

Impact Analysis and Mitigation Plan

for the
116th Avenue Bridge Crossing
of the Gila River
T1N,R1W
MARICOPA COUNTY, ARIZONA

Prepared for

MARICOPA COUNTY
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Introduction

The purpose of this report is to provide an impact analysis and mitigation plan for the proposed 116th Avenue bridge across the Gila River in Maricopa County, Arizona (Figure 1). A report discussing the proposed project and the existing biological resources in the area of the project has been prepared under a separate cover (RECON Consultants Inc. 1995a). The impact analysis is based on the information contained in that site evaluation report. Mitigation measures described are the result of conditions contained in the Final Environmental Assessment prepared for the project (Maricopa County Department of Transportation [MCDOT] 1994) and consultation with resource agencies. The impact analysis and mitigation program presented in this report will be used in the permitting approvals for the proposed project and therefore must be acceptable to all resource agencies involved, including the U.S. Fish and Wildlife Service (USFWS) and Federal Aid Division, U.S. Army Corps of Engineers (USACE), and the Arizona Game and Fish Department (AG&F).

Impact Analysis

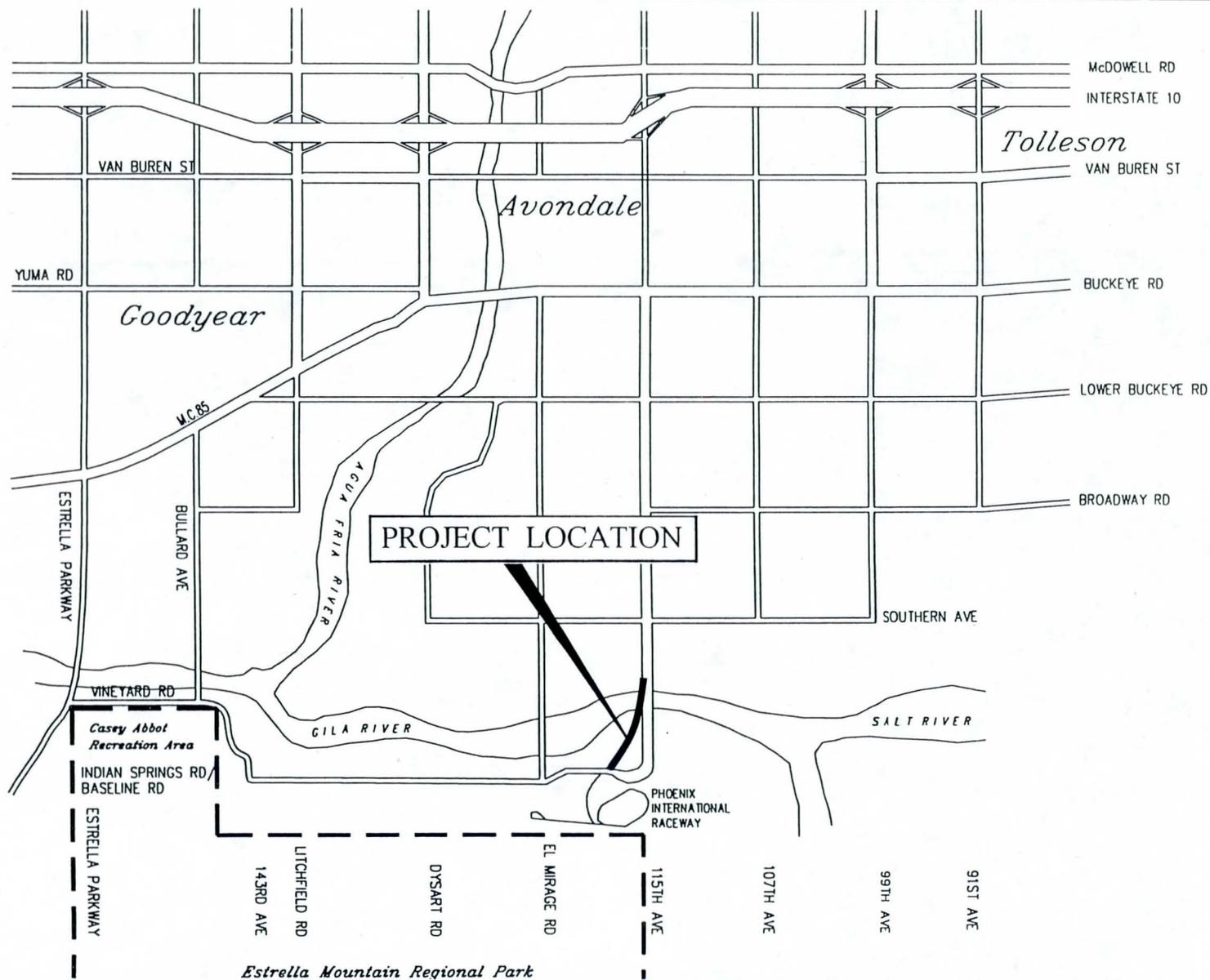
The biological resource impact analysis for this report is based on the assumption that all riparian habitat in the 200-foot bridge corridor would be directly impacted. This assumption is likely a worst case scenario since some impacts are anticipated to be temporary and others may be avoided or minimized during construction. Additionally, proposed dikes on the northern and southern ends of the project which extend outside of the 200-foot bridge construction corridor were included in the analysis of direct impacts. Indirect impacts on the Gila River, in general, from the proposed project were also assessed.

