, & Railroad Basin)** – This was an alternative that was added during Phase 2 of this study.

Other

- PEC and EDAW will work together to develop the hydrology, geometry, and themes for this selected alternatives.
- Next round of meetings in January 2007.



LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER RECOMMENDED ALTERNATIVE SELECTION

Date: June 4, 2007
9:30 a.m. – 11:30 a.m.

Place: FCDMC New River Room

1. Welcome (Jen/5 min)
 - a. Meeting Purpose
2. Project Background (Jen/5 min)
3. Preliminary Alternatives (Mike/15 min)
 - a. Alignment
 - b. Cost
 - c. Right-of-Way Needs
 - d. Opportunities and Constraints
4. Landscape Aesthetics/Multi-Use Components (Monina/10 min)
 - a. Preliminary Themes
5. Opportunities/Constraints of Each Alternative (All/50 min)
6. Recommended Alternative Selection (All/30 min)
 - a. Areas for Refinement
7. Next Steps (Jen/5 min)



**MEETING SUMMARY:
LOOP 303 DRAINAGE IMPROVEMENTS: I-10 TO GILA RIVER
06/04/07 RECOMMENDED ALTERNATIVE SELECTION MEETING**

Date: June 4, 2007
9:30 a.m. - 11:30 a.m.

Place: Flood Control District, New River Room

Attendees: Jeff Beimer, ADOT Drainage Section
Monica Baiza, ADOT Valley Project Management
Mike Duncan, Flood Control District
Dennis Holcomb, Flood Control District
Debbi Shortal, Flood Control District
Nicole Scheider, Flood Control District
Dennis Holcomb, Flood Control District
John Holmes, Flood Control District
Jennifer Pokorski, Flood Control District
Amir Motamedi, Flood Control District
Farhad Tavassoli, Goodyear
Keith Brown, Goodyear
Mike Heaton, Project Engineering Consultants
Ying Xu, Project Engineering Consultants, Ltd.
Jack Ankrom, EDAW
Monina Ramirez, EDAW
Jay Hicks, EDAW
Gary Sun, Parsons Brinckerhoff

Meeting Purpose

- Select the recommended alignment for the Loop 303 channel

Project Background

- The District gave a brief introduction to project including reviewing the project schedule, alignments, hydrology, possible issues and constraints of the ROW/Landscaping.
 - The base hydrology model is the “future condition with projects in place”
 - Data collection completed last August.
 - Four Alternatives selected in November.
 - Finish this project by November or December with 30% plans.
 - Area developing rapidly & Goodyear has helped to develop a new ownership map. Developments to the north farther along in planning and construction than those to the south. El Cidro has preliminary plat.

Cotton Flower has dedicated easements, but others just have agreements in place.

Preliminary Alternatives Overview

- PEC reviewed the four alternatives. Typical cross sections are used for the channels with a uniform roughness coefficient 0.04 for conservative estimation of the channel width.
- The “No Action Alternative”:
 - The north basin site is not available.
 - The south basin site may not be supported by Goodyear because its location makes it suitable for higher use.
 - The cost shown in the fact sheet for this alternative is lower because it is based on the 2004 cost information. The land right-of-way costs have increased substantially.
 - No estimate was done using current costs, but the actual cost may be comparable to the other alternatives.
- The “State Land Basin Alternative”:
 - Basin volume about 81 AF.
 - Negotiation needed for land acquisition from State Land Department.
 - It has an outfall to the Canyon Trails channel
 - Crossing Morocco Ruin may or may not be a problem.
 - EDAW asked what might happen if the basin is not available. Mike responded that while it’s hard to predict about the state land, if the basin goes away, the channel would be modified to accommodate the discharge.
- The “Multi- Small Basin Alternative”:
 - This alternative would maximize the multi-use opportunities because of the Canyon Trails channel.
 - Basins could possibly be widened channel sections with retention capability. It would be like overbank flow in a natural stream system.
 - Using the Canyon Trails Channel brings up HOA issues.
 - Crosses the Morocco Ruin.
 - The capacity of the existing channel should be sufficient, however PEC has not surveyed and done any calculations to be sure.
 - Amir asked about the two laterals across the Cotton Lane. Mike responded that this channel is not in the Cotton Lane ROW so approximate sized pipe was added to show connections for freeway drainage. The pipes were shown where the HEC-1 model has a concentration point.
 - Jeff had a question about the 215 cfs peak. Mike and Amir thought local runoff may contribute to this peak, but the volume under this peak is low and hardly to have impacts on the system.
- The “Dual System Alternative”:
 - Water can be split to flow along Cotton Lane or, for higher flows, flow in the Canyon Trails Channel.
 - This alternative curves to the west to follow the Loop 303 alignment favored by Goodyear

- Proposed southern basin site is in the existing floodplain.
- BID waste way can be used as outfall. This idea has been discussed with the BID and they like the concept.

Comments on Preliminary Alternatives

- The ADOT 801 TI location will be a key issue.
- Jen and Mike commented that the actual channel size would not be too much different among the alternatives since the Qs are similar and a conservative N value, and 3:1 and 5:1 slopes were used for all cases.
- Amir expressed concerns about the velocity. Mike explained that the District had requested that PEC provide an estimate of the "bank full" capacity of the proposed channels in the various alternatives. This was the velocity Amir mentioned and was not design velocity used for the 100-year future storm with projects in place.
- The depth of flow in the channels as proposed in the alternatives would likely be somewhere between 2.5 to 3.5 ft.
- Keith mentioned that somewhere near the Cotton Flower community (8 homes) the ROW is 55 ft instead of 75 ft.
- Keith suggested that we determine the historical flows that have reached the Canyon Trails Channel. This information could be used as a baseline for future agreements regarding use of the channel.

Landscape Aesthetics/Multi-Use

- Monina reviewed the EDAW's concepts on landscaping.
- Area is compatible with non-structural to semi-soft structural flood control methods.
- Dennis felt the Canyon Trails Channel was not shown correctly on the exhibits. EDAW said they would review and respond.
- Dennis commented that a 10-12 foot vegetation buffer was insufficient. The team should look into the possibilities of increasing the size of the vegetation buffer.
- These are just preliminary themes. The landscape aesthetics and multi-use opportunities will be defined cooperatively during the refinement of the recommended alignment.

Opportunities/Constraints of Each Alternative

A group examination of the opportunities and constraints of each alternative was conducted in order to select the preferred alignment. The various points of discussion were listed to quantify the preferred alternative. The negatives were subtracted from the positives for each alternative. The alternative with the highest score became the preferred alternative.

The concrete channel alternative was eliminated because of two fatal flaws: 1) the lack of a northern basin to attenuate the flow; and 2) it provided limited aesthetic and multi-use values for residents. The concrete channel is being carried forward to aid in developing the cost-share agreement between ADOT and FCD.

The following tables detail the pros and cons of each alternative as identified by the project partners.

No-Action	
+	-
Multi – use basin opportunities	North basin not available
No impact on Canyon Trails system	Larger Concrete Channel
Fits 75' ROW set aside by Goodyear north of Lower Buckeye (less ROW required)	Impact to Morocco Ruin
More efficient storm water conveyance	Impact to 801 Freeway & TI
	Minimal landscaping & aesthetics
	South basin not best use of land (industrial development planned for this parcel)
	City may not support concrete channels
	No recharge to ground water
	Limits opportunities for trail users
	Low context sensitivity
TOTAL +: 4	TOTAL -: 10

Rating for No-Action (or keep the Loop 303/White Tanks ADMPU Recommended Alternative): -6

State-Land Basin	
+	-
Alignment is away from Loop 303; less noise for trail users	Additional cost and coordination for ADOT Drainage
State Land Basin can be a "Gateway" for trails	Negative visual impact
Increased multi-use/recreation opportunities	North basin not best use of land
Increased water quality opportunities	South basin not best use of land
	Use of Canyon Trails Channel
	Uncertainty for regional trail connection
	Owners may back out of 75 ft. ROW already dedicated for "drainage"
	More public access to private Canyon Trials System
	Highest cost
	Would have to amend E.A. for 303L
	Crosses Morocco Ruin
TOTAL +: 4	TOTAL -: 11

Rating for State Land Basin Alternative: -7

Multi-Small Basins	
+	-
Potential for increased multi-use/recreation opportunities along 303/Cotton Lane	ROW complexity
Increased aesthetics opportunities in Canyon Trail Channel	Homes in potential ROW
HOA may benefit from money received for flowage easements	Use of Canyon Trail channel
	Losing ROW fast (south segment of this alternative may already not be available)
	Crosses Morocco Ruin
	O & M more complex
	Additional O&M to Loop 303
TOTAL +: 3	TOTAL -: 7

Rating for Multi-Small Basins Alternative: -4

Dual System	
+	-
Following city preferred Loop 303 alignment	State basin location
Uses existing floodplain for basin	Recreation close to HW
Minimizes use of canyon trails channel	Somehow rely on canyon trails
Majority of flow in acquired ROW	If relying on Canyon trails then difficult content sensitivity
Lowest cost	
Uses BID wasteway	
Avoids the Morocco Ruin	
Enhances the buffer between FW and residents	
State land Basin "Gateway" Concept	
Low cost of land for basin in floodplain	
Allows use of more aesthetic channel	
Routes regional trail around Canyon Trails	
Preserves landscape character of Canyon Trails Channel	
Greatest Multi-use opportunities	
Good (second best) context sensitivity	
Not stuck with linear alignment	
More compatible with ADOT	
Opportunity for premium lots in developments	
TOTAL+: 18	TOTAL-: 3

Rating for Dual System Alternative: 15

The Dual System Alternative received the highest rating of all four alternatives and was selected as the recommended alignment.

Other Issues

The group also had additional comments not covered by the scope of this meeting that will be addressed in subsequent meetings or communications. Those issues were as follows:

- Hydrology model (should the existing conditions or future conditions model be used to refine the alignment?)
- State Land Basin availability
- Sound wall issues on the Loop 303
- Is there an opportunity to go deeper with the channel?
- Document existing flows to the Canyon Trails system

Next Steps

- The District and PEC/EDAW will begin refinement of the recommended alignment taking into consideration the comments of the group regarding the positives/negatives associated with the alternative.
- The District will begin meeting with landowners impacted by the recommended alignment to get their feedback.
- A meeting to review progress will be held in late summer.



MEETING SUMMARY: LOOP 303 DRAINAGE IMPROVEMENTS STAKEHOLDER MEETING #2

Date: November 7, 2007

Place: Flood Control District

Attendees: Jeff Blilie, Beus Gilbert
Keith Brown, Goodyear
Lynn Dugan, Taylor Woodrow
Bruce Hilby, Coldwater Properties/Canyon Trails
Brian Hensley, CVL
John Holmes, Flood Control District
Greg Jones, Flood Control District
Ziad Kaakouch, DZ Engineering
Larry Kramer, GreenLight Investment Group
Pandu Kuruva, PEC
Terry Lewis, CVL
Velvet Li, ADOT
Sterling Margetts, Kimley-Horn
Kay McNeely, Arizona State Land Department
Scott Moore, BET Investments
Jen Pokorski, Flood Control District
Brittany Price, Kimley-Horn
Fred Tack, DZ Engineering
Dick Wilson, Canyon Trails
Ying Xu, PEC
Ko Yu, Diversified Partners

Meeting Purpose

- Progress update on the Loop 303 Drainage Improvements: I-10 to Gila River Candidate Assessment Report (CAR)
- Present and obtain feedback on the recommended alternative
- Discuss next steps

Project Background

The Loop 303 Drainage Improvements CAR is a refinement of a portion of the Loop 303/White Tanks Area Drainage Master Plan Update (ADMPU). The ADMPU recommended locating a regional channel and basins adjacent to the proposed SR 303L from approximately Greenway Road to the Gila River. Since completion of the ADMPU in 2005, development has occurred in the channel and basin locations proposed in the ADMPU south of I-10.

The purpose of the CAR is to:

- Evaluate and select new channel and basin locations
- Produce detailed cost estimates and ROW acquisition recommendations
- Consider stakeholder and community expectations regarding aesthetic and multi-use functions of the facilities

Project partners include ADOT and Goodyear. It is anticipated that FCD will construct this portion of the Loop 303 drainage system as part of its cost share agreement with ADOT.

Project Milestones & Schedule

The CAR will be conducted in two phases: Data Collection and Alternatives Analysis. The Data Collection phase started in June 2006, and was completed in September 2006.

The Alternatives Analysis kicked off in October 2006. Project milestones include:

- Fall 2006 – Development of preliminary alternatives and presentation to stakeholders
- Winter 2006 – early Summer 2007 – Project on-hold
- Summer 2007 – Selection of draft recommended alternative and individual meetings with stakeholders
- Fall 2007 – Refinement of hydrology, landscape designs
- November 2007 – Stakeholder/Public Meeting to present recommended alternative
- January 2008 – Final Report and Recommendations

Presentation of Preliminary Alternatives and Recommended Alternative

The project team has collected data regarding drainage issues, land use, and existing and planned landscape character and design themes. Using this data, the study team and project partners developed and evaluated several alternative solutions. The preliminary alternatives included:

- No Action Alternative: keep Loop 303/White Tanks ADMP recommended alternative
- State Land Basin Alternative: a basin on the state land property and a channel along the west side of Cotton Lane to the Gila River,
- Multi-Basin Alternative: a series of small basins co-located with the Canyon Trails drainage system
- Dual System Alternative: a channel along the west side of the SR303 freeway and basin just north of the railroad.

The Dual System Alternative was selected as the recommended alternative. This alternative includes a channel that follows the west side of Cotton Lane. At Lower Buckeye Road, the channel would curve to the west along with the proposed SR303L alignment. A basin would be built between Broadway Road and Highway MC85 where there is existing floodplain due to ponding behind the railroad. The basin would drain to a channel that continues southward and ultimately discharges to the Gila River. This alternative also recommends the use of the Canyon Trails channel for overflows from the new channel.

The recommended alternative includes an earthen channel and accommodates an adjacent pedestrian trail. The basin would allow for possible conversion to a community park.

Comments on Recommended Alternative

The stakeholders had the following comments on the recommended alternative:

- FCD should define the future of the Van Buren channel connection. The existing connection is for current condition. B. Hilby is working with Goodyear for phasing and location of an interim solution to convey flows across Cotton Lane to Canyon Trails system. Possible solutions include a temporary channel on the north end of the State Land parcel. This channel potentially could provide flood

protection to the State Land parcel as well as convey flows across Cotton Lane until the regional channel is constructed.

- Timing – on-going coordination and communication is essential
- No “concrete” dedication of ROW between Van Buren to Yuma. The dedication is triggered when the land is developed.
- Project can move forward without an IGA with Goodyear.
- Project should address how development can tie in to regional channel (criteria, first flush, waiver of on-site retention, etc.). The development concepts should be coordinated with Goodyear. Goodyear will act as liaison with FCD.
- Bonding/In-lieu fees should be investigated
- The stakeholders stated that the recommended alternative was the most favorable/potentially least impactful alternative

Next Steps

- Consideration of public and stakeholder input
- Refinement of alignment and development of plan sheets
- Finalization of landscape design and multi-use recommendations
- Finalization of right-of-way needs
- Final Report January 2008



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Next Steps

- Consideration of public and stakeholder input
- Refinement of alignment and development of plan sheets
- Finalization of landscape design and multi-use recommendations
- Finalization of right-of-way needs
- Final Report January 2008

Recommended Alternative: Dual System

The team and project partners selected a draft recommended alternative that best met the study goals of addressing the flooding concerns while providing multi-use opportunities for Goodyear residents.

This alternative includes a channel that follows the west side of Cotton Lane. At Lower Buckeye Road, the channel would curve to the west along with the proposed SR303L alignment. A basin would be built between Broadway Road and Highway MC85 where there is existing floodplain due to ponding behind the railroad. The basin would drain to a channel that continues southward and ultimately discharges to the Gila River. This alternative also recommends the use of the Canyon Trails channel for overflows from the new channel.

This alternative is recommended because of the following benefits:

- Provides 100-year flood protection
- Maximizes use of existing dedicated right-of-way and minimizes additional right-of-way acquisitions
- Locates basin in existing floodplain and has the potential to reduce the size of floodplain behind the railroad tracks
- Provides regional trail connectivity
- Provides opportunity for a park facility in basin

The channel would be earthen and accommodate an adjacent pedestrian trail. The basin would allow for possible conversion to a community park. The landscape design of the channel and basins would complement the existing surrounding landscape, provide shade and screen visible flood control structures. The recommended landscape design themes are pictured to the right of the alignment graphic.



Enhanced Desert Theme



The design character for the Enhanced Desert Theme represents a natural appearance with native species, including creosote, Palo Verde and saguaros.

Desert Oasis Theme



This theme is a mixture of enhanced native vegetation, ornamental grasses and turf grass areas. It incorporates large pockets of shade trees that complement the native surroundings. Plantings may include palm trees, mesquite trees and desert grasses.

Desert Park Theme



This theme consists of 30 percent near native vegetation and 70 percent turf grass, and is used for the basin sites. The large turf areas could be used for recreation for the surrounding neighborhoods. Typical plantings include lantana and shade trees such as eucalyptus.

Riparian Theme



This theme is recommended for project areas within the Gila River floodplain. Plants would consist of mesquite and Palo Verde trees, and lush ground plantings.

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

APPENDIX G

Cost Estimate

RECOMMENDED ALTERNATIVE
Loop 303 Candidate Assessment Report - Opinion Of Probable Cost

ALTERNATIVE	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	COST
Alternative 13 - Dual System				Rec. Alt. Total =	\$ 43,848,124.03
	Channel Excavation	C.Y.	\$ 4.00	251212	\$ 1,004,847.98
	Channel Fill	C.Y.	\$ 4.00	0	\$ -
	Channel Lining (Conc. & Steel)	C.Y.	\$ 450.00	17963	\$ 8,083,543.67
	Channel ROW	ACRES	\$ 250,000.00	64	\$ 15,898,479.11
	Basin Excavation	C.Y.	\$ 4.00	163015	\$ 652,060.00
	Basin ROW	ACRES	\$ 250,000.00	35	\$ 8,625,000.00
Landscaping & Aesthetics -	RR Basin (Enhanced Desert)	ACRES	\$ 61,855.20	35	\$ 2,171,117.52
Landscaping & Aesthetics -	Channel (Enhanced Desert)	ACRES	\$ 76,230.00	47	\$ 3,596,864.25
Landscaping & Aesthetics -	Channel (Riparian)	ACRES	\$ 91,476.00	22	\$ 2,032,842.00
	BID Wasteway Improvements	EACH	\$ 50,000.00	1	\$ 50,000.00
	Structures (Headwalls, etc.)	EACH	\$ 5,000.00	21	\$ 105,000.00
	Pipe 42"	LF	\$ 210.00	1590	\$ 333,900.00
	Pipe 84"	LF	\$ 420.00	265	\$ 111,300.00
	Pipe 90"	LF	\$ 450.00	282	\$ 126,900.00
	2-Bbl 6X5 RCBC	LF	\$ 660.00	328	\$ 216,480.00
	3-Bbl 6X5 RCBC	LF	\$ 942.50	407	\$ 383,597.50
	4-Bbl 8X5 RCBC	LF	\$ 1,536.00	297	\$ 456,192.00

Note: 1) This cost estimate does not include items such as utility relocation, engineering design, or maintenance.