A. Direct Impacts

Impacts to biological resources from the construction of the bridge and associated dikes are considered to be direct project impacts. These sources of direct impacts are discussed below. Refer to Table 1 for a summary of the direct impacts of the project.

1. Bridge Construction Corridor

It was estimated that about 11.6 acres of riparian area occur within the 2,548-foot-by-200-foot bridge corridor (Map 1; map pocket). Assuming all existing habitat within this corridor would be impacted, approximately 4.1 acres of riparian deciduous woodland, 2.0 acres of riparian scrubland, 1.4 acre of interior marshland/aquatic, and 4.1 acres of disturbed lands would be affected.



Map Source: Maricopa County Dept. Of Transportation,
 Transportation Planning Div. 1994

FIGURE 1
Project Location



REC'D

TABLE 1
SUMMARY OF DIRECT IMPACTS FROM THE PROPOSED
116TH AVENUE BRIDGE
(acres)

Habitat	Bridge Corridor	Northern Spur Dike	Southern Spur Dike
Riparian woodland	4.1		0.2
Riparian scrubland	2.0		0.42
Interior marsh/aquatic	1.4		0.89
Disturbed	4.1	1.2	1.49
TOTAL	11.6	1.2	3.0

The habitat values of the impacted areas within the bridge construction corridor are greatest within the dense riparian woodlands north of the Gila River low-flow channel and immediately adjacent to the south bank of the river. The woodlands provide cover and foraging areas for various species of birds, small mammals, and some reptiles. The woodlands also provide nesting habitat for birds such as mourning dove, quail, herons, and egrets.

The freshwater marsh areas of the small ponds north and south of the Gila River low-flow channel, and the aquatic habitat of the low-flow channel also add wildlife values to the area. The ponds provide habitat for insects and amphibians while the low-flow channel provides habitat for these, in addition to small fishes and birds (e.g., coots, ducks, herons, egrets). There is a low potential for Yuma clapper rail along this portion of the Gila River, and the proposed bridge construction corridor will not have significant effects on this species (RECON Consultants, Inc. 1995b and USFWS 1995).

Disturbed areas and open successional areas of riparian scrubland in the corridor contribute less to the existing wildlife values of the area, especially south of the river, than the intact dense woodlands and marsh habitats. The open (disturbed) riparian scrubland that is beginning to recolonize some of the less disturbed areas may provide some limited habitat for insects, forage for birds (seeds), and minor cover for small mammals.

The USACE under Section 404 of the Clean Water Act regulates the deposition of fill material into jurisdictional waters of the U.S. and adjacent wetlands. The proposed bridge corridor will affect areas under the regulatory jurisdiction of the USACE. Based on the results of a jurisdictional determination conducted by this agency on December 21, 1994, it is anticipated that of the 11.6 acres of impact from the proposed bridge corridor, 1.4 acres of impact is wetland and 4.61 acres of impact are within jurisdictional waters.

2. Spur Dikes

Spur dikes will be constructed on both the north and south end of the proposed bridge (see Map 1). Direct impacts from these spur dikes are the following: Northern spur dike - 1.2 acres of disturbed area; Southern spur dike - 3.0 acres (1.09 acres of disturbed area, 1.31 acres of wetland, and 0.6 acre of jurisdictional waters).

B. Indirect Impacts

Potential indirect impacts from the proposed 116th Avenue bridge project are primarily from three sources: (1) impacts associated with the discontinued maintenance and eventual loss of the existing 115th Avenue culverts and roadbed; (2) the effect the bridge could have on the existing riverbed due to contraction of the waterway from the spur

dikes, and obstructions to the flow created by the bridge piers, and (3) flood control maintenance. Each of these sources of indirect impacts is discussed below.

1. Loss of 115th Avenue Roadbed/Culverts

The new 116th Avenue bridge and roadway realignment will eliminate the need for the existing 115th Avenue crossing of the Gila River. The proposed northern and southern spur dikes will eliminate vehicular access to the existing 115th Avenue roadbed. It is anticipated that with the lack of maintenance of the existing roadbed and culverts, 115th Avenue will eventually be lost due to flood scour, especially after a large flood event. Currently the roadbed and culverts are replaced after damage from seasonal floods. The roadbed/culvert combination restricts the dry season low flows from the release of treated sewage effluent, resulting in the maintenance of a freshwater marsh area upstream from the existing 115th Avenue. Discontinued maintenance and eventual loss of the 115th Avenue roadbed and culverts could have an effect on the size and distribution of the freshwater marsh habitat in this area. The degree to which the loss of 115th Avenue roadbed and culverts would have on the freshwater marsh area and associated wildlife use is difficult to determine quantitatively since the exact configuration of the riverbed, distribution of riparian habitats, and other hydrological factors will not be known until after the first few flood events with the newly constructed bridge built. Currently, there is approximately 34 acres of aquatic (open water) habitat between 107th Avenue and 115th Avenue.

Information contained in the bridge hydraulics report for this project addresses the effect of the removal of 115th Avenue on the sediment transport of the Gila River (Simons, Li, and Associates, Inc. [SLA] 1995). A summary of this hydraulics report prepared by SLA is included as Attachment 1. It was found that for a 100-year flood event the impact of the 115th Avenue road on the general scour was insignificant. Under current conditions (i.e., existing 115th Avenue), the net effect of a 100-year flood at this location is a deposition of 1.5 feet (0.5 meter) of sediment. This aggradation of the riverbed is offset by the degradation of the lesser flows (e.g., 10-year discharge) over the long term of about 1.0 feet (0.3 meter) after which an equilibrium is expected until the next major flood event (see Attachment 1).

2. Contraction and Obstruction of the Gila River

The spur dikes, particularly the southern spur dike, will cause a contraction of the flows in the Gila River until after the water passes under the proposed 116th Avenue bridge. In addition, the proposed bridge piers will obstruct flows affecting the riverbed configuration. Scour impacts from these two sources are expected to be significant during a 100-year flood event. However, as the flood flows subside these scour effects are hidden through deposition of new sediment (see Attachment 1). Although this scour is typically hidden after a flood event the shape of the channel bottom of the Gila River

will change significantly, particularly near the proposed bridge. It is anticipated that the riverbed near the bridge could be affected as much as one bridge length upstream to one bridge length downstream. In addition, a minor localized area of scouring could occur at high flows at the downstream end of the southern spur dike due to flow separation.

How the above anticipated changes in the riverbed would affect the distribution and area of existing riparian habitat in the vicinity of the proposed bridge is difficult to quantify until after the bridge is built and floods occur. There would be changes in the existing configuration of the riverbed after major flood events (i.e., 100-year event) that would certainly affect the existing distribution of riparian habitats. However, over the long term these changes in habitat distribution could simply result in a shifting of the current areas colonized by native riparian habitats within the Gila River floodplain with no significant net loss of riparian habitat.

3. Flood Control Maintenance

In the past, this portion of the Gila River has been subject to flood control measures involving the clearing of riparian vegetation within a 1,000-foot swath centered on the low-flow channel. It is unlikely that this activity will happen again. However, future flood control issues may arise in this area that could have an effect on the riparian habitats. The design of the proposed 116th Avenue bridge has addressed the issue of minimizing any effects the project may have on flooding in the area.