Note: 2) Landscape & Aesthetics cost includes: Planting, Irrigation, labor, desert pavement (mulch) and fine grading for berms and terracing.

e Slope	Segment Length feet	Channel Area s.f.	Channel Excavation		Lining Thickness feet	Lining Area s.f.	Lining Volume		Section Lining 1=Yes 0=No	Top Width feet	O&M Road Width feet	Vegetative Buffer feet	Round Dig = 0		ROW Acquired? 1=No 0=Yes	LS	
			c.f.	c.y.			c.f.	c.y.					ROW Total Width Feet	ROW Total Area acres		ROW Width Plus 10 ft Total LS Width	ROW Width Plus 10 ft acres (10 ft is ADOT ROW)
:1	1986	138.1	274350	10161	0.5	53.7	106741	3953	0	52.8	20	10	83.0	3.8	1	93.0	4.2
:1	2717	138.1	375332	13901	0.5	53.7	146030	5409	0	52.8	20	10	83.0	5.2	1	93.0	5.8
:1	5383	95.1	511980	18962	0.5	44.7	240461	8906	0	43.9	20	10	74.0	9.1	1	84.0	10.4
:1	5200	153.3	797254	29528	0.5	56.6	294331	10901	0	55.6	16	3	75.0	9.0	1	78.0	9.3
:1	4700	197.2	927066	34336	0.5	64.7	303909	11256	1	63.6	20	10	94.0	10.1	1	104.0	11.2
:1	2300	281.1	646502	23945	0.5	78.7	181104	6708	1	77.6	20	10	108.0	5.7	1	118.0	6.2
:1	6676	486.9	3250241	120379	0.5	106.1	708192	26229	0	104.7	20	10	135.0	20.7	1	145.0	22.2
			6782724	251212			Total =	73362	17963						64		69.4

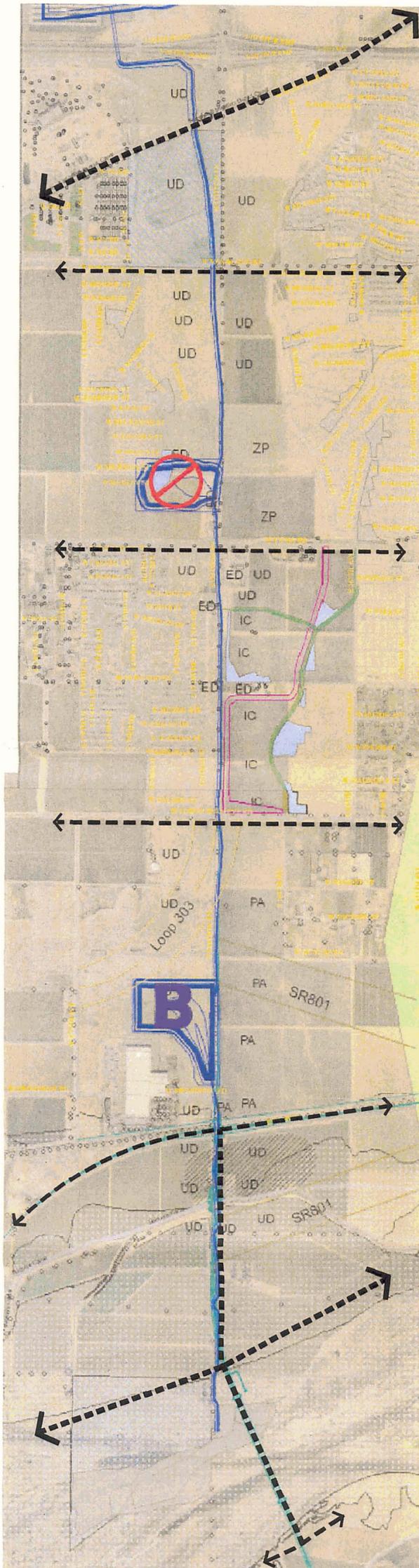
Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

EXHIBIT A

Project Alternatives Alignment & Alternative Design



NO ACTION OR KEEP ADMP PLAN



Legend



Enhanced Desert Theme:
The design character for the Enhanced Desert Theme shall represent a natural appearance with near native species, enhanced visual drama and focal points including visual and spatial experiences.



Desert Oasis Theme:
The design character for the Desert Oasis is a mixture of enhanced native vegetation, ornamental grasses and/or turf grass areas. The design character shall incorporate large pockets of native shade trees with free forming natural shapes and forms, complimenting the native surroundings.



Riparian Theme:
Areas within the Gila River are a Riparian Theme with dense stream vegetation consisting of Mesquite, Palo Verde, Ironwood and lush ground planting. The edges shall blend into the existing character with 100% riparian species and dense vegetation matching in form, color and texture.



Desert Park Theme:
The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods.



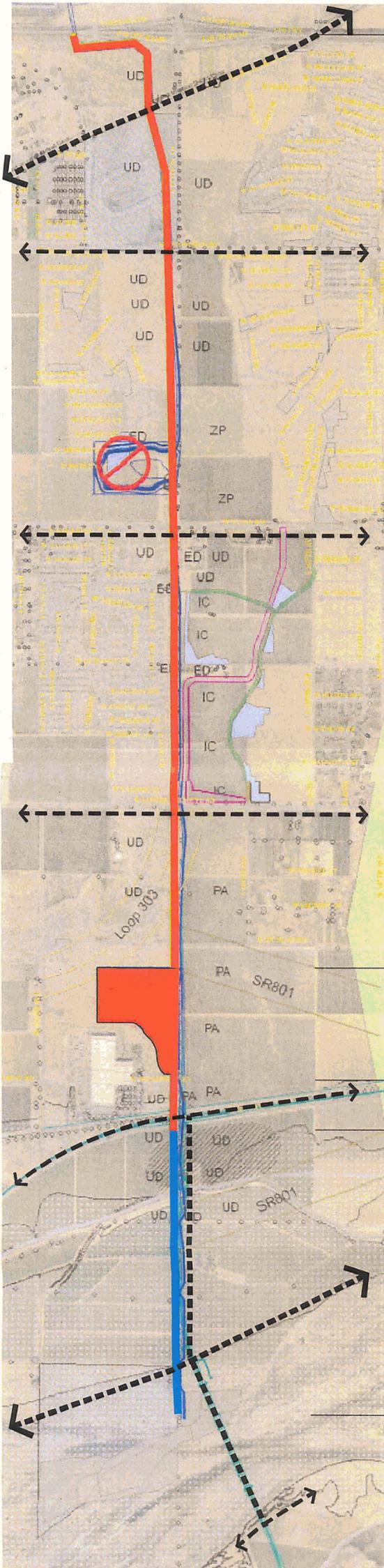
Maricopa County Regional Trail



Goodyear Trails



CONCRETE CHANNEL ALTERNATIVE



Legend

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CHANNEL
HARD STRUCTURAL METHOD
WITH AESTHETIC TREATMENT
DESERT OASIS THEME

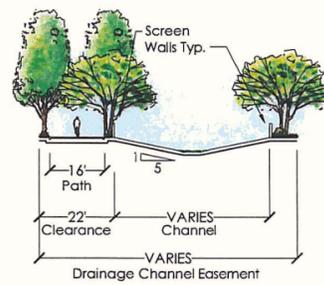


Maricopa County Regional Trail



Goodyear Trails

CHANNEL



CHANNEL SECTION



HARD STRUCTURAL METHOD WITH
AESTHETIC TREATMENT



DESERT OASIS THEME



RIPARIAN THEME

BASIN
SOFT STRUCTURAL METHOD
DESERT OASIS

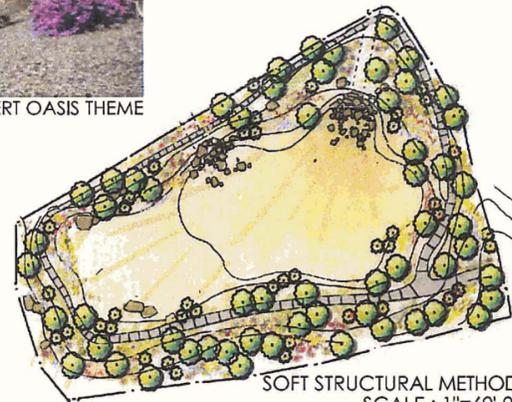
BASIN



DESERT OASIS THEME

CHANNEL
HARD STRUCTURAL METHOD
WITH AESTHETIC TREATMENT
DESERT OASIS THEME

CHANNEL
HARD STRUCTURAL METHOD
WITH AESTHETIC TREATMENT
RIPARIAN THEME



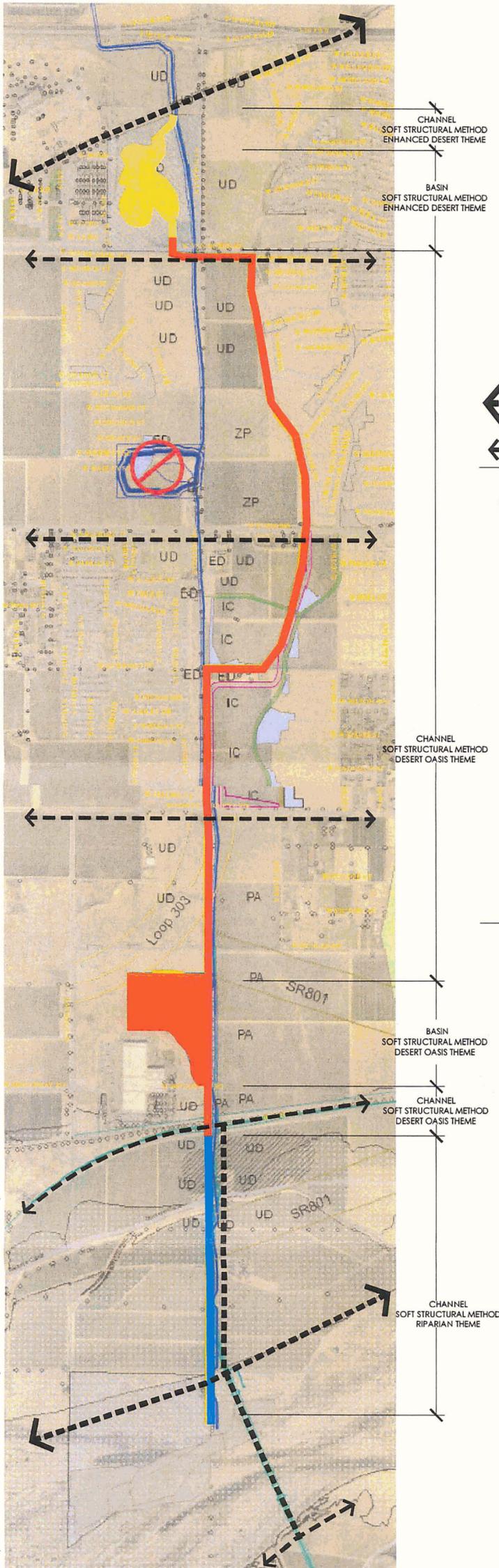
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SCALE : 1"=30'-0"



STATE LAND BASIN ALTERNATIVE

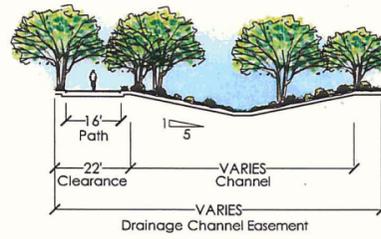


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- Maricopa County Regional Trail
- Goodyear Trails

CHANNEL



SOFT STRUCTURAL METHOD

CHANNEL SECTION



RIPARIAN THEME



DESERT OASIS THEME

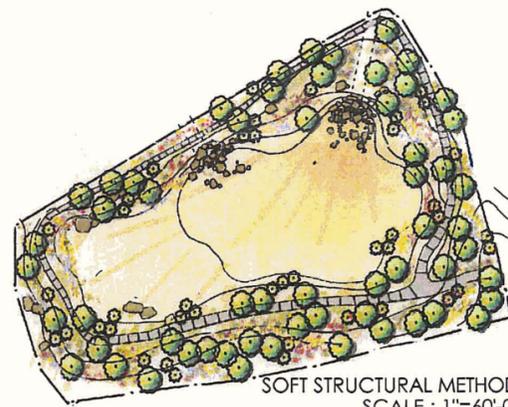
BASINS



DESERT OASIS THEME

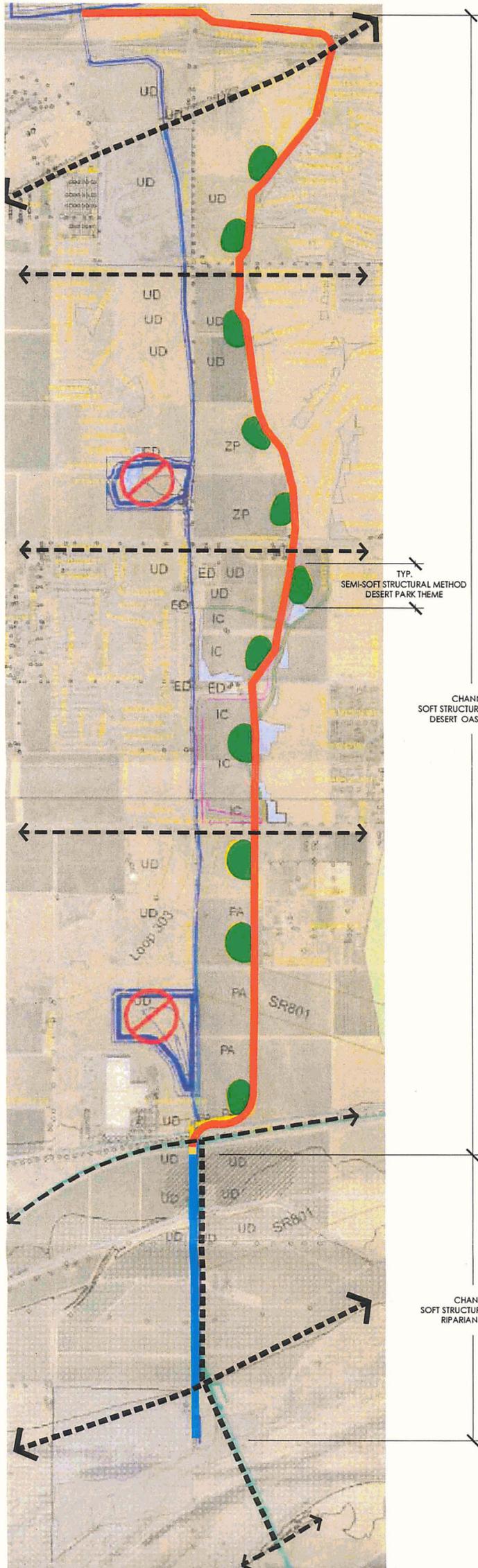


ENHANCED DESERT THEME





MULTI-SMALL BASIN CHANNEL ALTERNATIVE

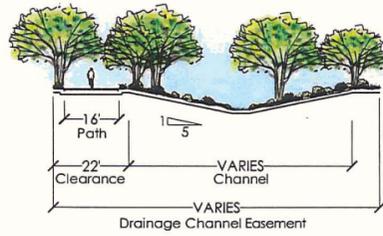


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-  Maricopa County Regional Trail
-  Goodyear Trails

CHANNEL



SOFT STRUCTURAL METHOD

CHANNEL SECTION



DESERT OASIS THEME



RIPARIAN THEME

BASINS



DESERT PARK THEME



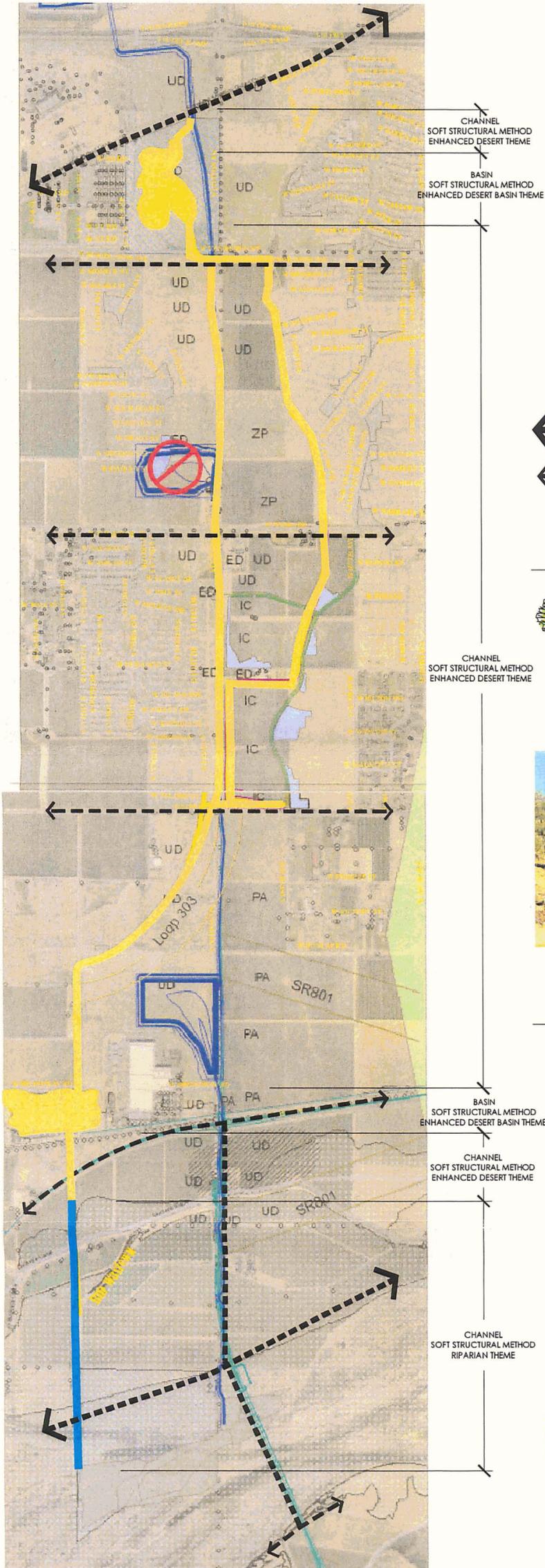
SEMI-SOFT STRUCTURAL METHOD
Scale: 1"=60'-0"



SEMI-SOFT STRUCTURAL METHOD
Scale: 1"=30'-0"