C. Avoidance and Minimization of Impacts

The following measures to avoid and minimize impacts to riparian habitats of the Gila River have been incorporated into the project:

1. The Final Environmental Assessment (MCDOT 1994) for this project conducted an alternative analysis that compared several possible bridge placements and alignments. The selection of the 116th Avenue alignment alternative avoided impacts to other more sensitive locations on the Gila River and minimized potential impacts to biological resources.
2. The design of the proposed 116th Avenue bridge incorporated ways of avoiding and minimizing impacts to the Gila River. For example, the placement of the pier supports is in such a way as to span the current low-flow channel of the river. By using pier-support construction for the bridge, the area underneath the bridge that is disturbed during construction will have the opportunity for native plant species to re-colonize the area naturally. The natural fluvial processes coupled with the year-round water supply from the wastewater treatment plant at 91st Avenue create conditions in the riverbed that encourage natural colonization by riparian and wetland species.

3. Project phasing is such that the north dike can be built last, allowing vehicular access to the bridge construction corridor and on 115th Avenue for through traffic and construction traffic to the south side of the river. Once the bridge is built the north dike can be built, eliminating vehicle access to the 115th Avenue roadbed. During construction of the project, access to the bridge corridor will be limited to a point at the northernmost portion of the corridor where it abuts 115th Avenue, and access to the south end of the bridge corridor will be across areas previously disturbed (see Map 1).
4. Construction Special Provisions have been incorporated into the project plans that will help minimize impacts to both riparian and aquatic resources. These provisions include:

Section 107.4 - Contractors Responsibility: Existing vegetation and wetland areas adjacent to the project site are to remain undisturbed. All work should take place and be limited to the area within the 116th Avenue bridge and dike construction corridors which shall be fenced with temporary fencing (orange-webbed or similar material). The east and west sides of the existing 115th Avenue right-of-way area shall also be fenced with the same type of temporary fencing to prevent damage to vegetation outside and upstream of the construction zone. On the east side of 115th Avenue, the fencing shall extend from the top of the rock dike at the north bank of the riverbed to the temporary construction easement at the south dike. On the west side of 115th Avenue, the fencing shall extend from the point of intersection with the bridge corridor to the temporary construction easement at the south dike. The contractor shall be responsible for monitoring the construction zone during the entire length of the contract to insure that the fencing remains in place and that no vegetation is disturbed outside of the construction limits. The contractor shall be responsible for all costs of mitigation measures required due to damage caused by his operations outside of the approved construction zone.

Section 107.5 - Handling of Aquatic Life: Areas affected by dewatering processes required during construction shall be visually surveyed prior to dewatering for the presence of fish and turtles. Fish shall either be netted and released at a location downstream of the construction zone, or they may be properly disposed of, in accordance with Arizona Game and Fish regulations. Turtles found shall be carefully picked up and taken to a downstream location of similar conditions (500' downstream minimum distance) and released. Any other aquatic wildlife located in the construction corridor that are encountered during construction shall not be removed or relocated without the consent of the Engineer. The contractor shall not be permitted to completely stop the flow of the river. All

dewatering operations shall be restricted to the areas necessary for his current operations. All areas not affected by his operations and all areas downstream of the construction zone shall not be dewatered.

Mitigation Plan

Unavoidable impacts to biological resources of the Gila River that will result from the implementation of this project shall be mitigated by the following measures:

1. Current management problems that affect the quality of the biological resources on this portion of the Gila River include the dumping of trash in the river floodplain, parking and other activities associated with the operation of events at the Phoenix International Raceway, and passive recreational use of the area. The construction of the proposed bridge will eliminate (or minimize) these impact sources by restricting access to the riverbed in this area. As stated in the Final Environmental Assessment (MCDOT 1994):

Access will be maintained to the Arizona Game and Fish Department property via a single gated entry/exit located at or near the northeast bridge abutment. The gated opening at the right-of-way line would accommodate pedestrian and equestrian access, not vehicular access (including motorcycles and off-highway vehicles).

The north and south dikes will preclude unauthorized vehicular access to the riverbed. The end result of the restricted access is less use of the river floodplain with vehicles, in general, in the vicinity of the bridge such that chronically disturbed areas can be allowed to re-establish riparian habitat naturally.

2. In accordance with Special Mitigation Measure Number 6 contained in the Final Environmental Assessment, MCDOT, in consultation with the AG&F, shall mitigate impacts of the project to riparian habitat of the Gila River through the acquisition and enhancement of lands adjacent to the proposed bridge (by MCDOT) and transferring land management responsibilities to AG&F for conservation and wildlife management purposes. Where only one 28-acre parcel is contained in Special Mitigation Measure Number 6 (Harper Sand and Gravel property), Maricopa County proposes to also acquire five other private properties (Amator, Carnahan, Moorehead, Swindle, and Samaniego) in the vicinity that are contiguous to existing AG&F property holdings on the river (for a discussion of biological resources on these properties see site evaluation report, RECON 1995a). It should be noted that by the year 2008 the Harper Sand and Gravel property will revert to AG&F Commission ownership; therefore, the proposed

acquisition of this shortens the length of time the property is not managed for natural resources.

Land acquisition as mitigation presents opportunities to enhance wildlife habitat values on the acquired lands, and to maintain those values over the long term. By taking the above properties out of private ownership and management, their habitat values would be enhanced over time by precluding certain land uses potentially occurring while under private ownership (lease) (i.e., parking for PIR events, wildcat dumping, access by off-highway vehicles, sand and gravel operations). The management of the acquired lands for biological resources, coupled with restricted access to the area imposed by the presence of the bridge, will allow the eventual natural re-establishment of riparian habitat in disturbed areas. In turn, this will result in the enhancement of wildlife values due to increases in vegetation cover and reduced disturbance. If all six of the potential mitigation parcels outside of the bridge corridor are purchased and managed for natural resource purposes, then the loss of habitat values from the project are anticipated to be more than compensated for since approximately 54.35 acres of riparian habitat would no longer be subject to potentially damaging land uses that diminish their wildlife habitat values. The long-term maintenance of the acquired parcels for conservation of biological resources is afforded through management practices of AG&F.

Conservation biology theory includes the concept that larger, contiguous blocks of habitat are more valuable for conservation than smaller, isolated blocks (Noss 1991). Thus, the key parcels of land in the land acquisition process are the Amator and Carnahan properties. These parcels have the highest vegetation cover, relatively low levels of disturbance (man-caused), and consequently, have the highest wildlife values (RECON 1995a). The Amator property has added value in that it lies adjacent to lands owned by AG&F and its purchase would enlarge the block of riparian habitat under AG&F ownership west of 115th Avenue. The Carnahan property acquisition would conserve valuable wildlife habitat and provide for a conserved buffer between the agriculture to the north and the Salt River to the south. The Moorehead, Swindle, and Samaniego properties have less habitat acreage and lower wildlife values than the properties west of 115th Avenue, but their purchase would help connect lands of the northern floodplain of the river to AG&F-owned lands (Base-Meridian property) just north and south of the Salt River, east of 115th Avenue. These three parcels of land represent the greatest potential for habitat enhancement.

3. The Final Environmental Assessment has identified two other Special Mitigation Measures that have been modified due to the results of this impact analysis and informal consultation with the resources agencies (i.e., USACE, AG&F, and USFWS). Special Mitigation Measure Number 2 in the Final Environmental Assessment states that there will be the revegetation of approximately five acres of riparian vegetation according to a revegetation plan to be prepared. Special Mitigation Measure Number 5 states that 115th Avenue will be removed and 1.5 acres of riparian habitat will be revegetated according to a mitigation plan. Discussions with the above-stated resource agencies concluded that the dynamics of the Gila River (e.g., hydrogeomorphology) were not conducive to the restoration of habitat by revegetation because the area is subject to powerful flooding and scouring that would impact or eliminate any revegetation efforts. It is anticipated that through the above-described acquisition and management of the properties in the Gila River, the resulting enhanced habitat and wildlife values, over time, will meet the goals of these two Special Mitigation requirements.

4. It is anticipated that unavoidable direct impacts to 2.71 acres of wetlands and 5.21 acres of jurisdictional waters and any indirect impacts to adjacent areas of wetlands/jurisdictional waters are anticipated to be replaced, over time, by the natural creation of new wetland and jurisdictional waters as flood events reshape the Gila riverbed in the vicinity of the bridge. Wetland habitat similar to that existing now is expected to establish in areas both upstream and downstream of the bridge in new scour ponds and backwater areas. AG&F will conduct a habitat value and mitigation analysis for agreement by all resource agencies involved. Regionally, discussions are underway to create a series of man-made wetlands, supported by treated effluent, in this area extending west to the Agua Fria River (Tres Rios proposed project).

References Cited

Maricopa Department of Transportation (MCDOT)

1994 Final Environmental Assessment for Gila River Crossing Study (115th Avenue - Estrella Parkway). Transportation Planning Division, Phoenix, Arizona. August.

Noss, R. F.