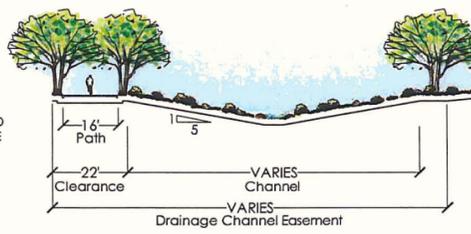
DUAL SYSTEM ALTERNATIVE



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-  **Desert Park Theme:**
The vegetation is 30% enhanced near natives with ornamental grasses and 70% turf grass. The basins remain natural with native vegetation and pockets of oasis planting for shade and screening of visible structures that blend to native planting and existing landscape. The large areas of turf may be used for open play /recreation for the surrounding neighborhoods.
-  Maricopa County Regional Trail
-  Goodyear Trails

CHANNEL



SOFT STRUCTURAL METHOD

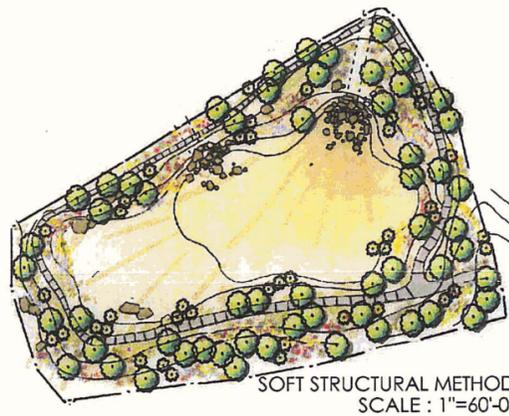


ENHANCED DESERT THEME



RIPARIAN THEME

BASINS



ENHANCED DESERT THEME



Scale: 1"=30'-0"

Loop 303 Drainage Improvements CAR
Final Report for
Flood Control District of Maricopa County, Arizona

EXHIBIT C

Right-of-Way/Design Concept Report Level Plans



RECEIVED
By Michael D. Heaton at 1:24 pm, Jan 14, 2008

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

SR 303L DRAINAGE SYSTEM

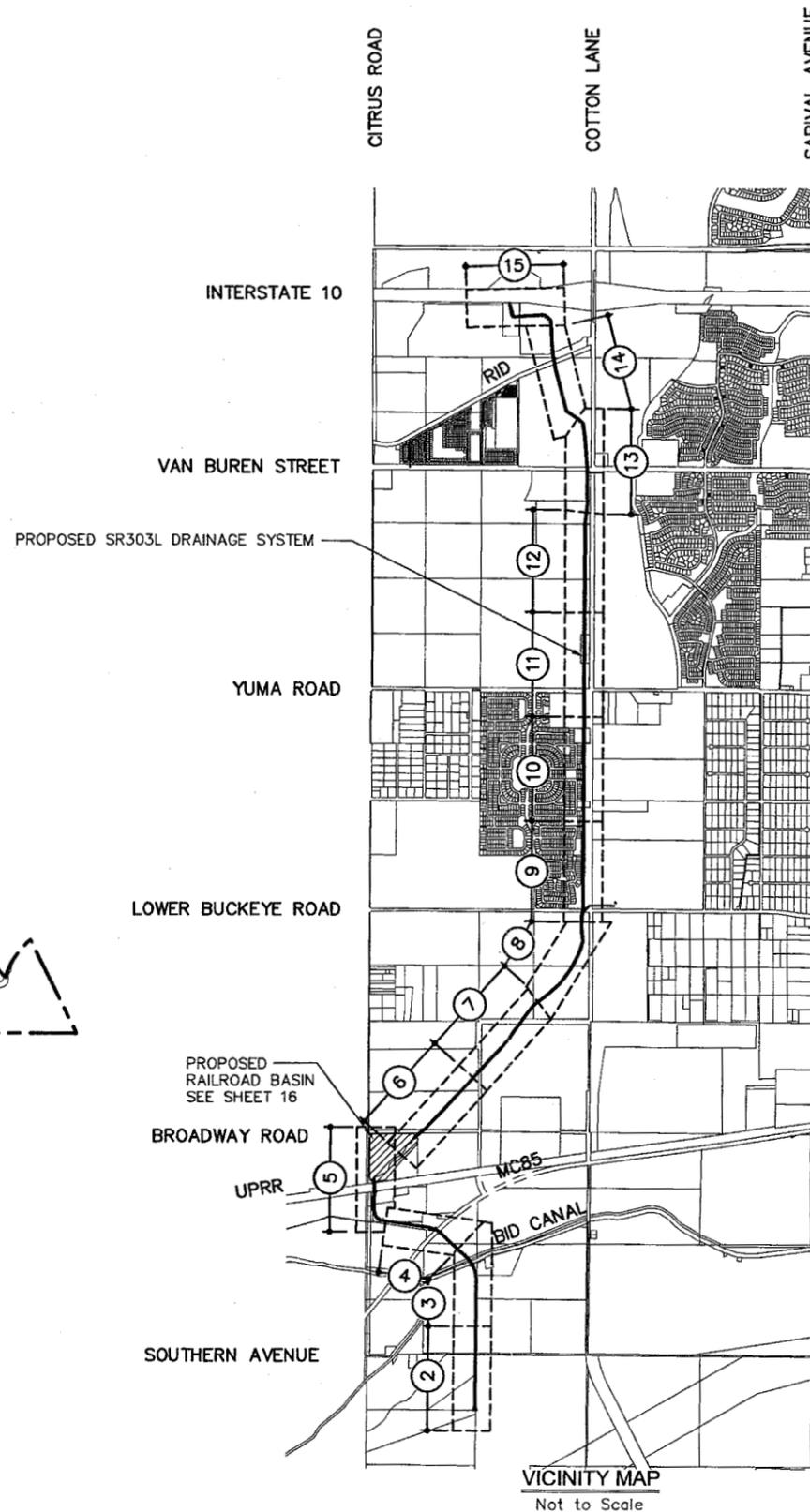
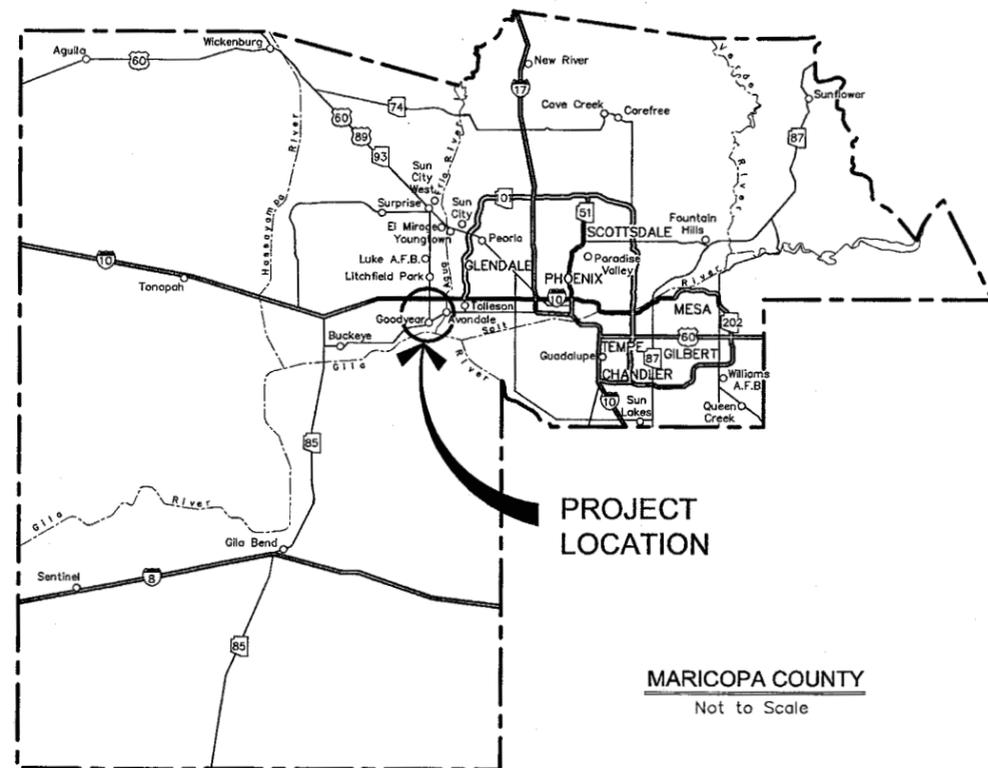
FEASIBILITY LEVEL PLANS

THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 CHANNEL FROM I-10 TO THE GILA RIVER

DATUM

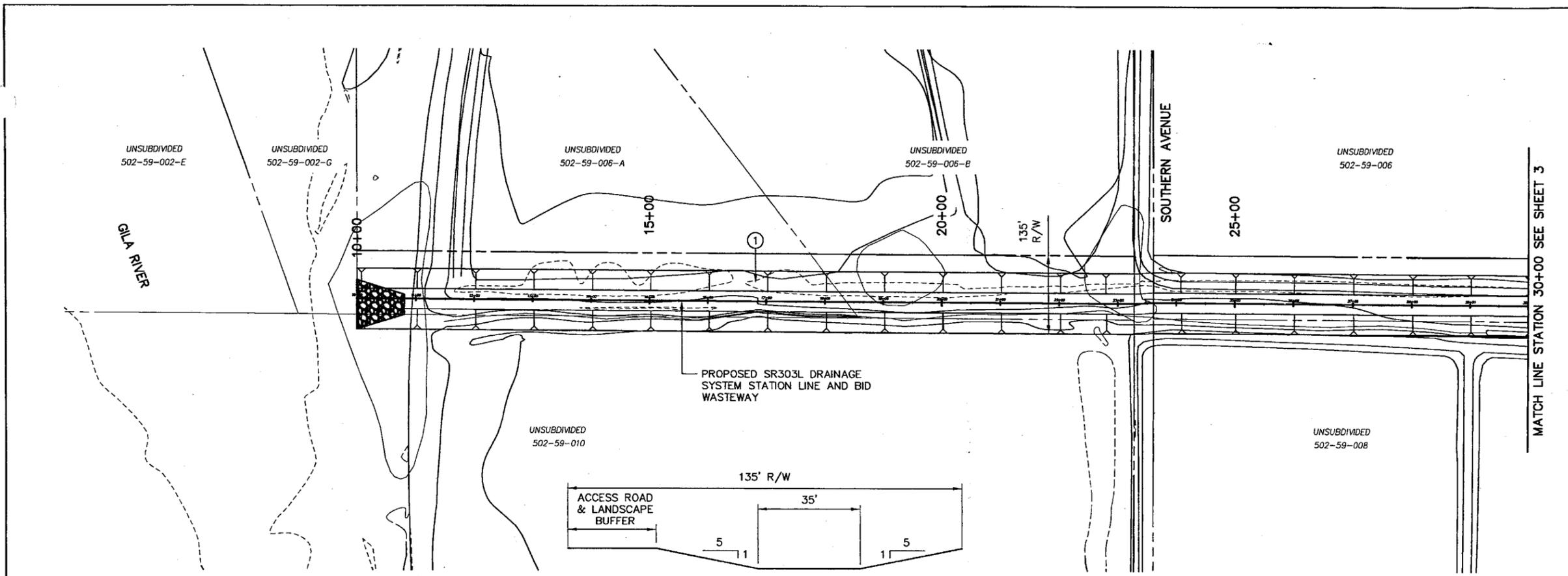
NAD 83 AND NGVD 29
NO SURVEY WAS DONE FOR THESE PLANS. MAPPING FROM SEVERAL SURVEYS WAS BLENDED AND MODIFIED TO THE PROJECT DATUM SHOWN.

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901



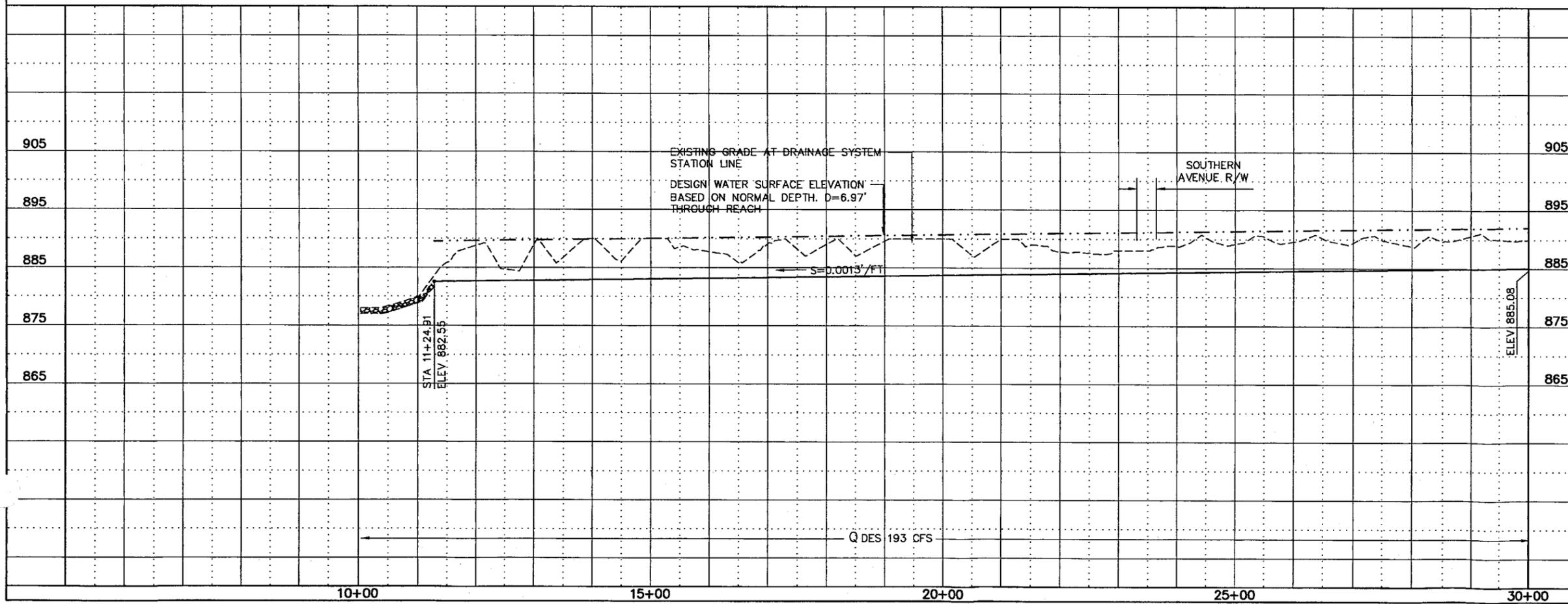
SHEET OF 16

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY	
ISSUE RECOMMENDED BY: _____	
PROJECT MANAGER _____	DATE _____
ISSUED FOR PUBLIC BIDDING BY: _____	
CHIEF ENGINEER & GENERAL MANAGER _____	DATE _____
BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT	
FULTON BROCK - CHAIRMAN	
DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	ANDY KUNASEK
DISTRICT 4	MAX WILSON
DISTRICT 5	MARY ROSE WILCOX



NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER
SURFACE ELEVATION THROUGH REACH



REMOVE

CONSTRUCT

① STA 11+24.91 TO STA 30+00.00
CONSTRUCT 1875 LIN. FT. CHANNEL

GENERAL NOTES:

- UTILITY LOCATIONS ARE SCHEMATIC.
- STRUCTURE SIZES ARE APPROXIMATE.
- FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
- PRELIMINARY NOT FOR CONSTRUCTION. FEASIBILITY LEVEL PLANS, THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 DRAINAGE SYSTEM FROM I-10 TO THE GILA RIVER.
- THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

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NO.	REVISION	BY	DATE

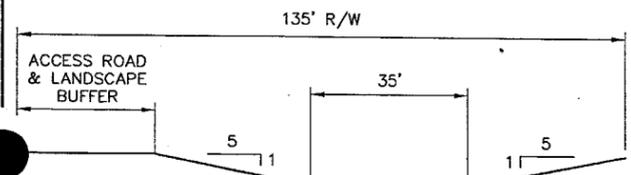
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

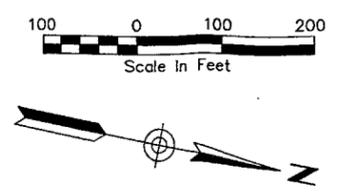
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	DRAWN	JG	12/07
	CHECKED	SM	12/07

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

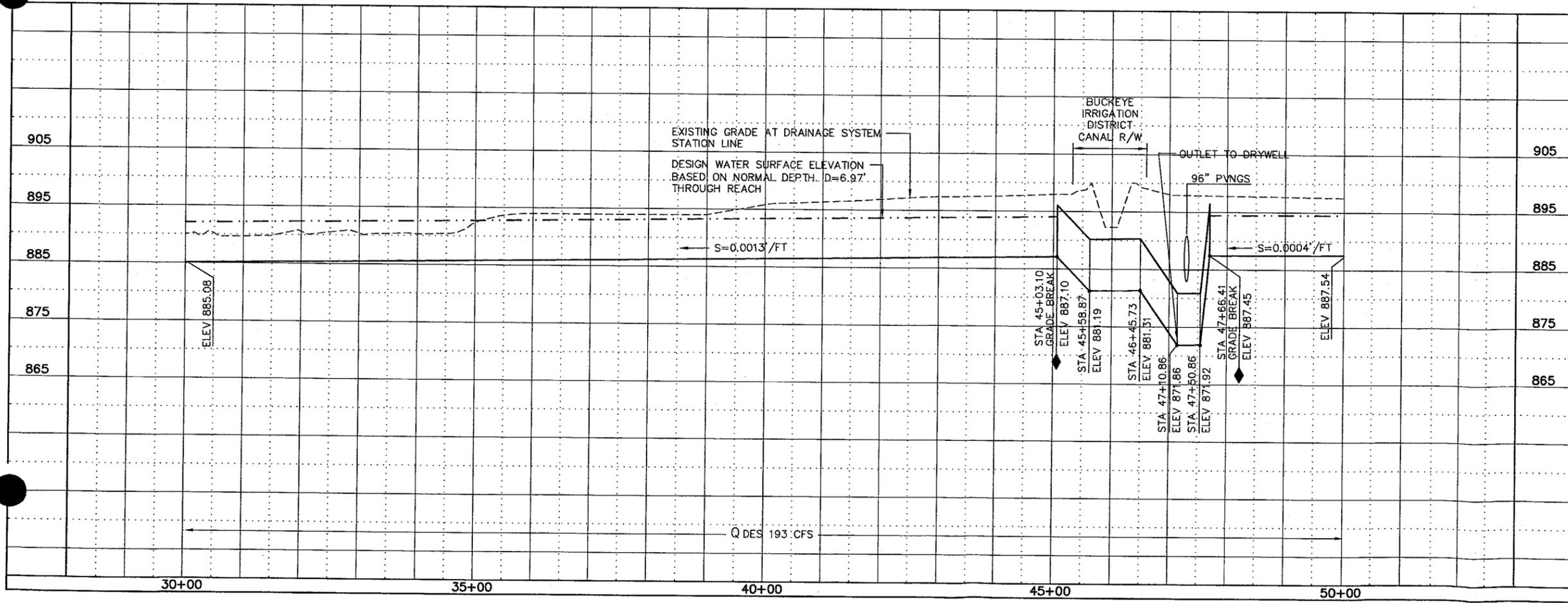
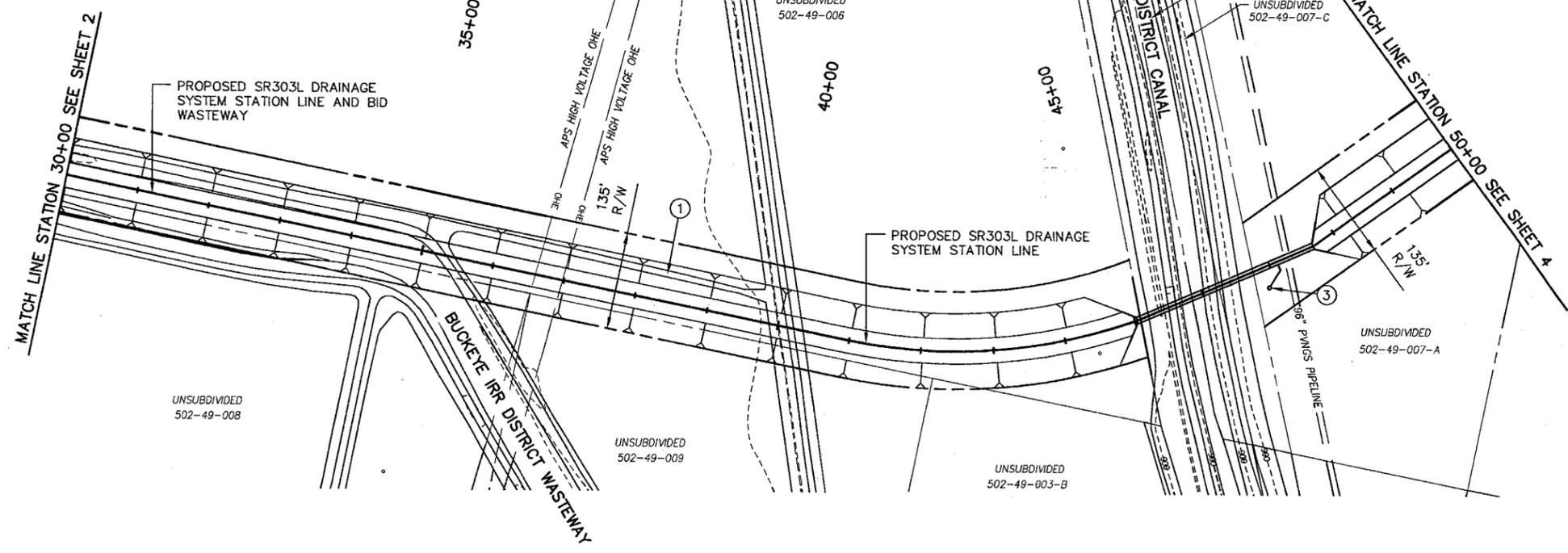
DRAWING NO.	PLAN AND PROFILE STA 10+00 TO STA 30+00	SHEET OF 2 16
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NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION



TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH



REMOVE

CONSTRUCT

- ① STA 30+00.00 TO STA 50+00.00
CONSTRUCT 1737 LIN. FT. CHANNEL
- ② CONSTRUCT 263 LIN. FT. 84" DIA RCP SIPHON
- ③ INSTALL DRYWELL

GENERAL NOTES:

- 1. UTILITY LOCATIONS ARE SCHEMATIC.
- 2. STRUCTURE SIZES ARE APPROXIMATE.
- 3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
- 4. PRELIMINARY NOT FOR CONSTRUCTION. FEASIBILITY LEVEL PLANS, THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 DRAINAGE SYSTEM FROM I-10 TO THE GILA RIVER.
- 5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

NO.	REVISION	BY	DATE
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REVISION BY DATE

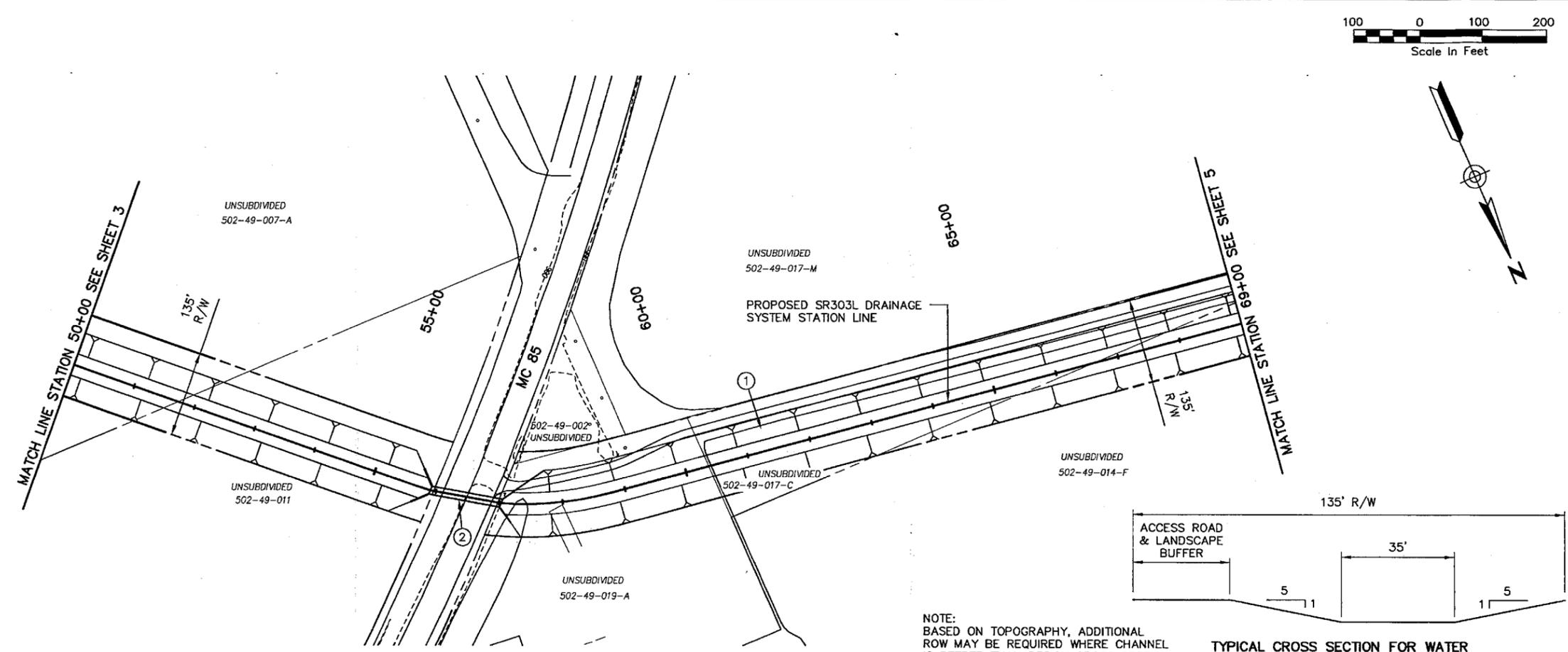
FC **LOOP 303 DRAINAGE IMPROVEMENTS**
OF MARICOPA COUNTY
ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MDH	DATE	12/07
	DRAWN	JG		12/07
	CHECKED	SM		12/07

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

DRAWING NO.	PLAN AND PROFILE STA 30+00 TO STA 50+00	SHEET OF 3 16
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NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION

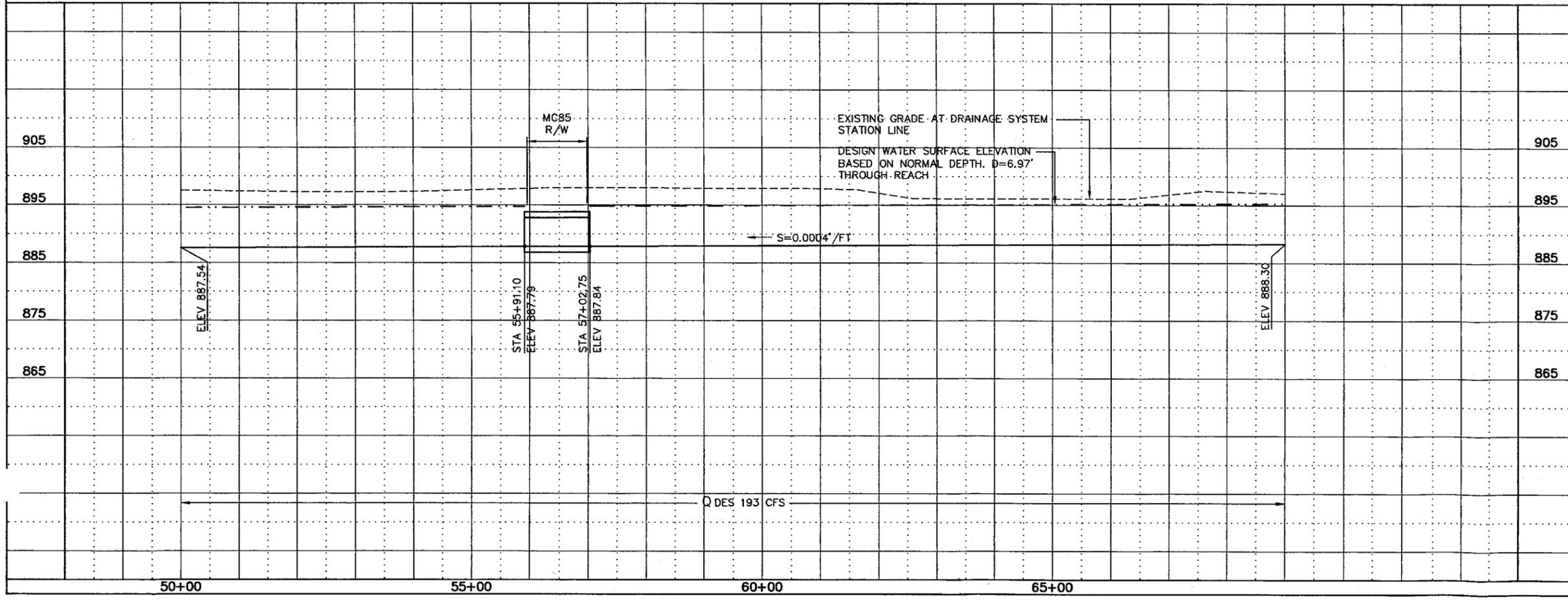
TYPICAL CROSS SECTION FOR WATER
SURFACE ELEVATION THROUGH REACH

REMOVE

CONSTRUCT

- ① STA 50+00.00 TO STA 69+00.00
CONSTRUCT 1788 LIN. FT. CHANNEL
- ② CONSTRUCT 112 LIN. FT. 2 BARREL 5' x 5' RCBC

- GENERAL NOTES:**
1. UTILITY LOCATIONS ARE SCHEMATIC.
 2. STRUCTURE SIZES ARE APPROXIMATE.
 3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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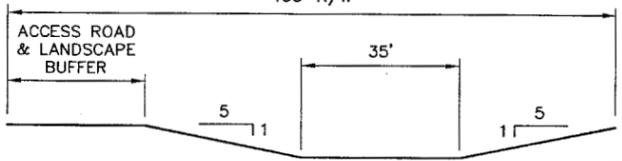
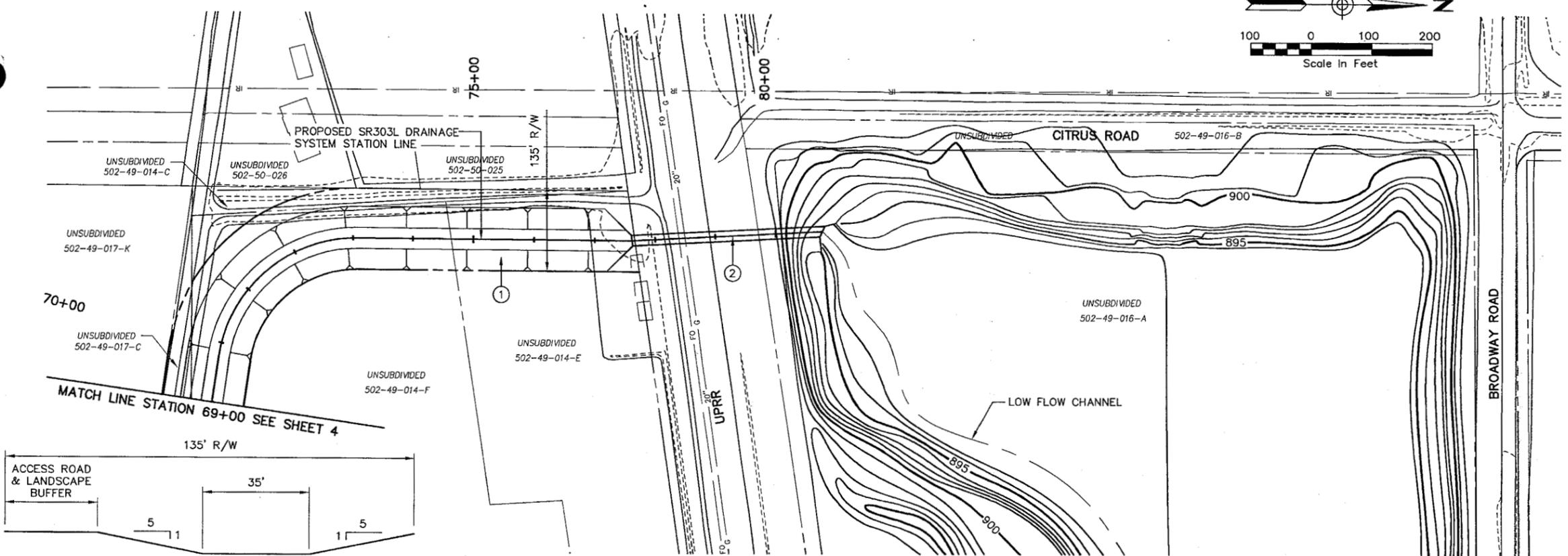
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NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

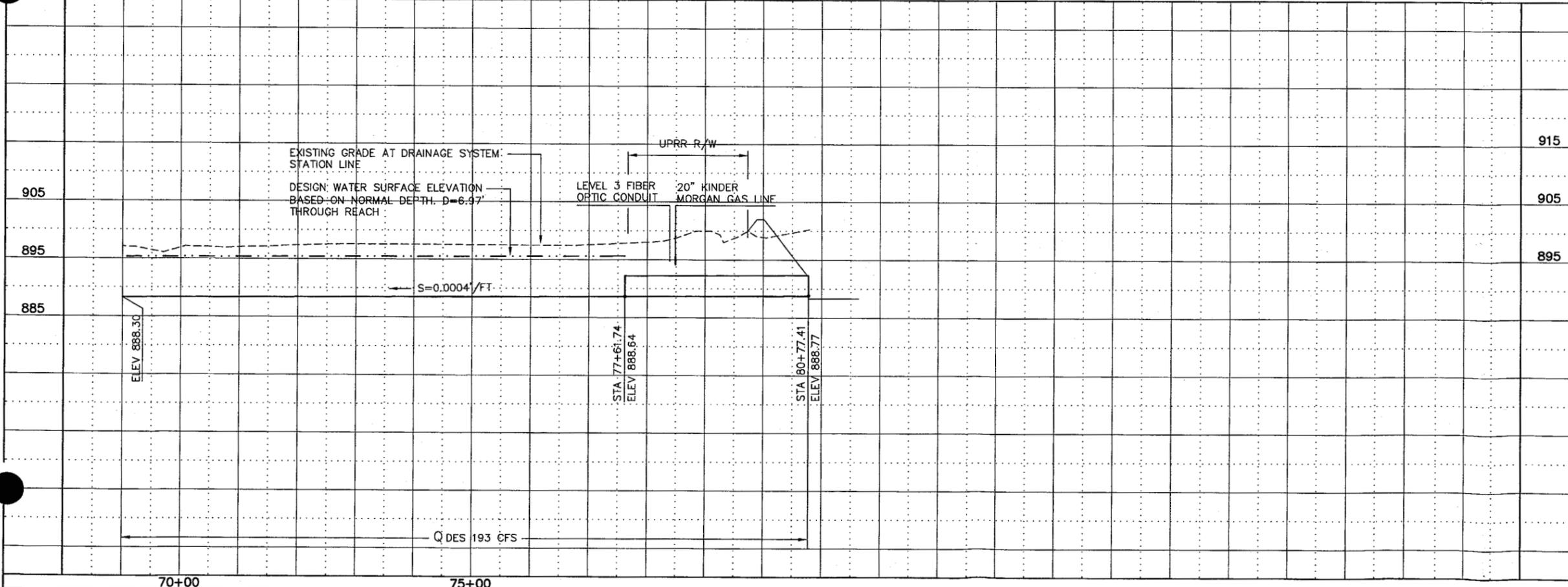
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	DRAWN	JG	12/07
	CHECKED	SM	12/07
	PROJECT ENGINEERING CONSULTANTS, LTD. 2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021 PHONE (602) 906-1901		

DRAWING NO. PLAN AND PROFILE SHEET OF 4 16
STA 50+00 TO STA 69+00



TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

NOTE: BASED ON TOPOGRAPHY, ADDITIONAL ROW MAY BE REQUIRED WHERE CHANNEL IS DEEPER THAN DESIGN CROSS SECTION



REMOVE

CONSTRUCT

- ① STA 69+00.00 TO STA 77+61.74
CONSTRUCT 862 LIN. FT. CHANNEL
- ② CONSTRUCT 316 LIN. FT. 5 BARREL 42"RCP

GENERAL NOTES:

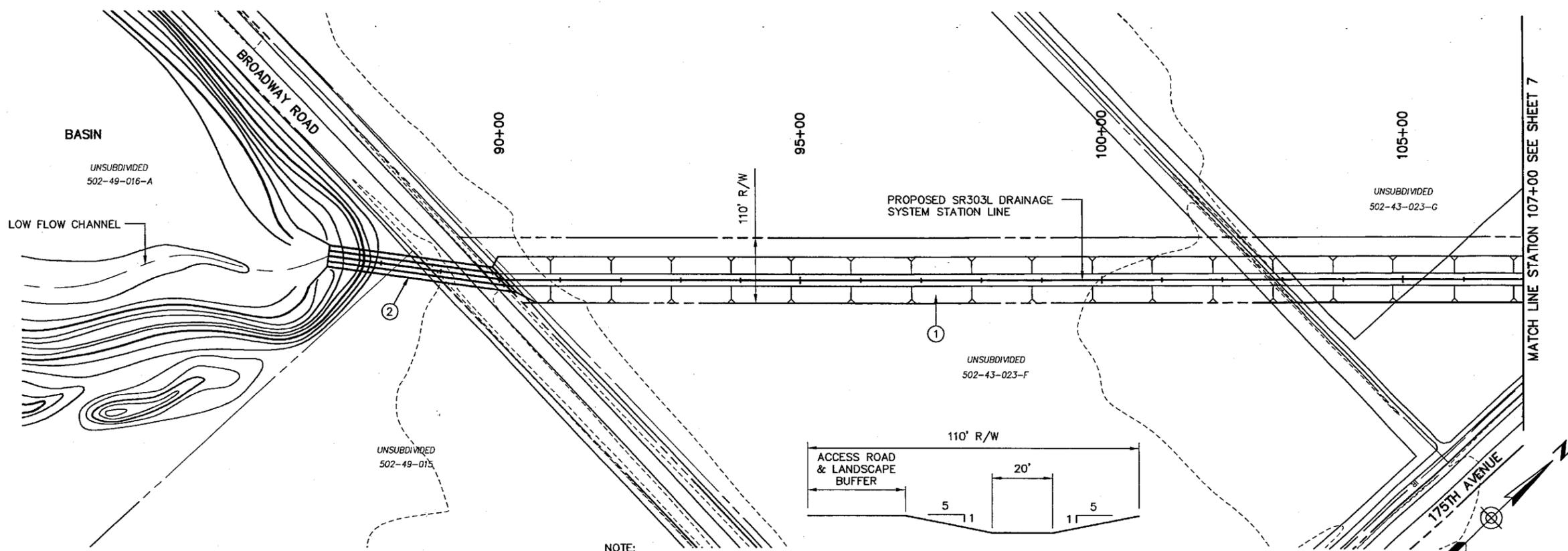
1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
4. PRELIMINARY NOT FOR CONSTRUCTION. FEASIBILITY LEVEL PLANS, THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 DRAINAGE SYSTEM FROM I-10 TO THE GILA RIVER.
5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

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NO.	REVISION	BY	DATE


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 ENGINEERING DIVISION
LOOP 303 DRAINAGE IMPROVEMENTS
 CANDIDATE ASSESSMENT REPORT PHASE II
 FCDMC PROJECT NO. 2005C014
 ASSIGNMENT NO. 2

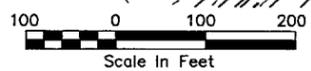
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	DRAWN	JG	12/07
	CHECKED	SM	12/07
	 PROJECT ENGINEERING CONSULTANTS, LTD. 2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021 PHONE (602) 906-1901		

DRAWING NO. **PLAN AND PROFILE** STA 69+00 TO STA 80+77.41 SHEET OF 5 16



NOTE:
 BASED ON TOPOGRAPHY, ADDITIONAL
 ROW MAY BE REQUIRED WHERE CHANNEL
 IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER
 SURFACE ELEVATION THROUGH REACH

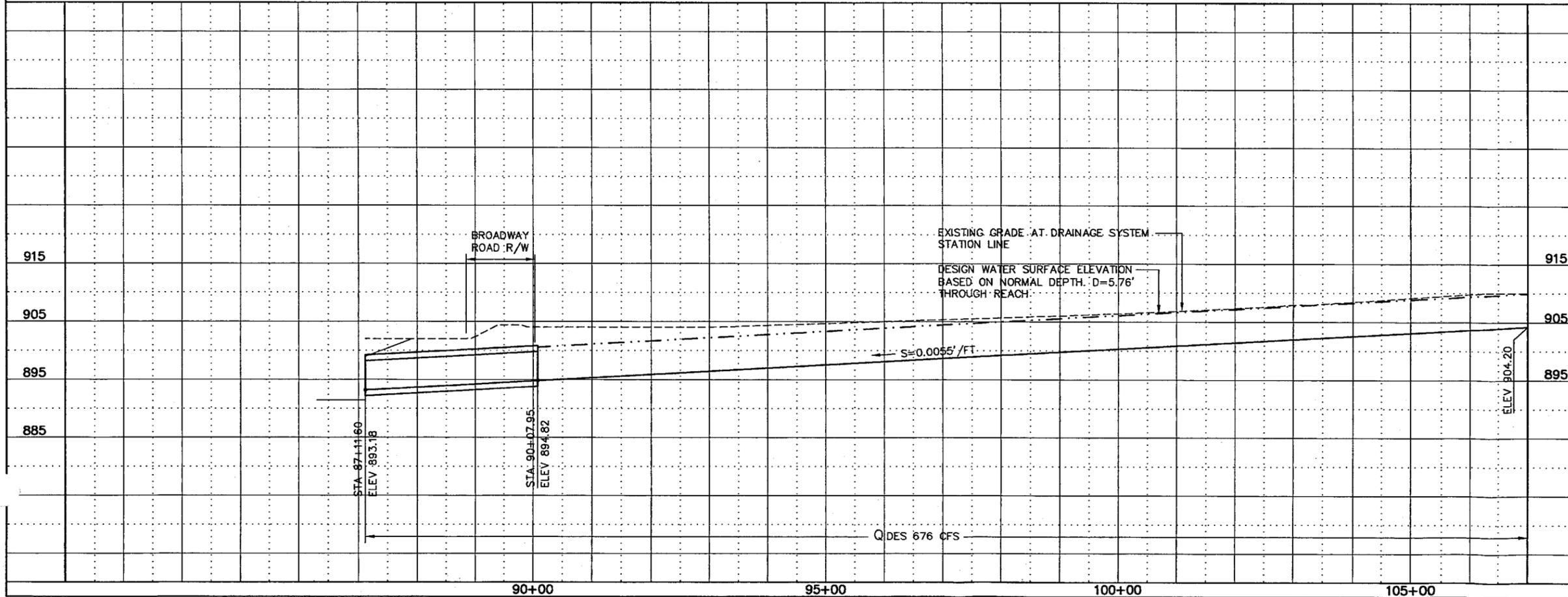


REMOVE

CONSTRUCT

- ① STA 90+07.95 TO STA 107+00.00
 CONSTRUCT 1692 LIN. FT. CHANNEL
- ② CONSTRUCT 296 LIN. FT. 4 BARREL 8' x 5' RCBC

- GENERAL NOTES:**
1. UTILITY LOCATIONS ARE SCHEMATIC.
 2. STRUCTURE SIZES ARE APPROXIMATE.
 3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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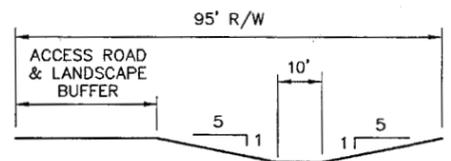
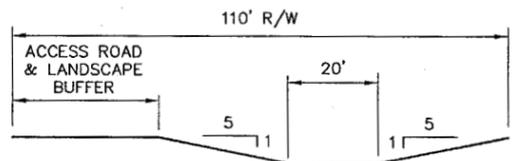
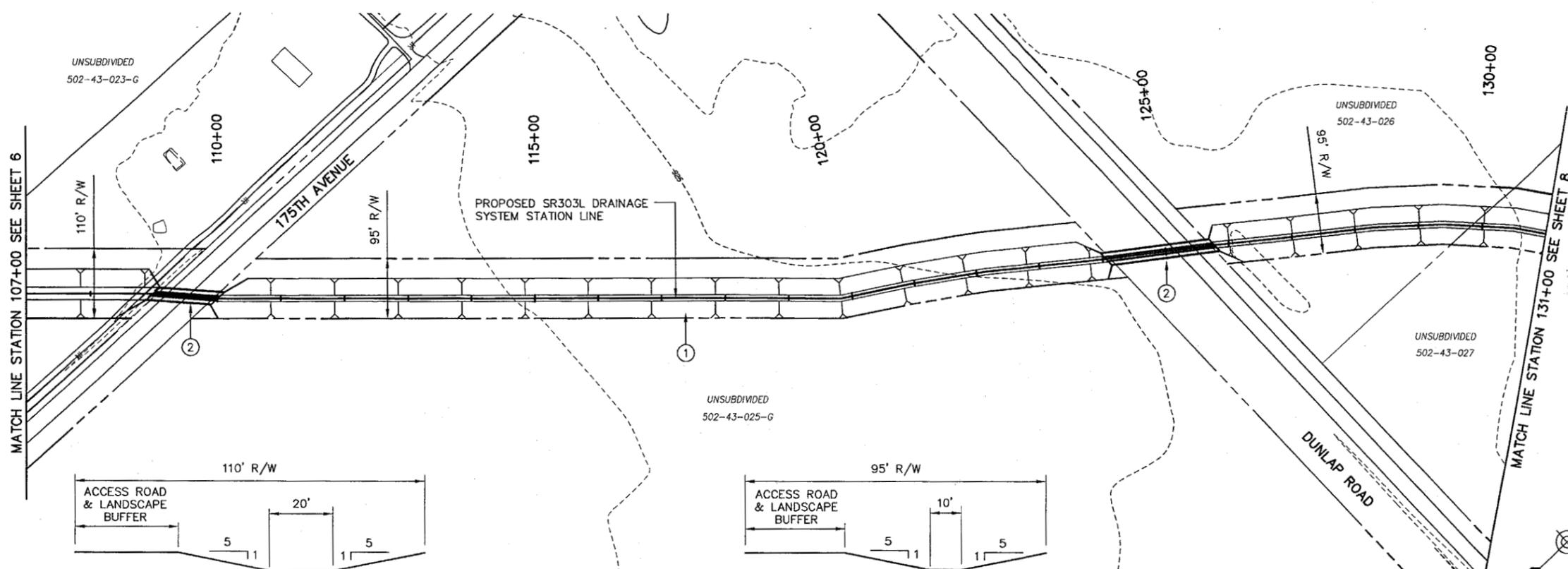
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT PHASE II
 FCDMC PROJECT NO. 2005C014
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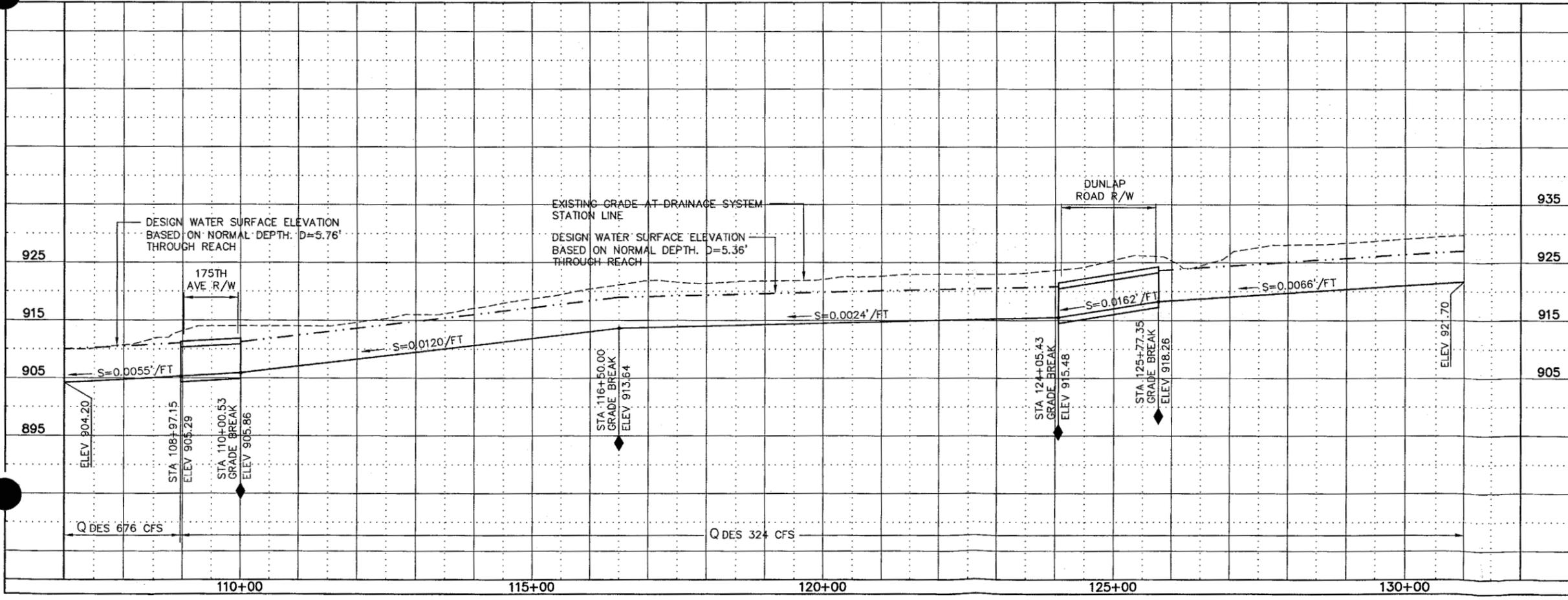
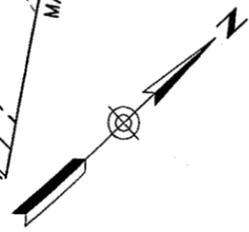
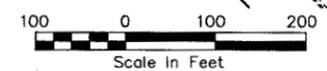
PRELIMINARY NOT FOR CONSTRUCTION	BY		DATE
	DESIGNED	MDH	12/07
	DRAWN	JG	12/07
	CHECKED	SM	12/07

PROJECT ENGINEERING CONSULTANTS, LTD.
 2310 W. MISSON LANE, STE. 4 PHOENIX, AZ 85021
 PHONE (602) 906-1901

DRAWING NO.	PLAN AND PROFILE	SHEET OF
	STA 87+11.60 TO STA 107+00	6 16



NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION



REMOVE

CONSTRUCT

- ① STA 107+00.00 TO STA 131+00.00
CONSTRUCT 2125 LIN. FT. CHANNEL
- ② CONSTRUCT 275 LIN. FT. 3 BARREL 6' x 5' RCBC

GENERAL NOTES:

1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

NO.	REVISION	BY	DATE
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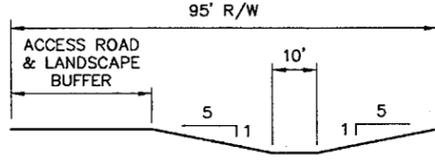
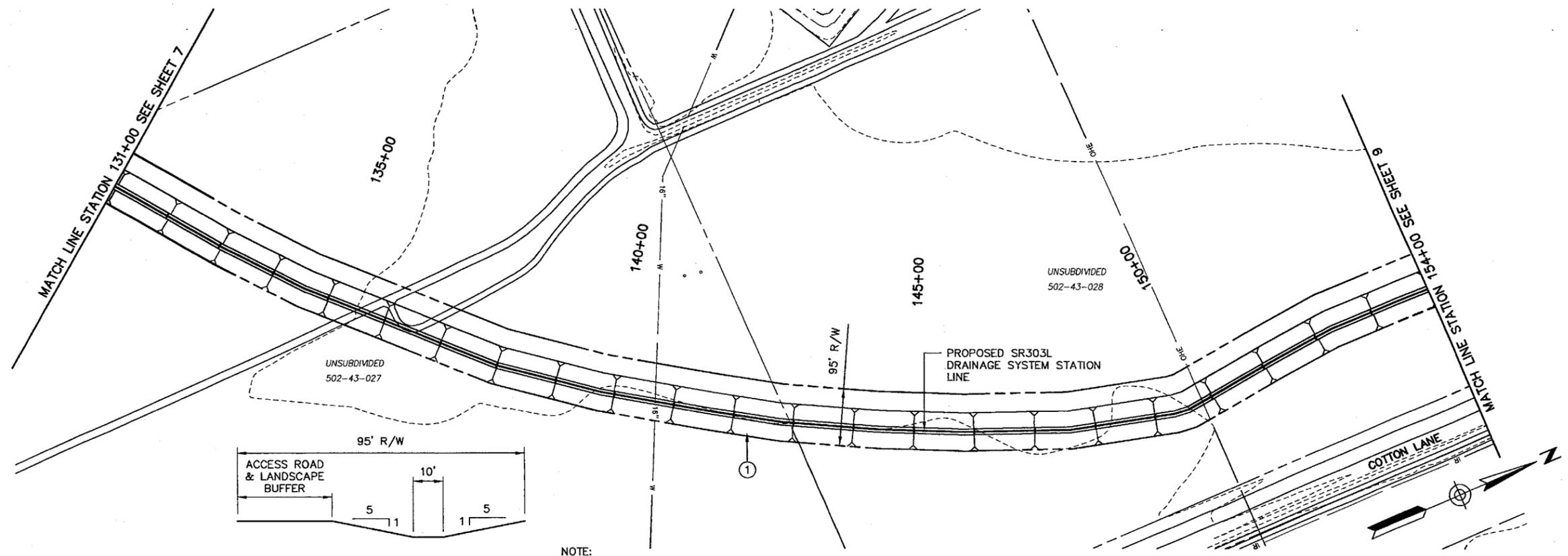
**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
ENGINEERING DIVISION

**LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2**

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MDH	12/07
	DRAWN	JG	12/07
	CHECKED	SM	12/07

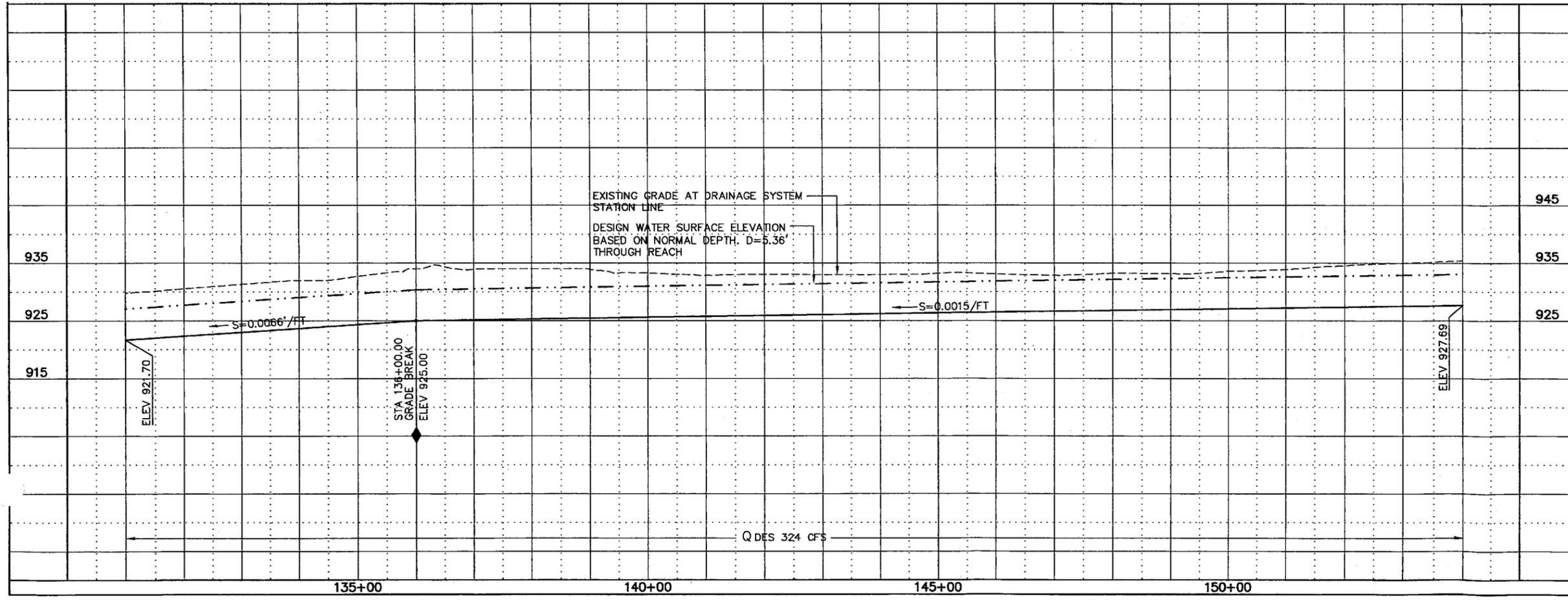
PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MESSON LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

DRAWING NO.	PLAN AND PROFILE STA 107+00 TO STA 131+00	SHEET OF 7 16
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TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

NOTE: BASED ON TOPOGRAPHY, ADDITIONAL ROW MAY BE REQUIRED WHERE CHANNEL IS DEEPER THAN DESIGN CROSS SECTION



REMOVE

CONSTRUCT

① STA 131+00.00 TO STA 154+00.00
CONSTRUCT 2300 LIN. FT. CHANNEL

GENERAL NOTES:

- UTILITY LOCATIONS ARE SCHEMATIC.
- STRUCTURE SIZES ARE APPROXIMATE.
- FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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- THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

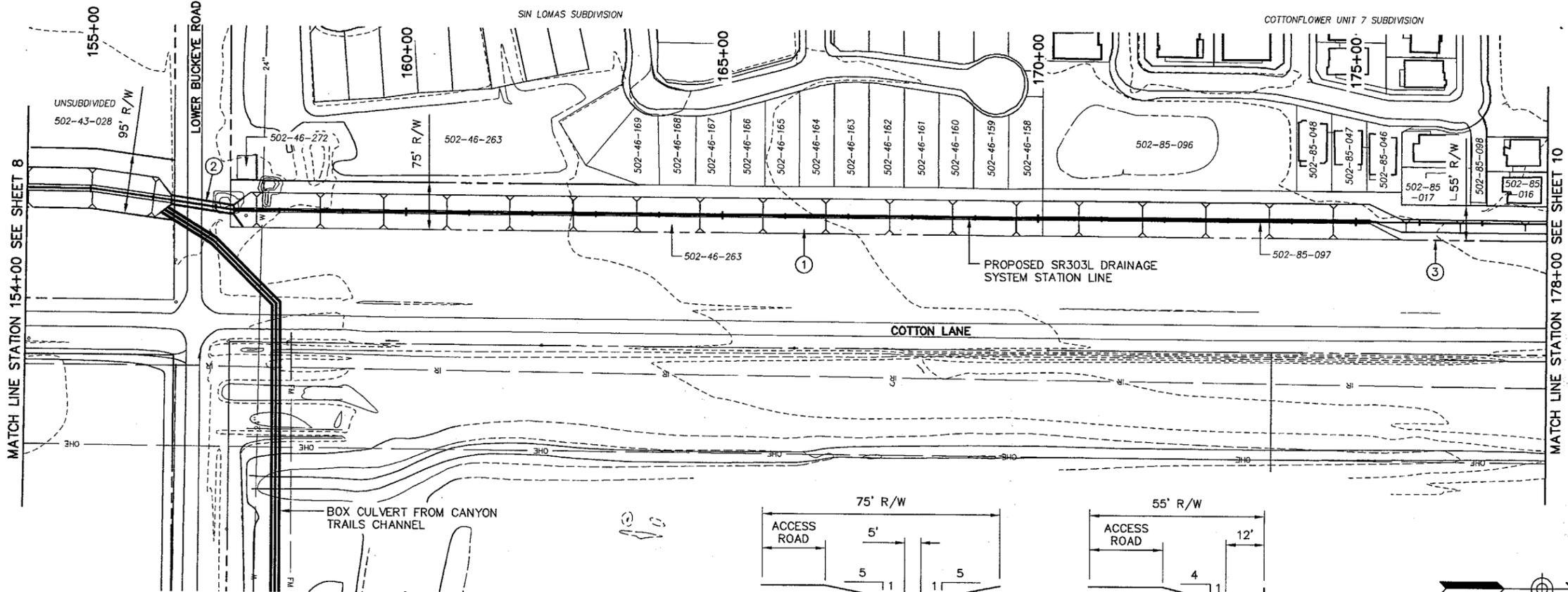
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NO.	REVISION	BY	DATE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
 ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
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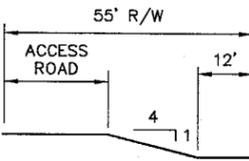
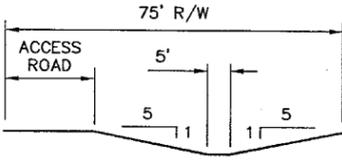
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MDH	DATE	12/07
	DRAWN	JG		12/07
	CHECKED	SM		12/07
	PROJECT ENGINEERING CONSULTANTS, LTD. 2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021 PHONE (602) 906-1901			

DRAWING NO.	PLAN AND PROFILE	SHEET OF
	STA 131+00 TO STA 154+00	8 16



MATCH LINE STATION 154+00 SEE SHEET 8

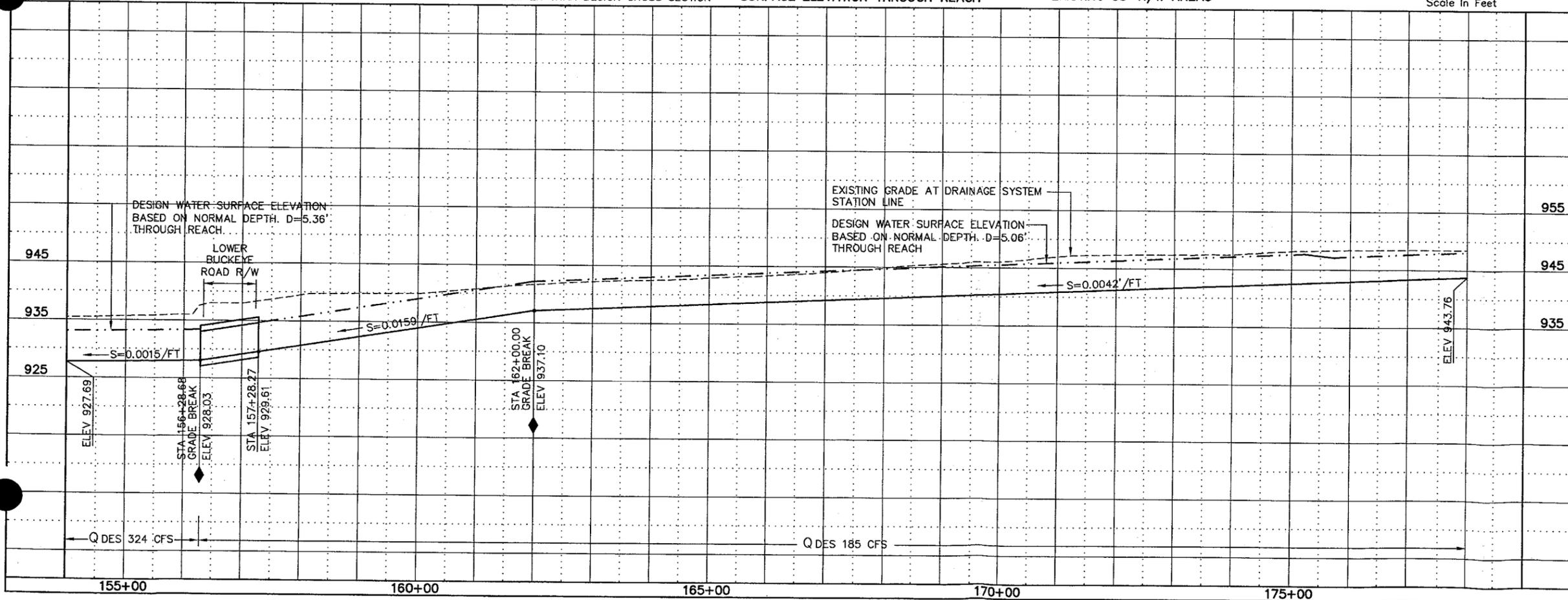
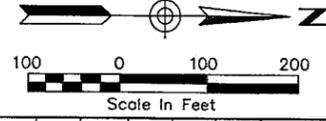
MATCH LINE STATION 178+00 SEE SHEET 10



NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL ROW MAY BE REQUIRED WHERE CHANNEL IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

TYPICAL CROSS SECTION THROUGH EXISTING 55' R/W AREAS



REMOVE

CONSTRUCT

- ① STA 154+00.00 TO STA 178+00.00
CONSTRUCT 2300 LIN. FT. CHANNEL
- ② CONSTRUCT 100 LIN. FT. 2 BARREL 6' x 5' RCBC
- ③ CONSTRUCT 232 LIN. RETAINING WALL

- GENERAL NOTES:**
1. UTILITY LOCATIONS ARE SCHEMATIC.
 2. STRUCTURE SIZES ARE APPROXIMATE.
 3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

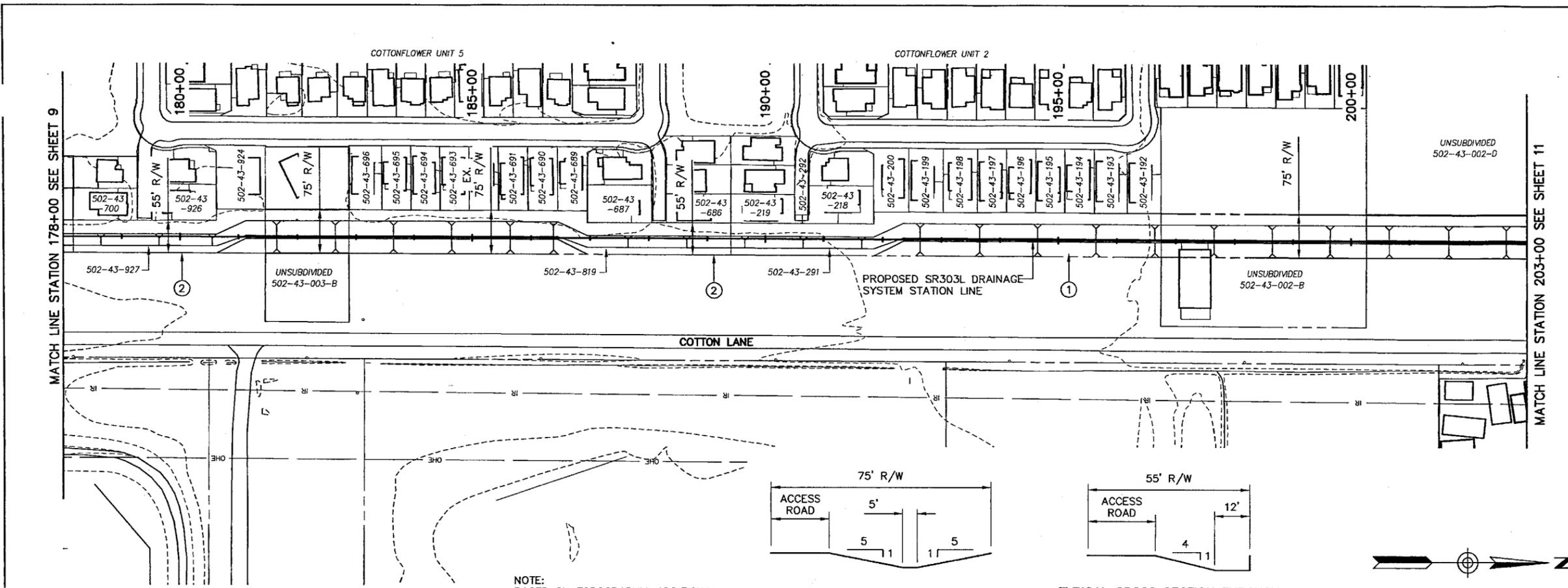
DESIGNED	MDH	DATE	12/07
DRAWN	JG	DATE	12/07
CHECKED	SM	DATE	12/07

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

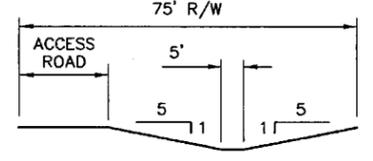
DRAWING NO. **PLAN AND PROFILE** STA 154+00 TO STA 178+00 SHEET OF 9 16

155+00 160+00 165+00 170+00 175+00

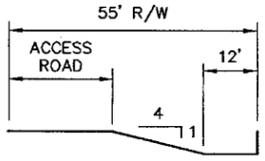
Q DES 324 CFS Q DES 185 CFS



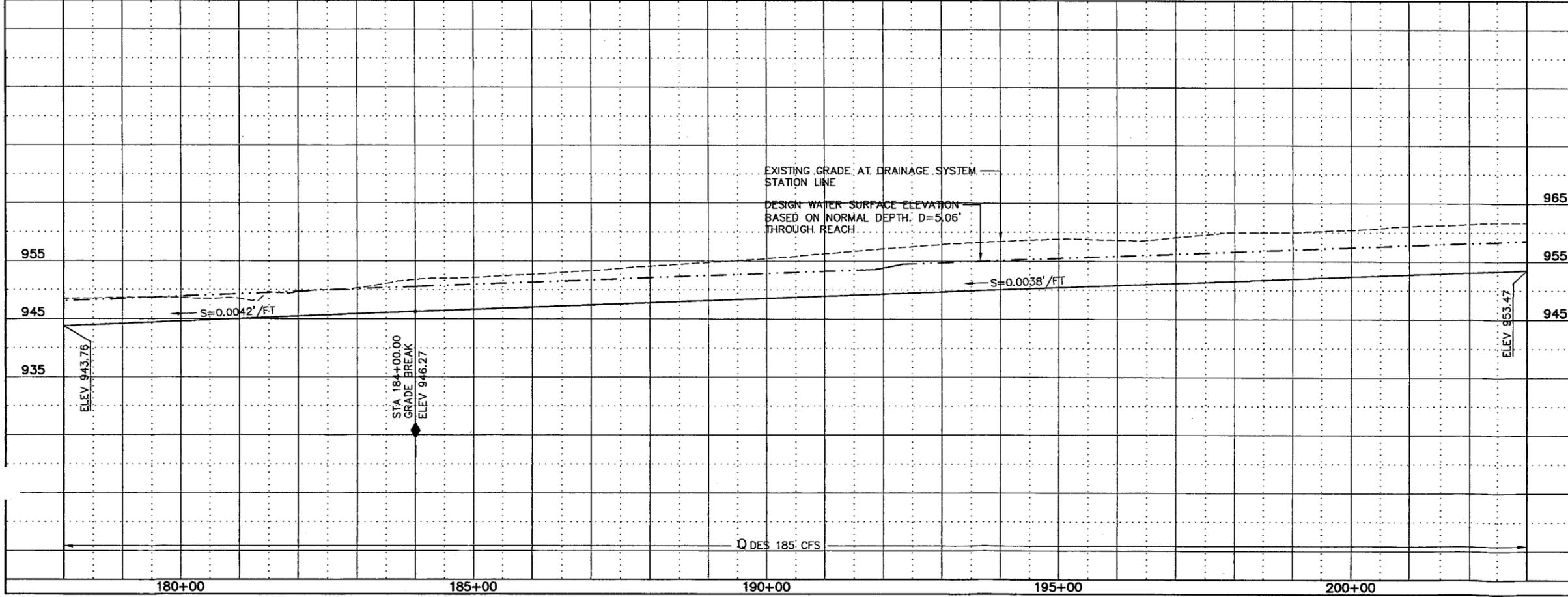
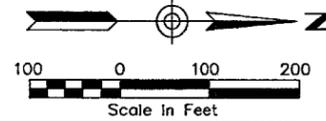
NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION



TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH



TYPICAL CROSS SECTION THROUGH EXISTING 55' R/W AREAS



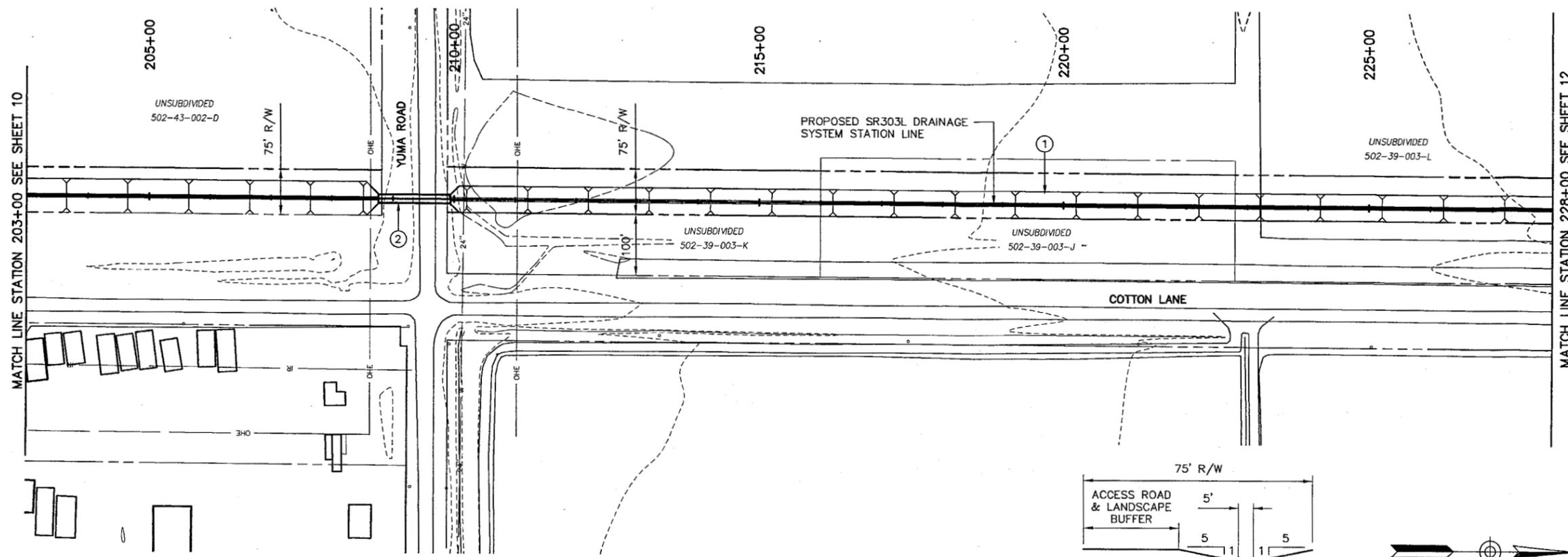
REMOVE
 CONSTRUCT

- ① STA 178+00.00 TO STA 203+00.00
CONSTRUCT 2500 LIN. FT. CHANNEL
- ② CONSTRUCT 749 LIN. FT. RETAINING WALL

GENERAL NOTES:

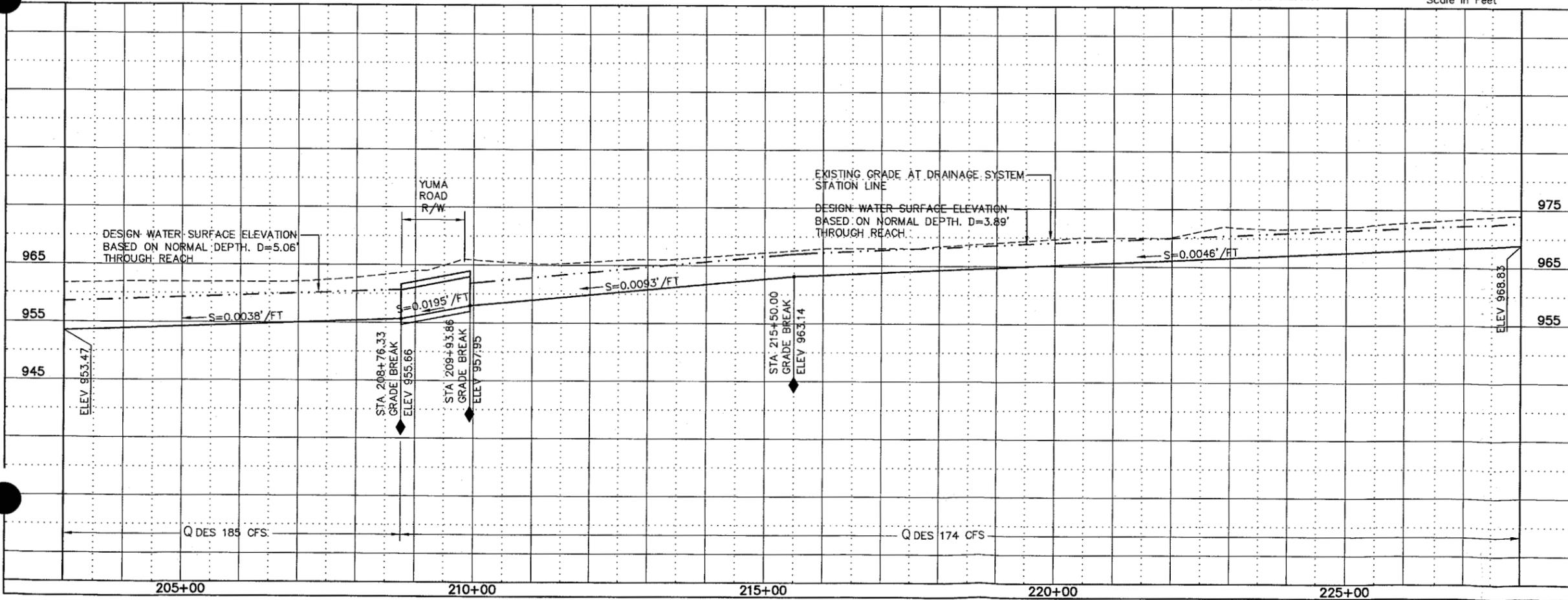
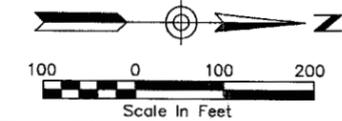
1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
4. PRELIMINARY NOT FOR CONSTRUCTION. FEASIBILITY LEVEL PLANS, THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 DRAINAGE SYSTEM FROM I-10 TO THE GILA RIVER.
5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

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NO.	REVISION	BY	DATE		
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>					
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PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MDH	BY	DATE	12/07
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	CHECKED	SM			12/07
	<p>PROJECT ENGINEERING CONSULTANTS, LTD. 2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021 PHONE (602) 906-1901</p>				
DRAWING NO.		PLAN AND PROFILE		SHEET OF	
		STA 178+00 TO STA 203+00		10 16	



NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER
SURFACE ELEVATION THROUGH REACH



REMOVE

CONSTRUCT

- ① STA 203+00.00 TO STA 228+00.00
CONSTRUCT 2382 LIN. FT. CHANNEL
- ② CONSTRUCT 118 LIN. FT. 2 BARREL 6' x 5' RCBC

GENERAL NOTES:

1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

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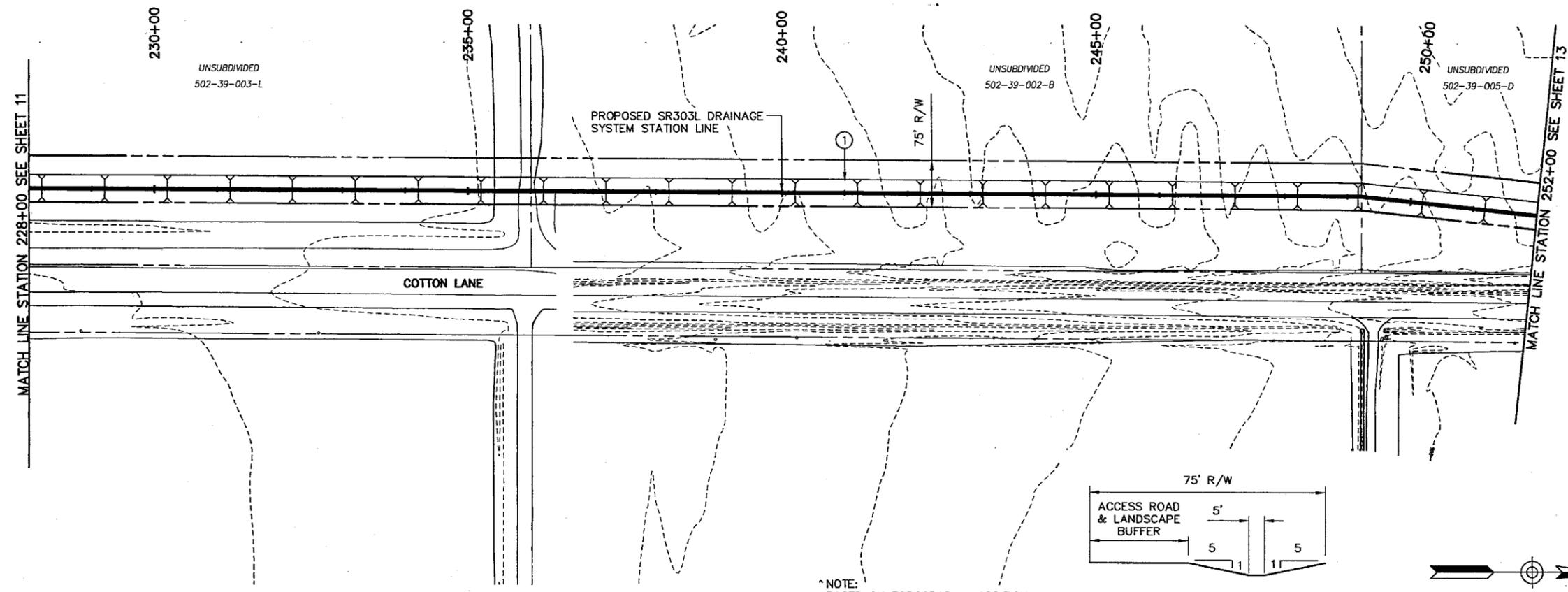
**FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY**
ENGINEERING DIVISION

LOOP 303 DRAINAGE IMPROVEMENTS
CANDIDATE ASSESSMENT REPORT PHASE II
FCDM PROJECT NO. 2005C014
ASSIGNMENT NO. 2

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	CHECKED	SM	12/07

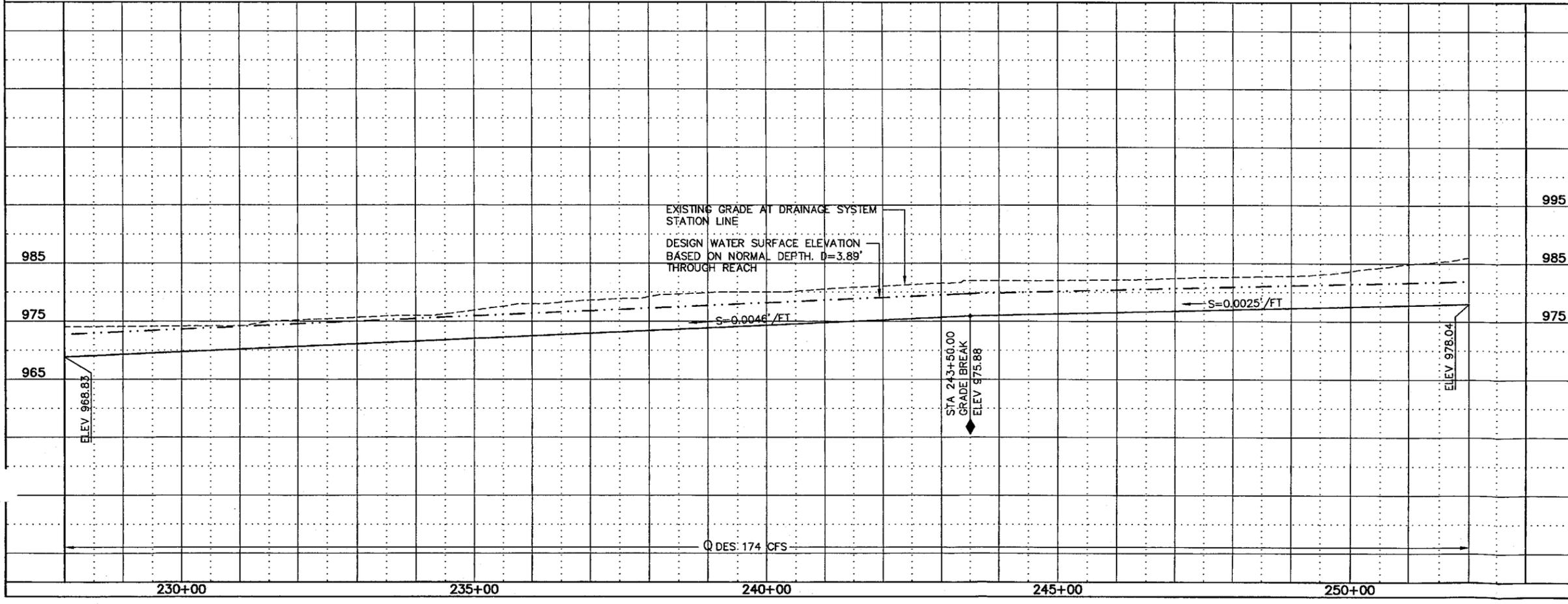
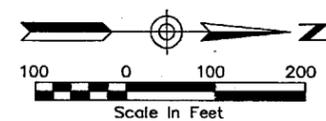
PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021
PHONE (602) 906-1901

DRAWING NO.	PLAN AND PROFILE STA 203+00 TO STA 228+00	SHEET OF 11 16
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NOTE:
BASED ON TOPOGRAPHY, ADDITIONAL
ROW MAY BE REQUIRED WHERE CHANNEL
IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER
SURFACE ELEVATION THROUGH REACH



REMOVE

CONSTRUCT

① STA 228+00.00 TO STA 252+00.00
CONSTRUCT 2400 LIN. FT. CHANNEL

GENERAL NOTES:

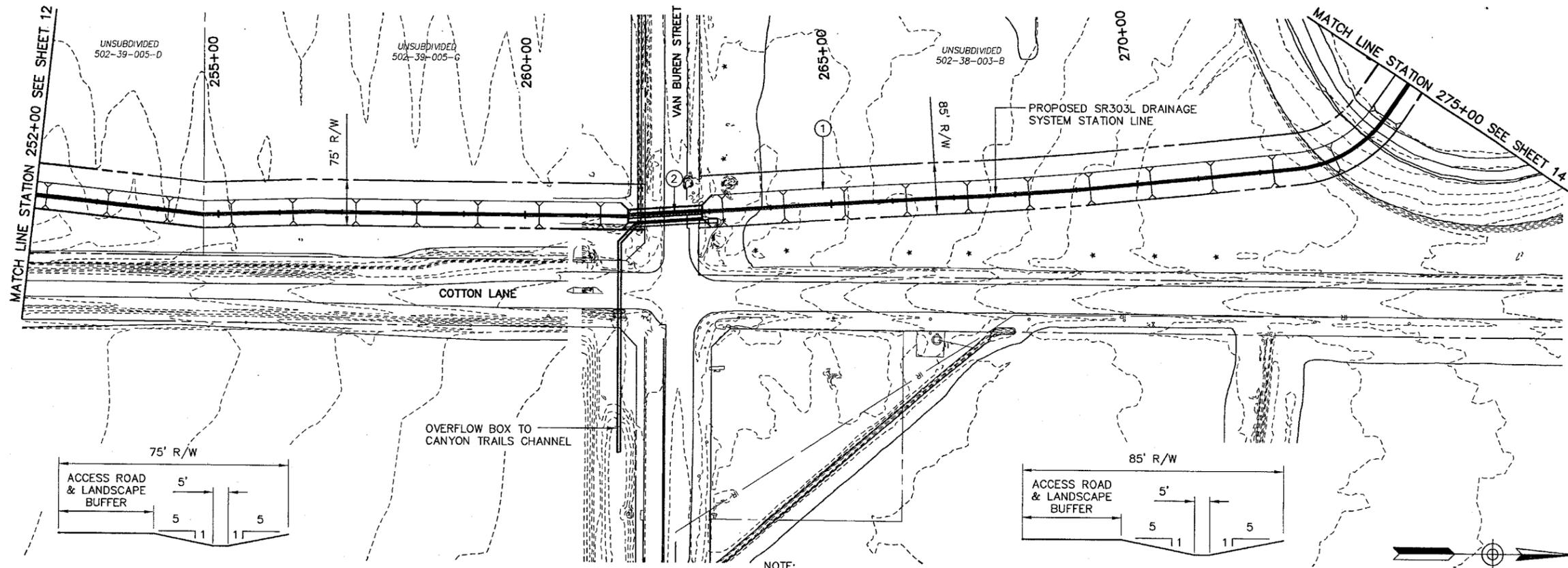
1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
4. PRELIMINARY NOT FOR CONSTRUCTION. FEASIBILITY LEVEL PLANS, THESE PLANS WERE DEVELOPED TO DETERMINE GENERAL GRADE, ALIGNMENT AND RIGHT OF WAY REQUIREMENTS FOR THE LOOP 303 DRAINAGE SYSTEM FROM I-10 TO THE GILA RIVER.
5. THE CHANNEL WAS SIZED USING THE NORMAL DEPTH DISCHARGE FOR THE "EXISTING CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS. THE STRUCTURES WERE SIZED USING THE DISCHARGE FOR THE "FUTURE CONDITIONS WITH PROJECTS IN PLACE" HYDROLOGIC ANALYSIS.

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**FLOOD CONTROL DISTRICT
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CANDIDATE ASSESSMENT REPORT PHASE II
FCDMC PROJECT NO. 2005C014
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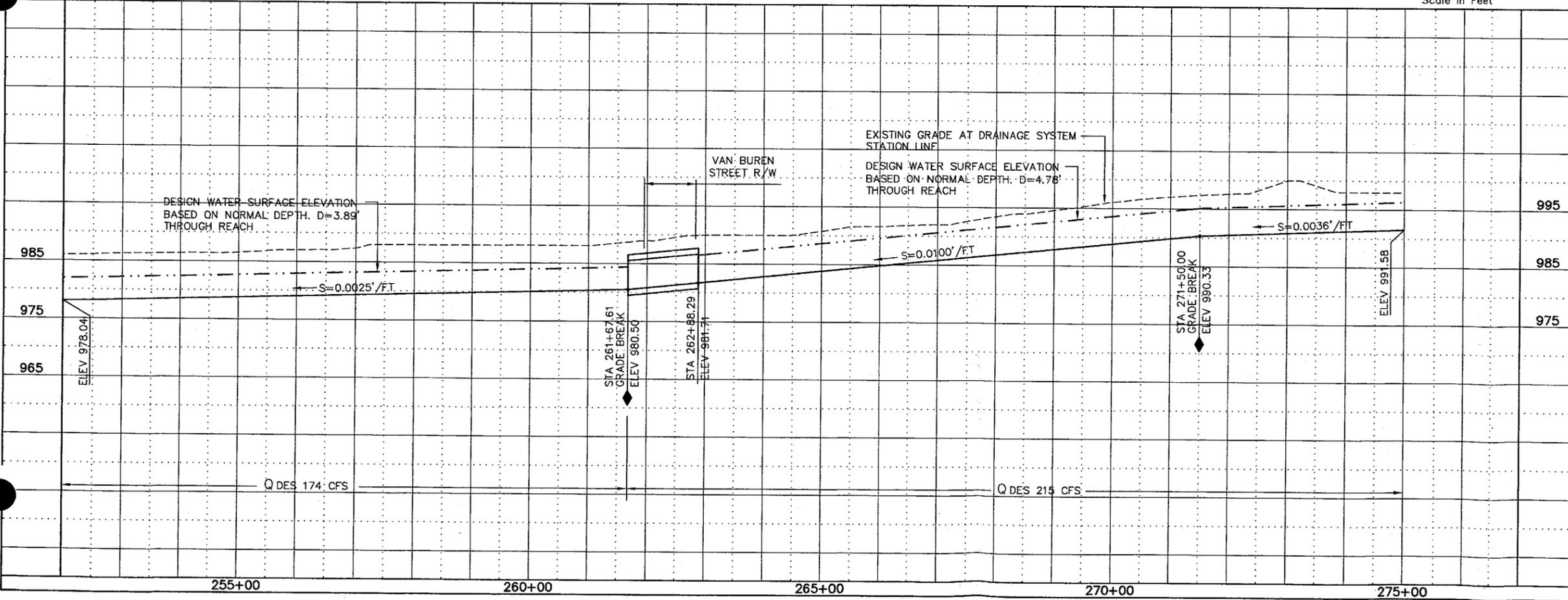
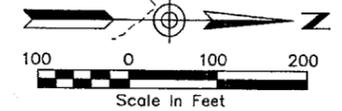
DRAWING NO. **PLAN AND PROFILE** SHEET OF **12 16**
STA 228+00 TO STA 252+00



TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

NOTE: BASED ON TOPOGRAPHY, ADDITIONAL ROW MAY BE REQUIRED WHERE CHANNEL IS DEEPER THAN DESIGN CROSS SECTION



REMOVE

CONSTRUCT

- ① STA 252+00.00 TO STA 275+00.00
CONSTRUCT 2179 LIN. FT. CHANNEL
- ② CONSTRUCT 121 LIN. FT. 3 BARREL 6' x 5' RCBC

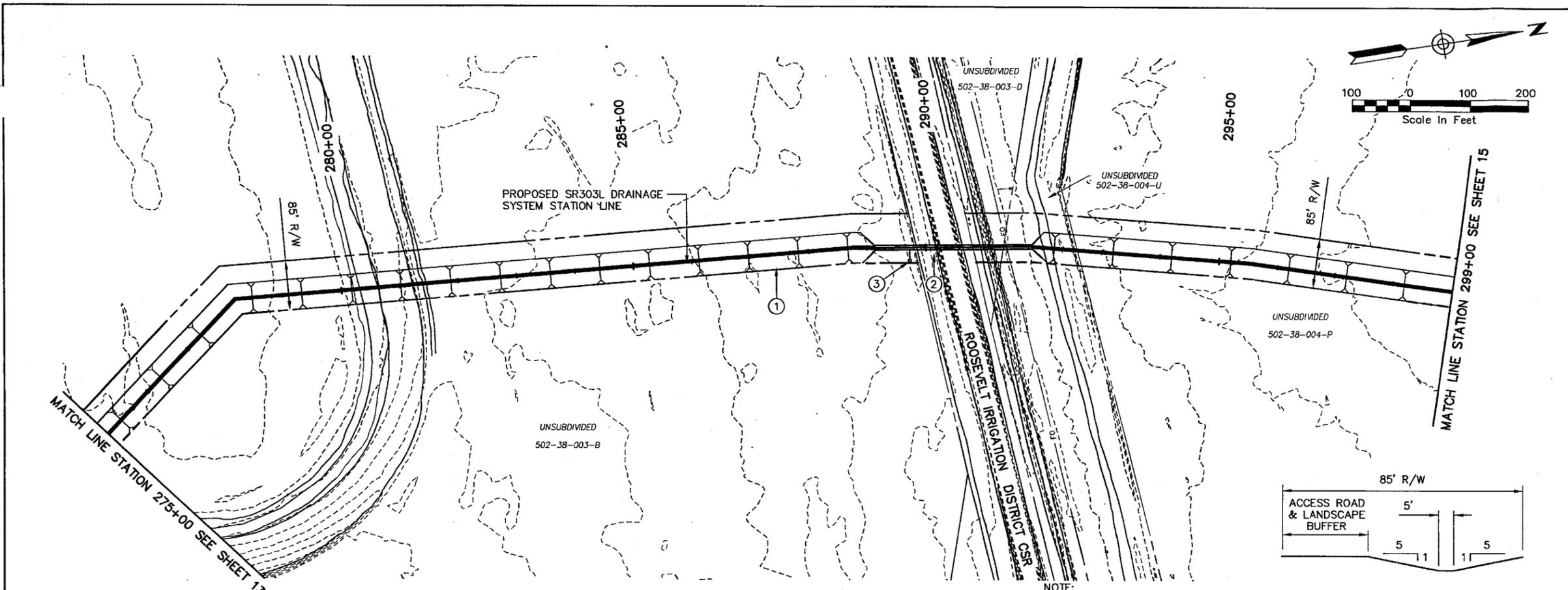
- GENERAL NOTES:**
1. UTILITY LOCATIONS ARE SCHEMATIC.
 2. STRUCTURE SIZES ARE APPROXIMATE.
 3. FOR LANDSCAPE AESTHETIC TREATMENTS FOR THE IDENTIFIED CROSS SECTIONS AND BASINS SEE THE LANDSCAPE AESTHETICS AND MULTI-USE DESIGN GUIDELINES IN THE LOOP 303 DRAINAGE IMPROVEMENTS CANDIDATE ASSESSMENT REPORT - PHASE 2
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FCDMC PROJECT NO. 2005C014
ASSIGNMENT NO. 2

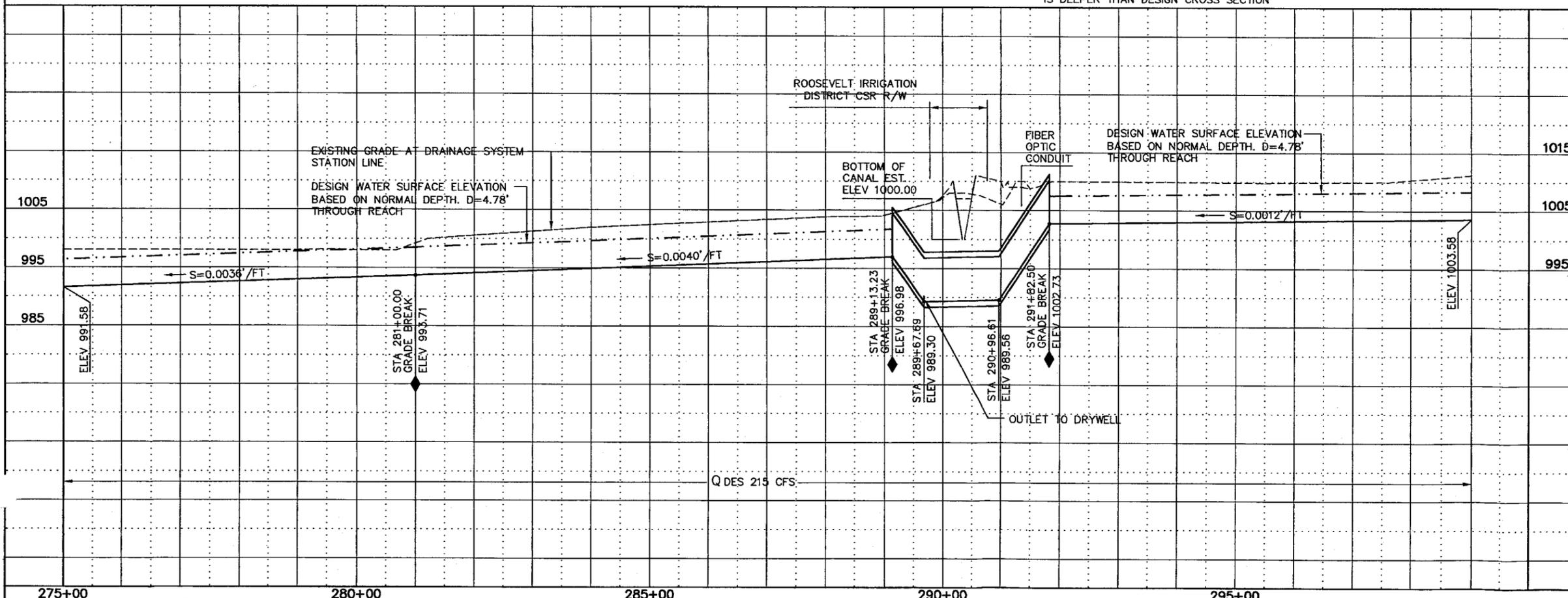
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MDH	12/07
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	PROJECT ENGINEERING CONSULTANTS, LTD. 2310 W. MISSION LANE, STE. 4 PHOENIX, AZ 85021 PHONE (602) 906-1901		

DRAWING NO. **PLAN AND PROFILE** SHEET OF **13 16**
STA 252+00 TO STA 275+00



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 IS DEEPER THAN DESIGN CROSS SECTION

TYPICAL CROSS SECTION FOR WATER
 SURFACE ELEVATION THROUGH REACH



REMOVE

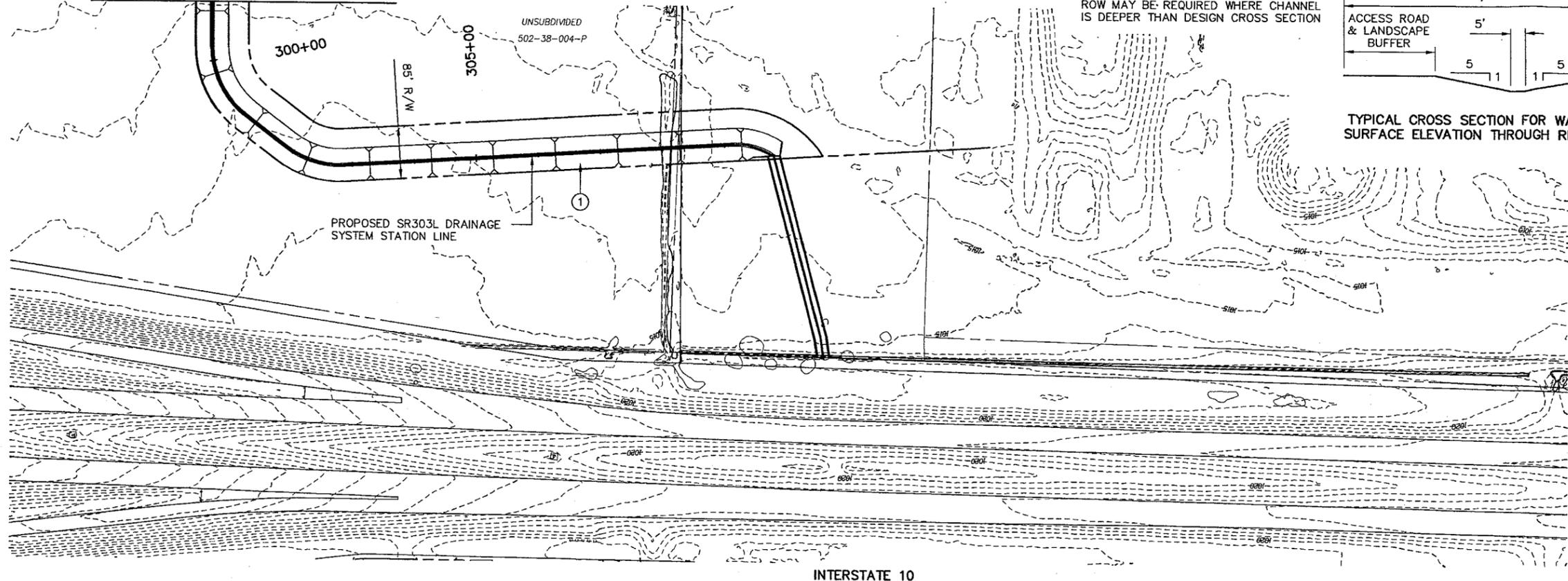
CONSTRUCT

- ① STA 275+00.00 TO STA 299+00.00
CONSTRUCT 2131 LIN. FT. CHANNEL
- ② CONSTRUCT 269 LIN. FT. 90" DIA RCP SIPHON
- ③ INSTALL DRYWELL

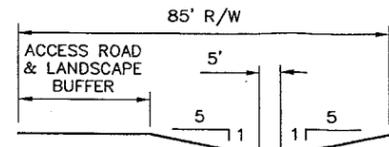
- GENERAL NOTES:**
1. UTILITY LOCATIONS ARE SCHEMATIC.
 2. STRUCTURE SIZES ARE APPROXIMATE.
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MATCH LINE STATION 299+00 SEE SHEET 14



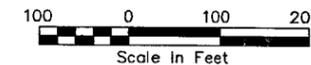
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TYPICAL CROSS SECTION FOR WATER SURFACE ELEVATION THROUGH REACH

PROPOSED SR303L DRAINAGE SYSTEM STATION LINE

INTERSTATE 10



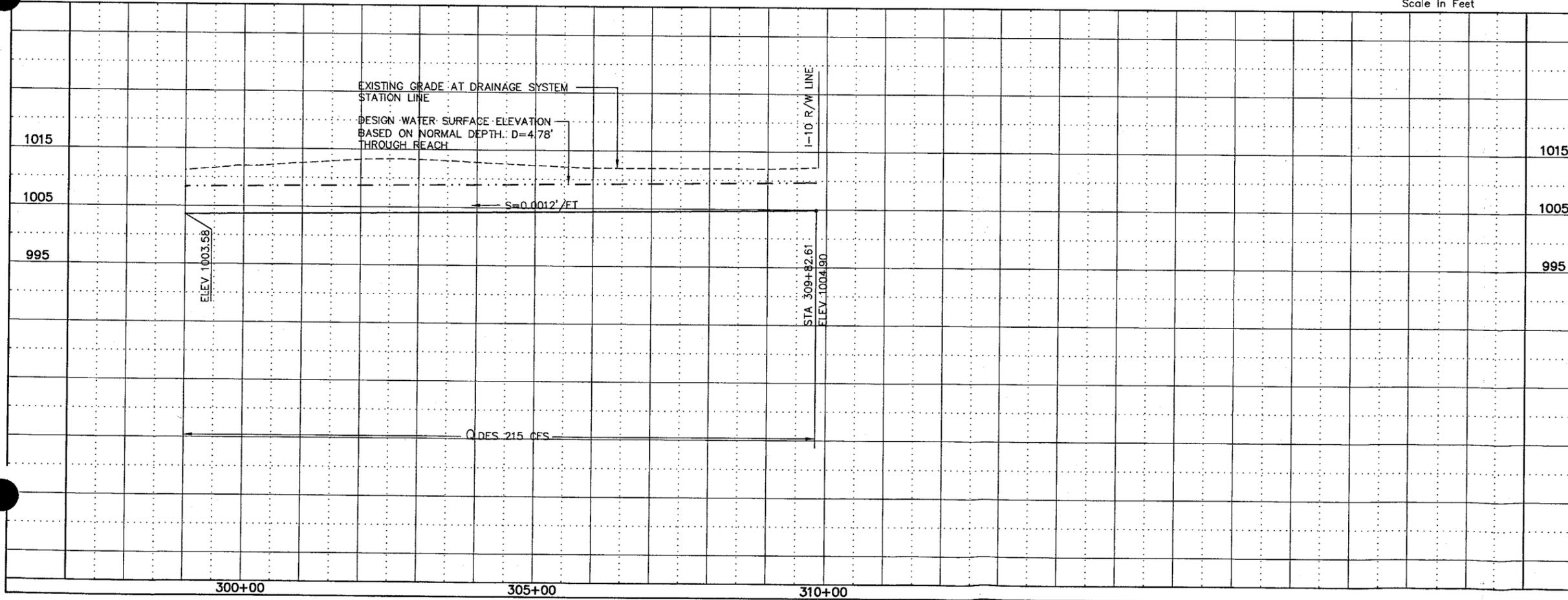
REMOVE

CONSTRUCT

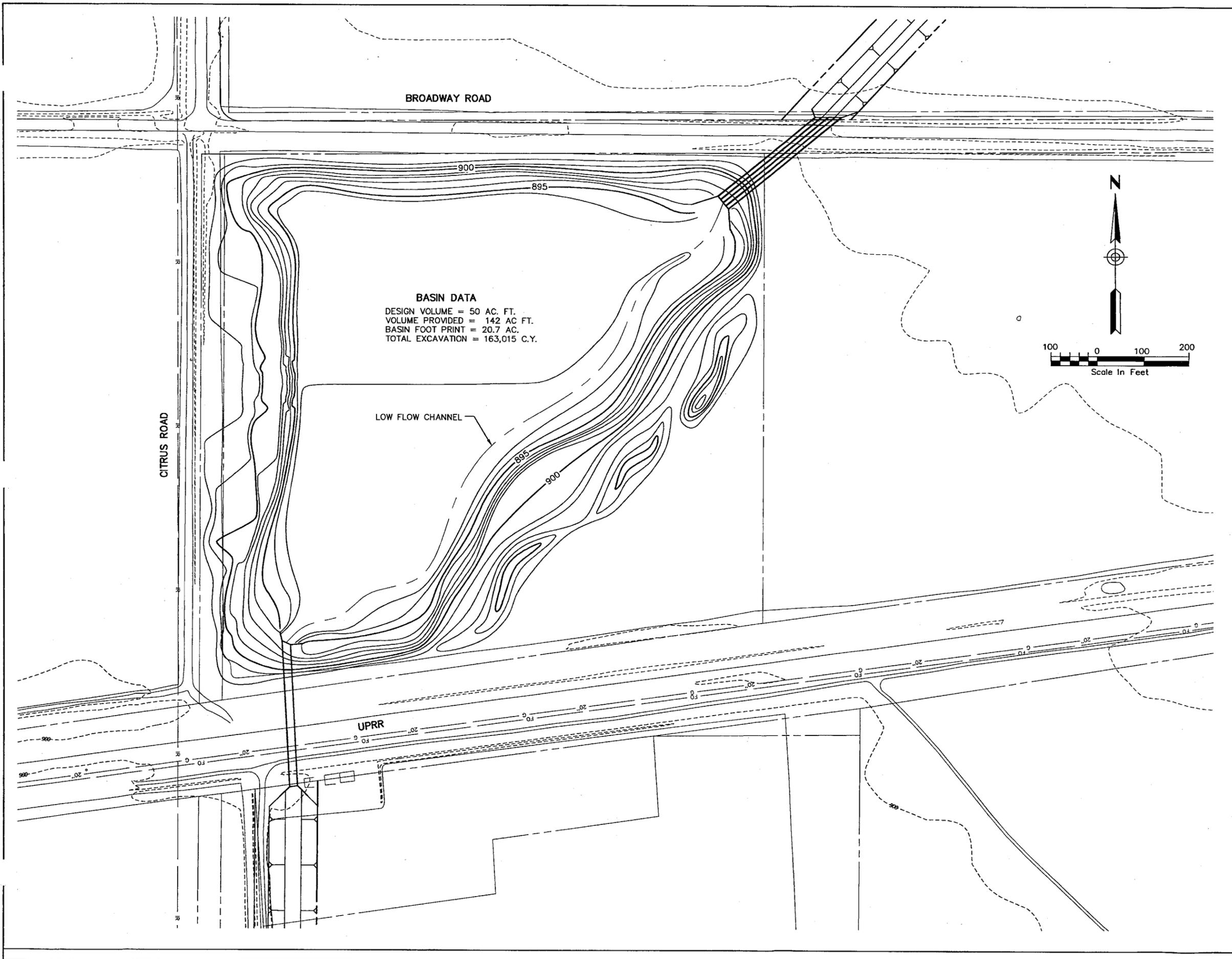
① STA 299+00.00 TO STA 309+82.61
CONSTRUCT 1083 LIN. FT. CHANNEL

GENERAL NOTES:

1. UTILITY LOCATIONS ARE SCHEMATIC.
2. STRUCTURE SIZES ARE APPROXIMATE.
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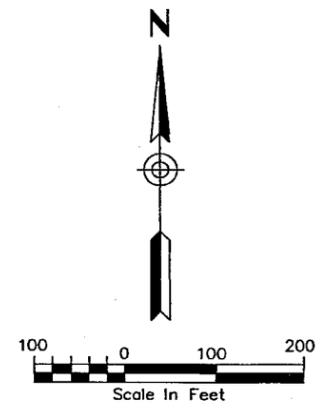


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DRAWING NO.	PLAN AND PROFILE	SHEET OF	
	STA 299+00 TO 309+82.61	15 16	



BASIN DATA
 DESIGN VOLUME = 50 AC. FT.
 VOLUME PROVIDED = 142 AC FT.
 BASIN FOOT PRINT = 20.7 AC.
 TOTAL EXCAVATION = 163,015 C.Y.

LOW FLOW CHANNEL



REMOVE

CONSTRUCT

GENERAL NOTES:

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DRAWING NO.	PLAN AND PROFILE BASIN PLAN	SHEET OF 16 16
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