1991 *Protecting Habitat and Biological Diversity*. Part 1: Guidelines for Regional Reserve Systems. Report to the National Audubon Society.

RECON Consultants, Inc.

1995a Site Evaluation Report for the 116th Avenue Bridge Crossing of the Gila River T1N, R1W, Maricopa County, Arizona. Prepared for Maricopa County Department of Transportation and Hoffman-Miller Engineers, Inc. December.

1995b Biological Assessment for the 116th Avenue Bridge Crossing of the Gila River. Prepared for Maricopa County Department of Transportation. February.

Simons, Li, & Associates, Inc. (SLA)

1995 Bridge Hydraulics Report, 116th Avenue Bridge at the Gila River. Prepared for the Maricopa County Department of Transportation. April.

U.S. Fish and Wildlife Service (USFWS)

1995 Letter of "no effect" on endangered species from Sam Spiller, State Supervisor, March 14.

ATTACHMENT 1



Simons, Li & Associates, Inc.

Water Resources & Civil Engineering Consultants

September 11, 1995

Ms. Lori Jones Woods
President
Recon Consultants, Inc.
3443 North Campbell Avenue, Suite 100A
Tucson, Arizona 85719

RE: LONG-TERM IMPACTS OF THE 116TH AVENUE BRIDGE

Dear Ms. Woods:

The following information is based on the analyses conducted by Simons, Li & Associates, Inc. (SLA) for designing the 116th Avenue bridge foundations and the associated cement stabilized alluvium (CSA) guide bank and bank protection. These analyses were conducted primarily for the 100-yr flood and the 500-yr "superflood" to derive the worst-case information used for design. This information is taken directly from the SLA report, "Bridge Hydraulics Report, 116th Avenue Bridge at the Gila River," revised in April, 1995.

The sediment transport analyses was done assuming existing 115th Avenue would be removed either by the contractor or by the river over time. The impact of this minor embankment on the general scour during the 100-yr event is insignificant. Our sediment transport model indicates that the net effect of a 100-yr flood at this location, under current conditions (i.e., without the bridge), is a deposition of 1.5 feet (0.5 m) of sediment. This general aggradation is offset in the long-term by degradation associated with lesser flows represented by the 10-yr discharge. The long-term degradation at this location is estimated to be approximately 1.0 foot (0.3 m), after which equilibrium is expected until the next major flood. To be conservative, aggradation was not included in the scour estimates used for design.

The proposed bridge produces more localized scour impacts associated with the contraction of the waterway and the obstructions to the flow created by the bridge piers. These impacts are significant during the flood event; however, as the flood subsides, they are hidden through the deposition process that occurs. Using the peak 100-yr discharge, the contraction scour was estimated to be 5.2 feet (1.6 m) and the pier scour was estimated to be 15.1 feet (4.6 m).

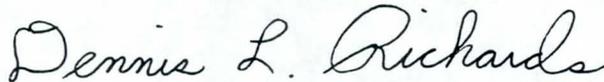
Even though scour is typically hidden to a large degree after a flood event, it will significantly reshape the channel bottom, especially in the vicinity of a bridge. At the proposed bridge, significant reshaping can be expected to occur from approximately one bridge length upstream to one bridge length downstream. For your information, the limits of these impacts are depicted in a qualitative manner on Attachments 1 (plan) and 2 (profile). A minor localized scour hole may also occur at high flows, due to flow separation, at the downstream end of the south abutment.

Referring to Attachments 1 and 2, it can be seen that the delineated wetlands near 115th Avenue are likely to undergo significant change during a large flood event. However, if 115th Avenue is converted to a permanent grade control structure, it would disrupt the scour pattern described above and possibly preserve some of the existing wetland features through local scour characteristics of its own. Further in-depth analyses using anticipated control structure geometries would be required to even qualitatively define the changes that may result. Using CSA for a permanent control structure at 115th Avenue would cost an estimated \$1.1 M. CSA is considered to be the most economical alternative for building such a structure.

Enclosed for your information and use are 90% plan sheets C-1 and C-5 which should help you determine the construction impacts of the CSA guide bank\bank protection on the delineated wetlands. The temporary construction easement (TCE) line should provide a reasonable measure of the area disrupted during construction. If you have any questions regarding the above or need further information, please do not hesitate to call Bart Bergendahl at (602) 491-1393.

Sincerely,

SIMONS, LI & ASSOCIATES, INC.

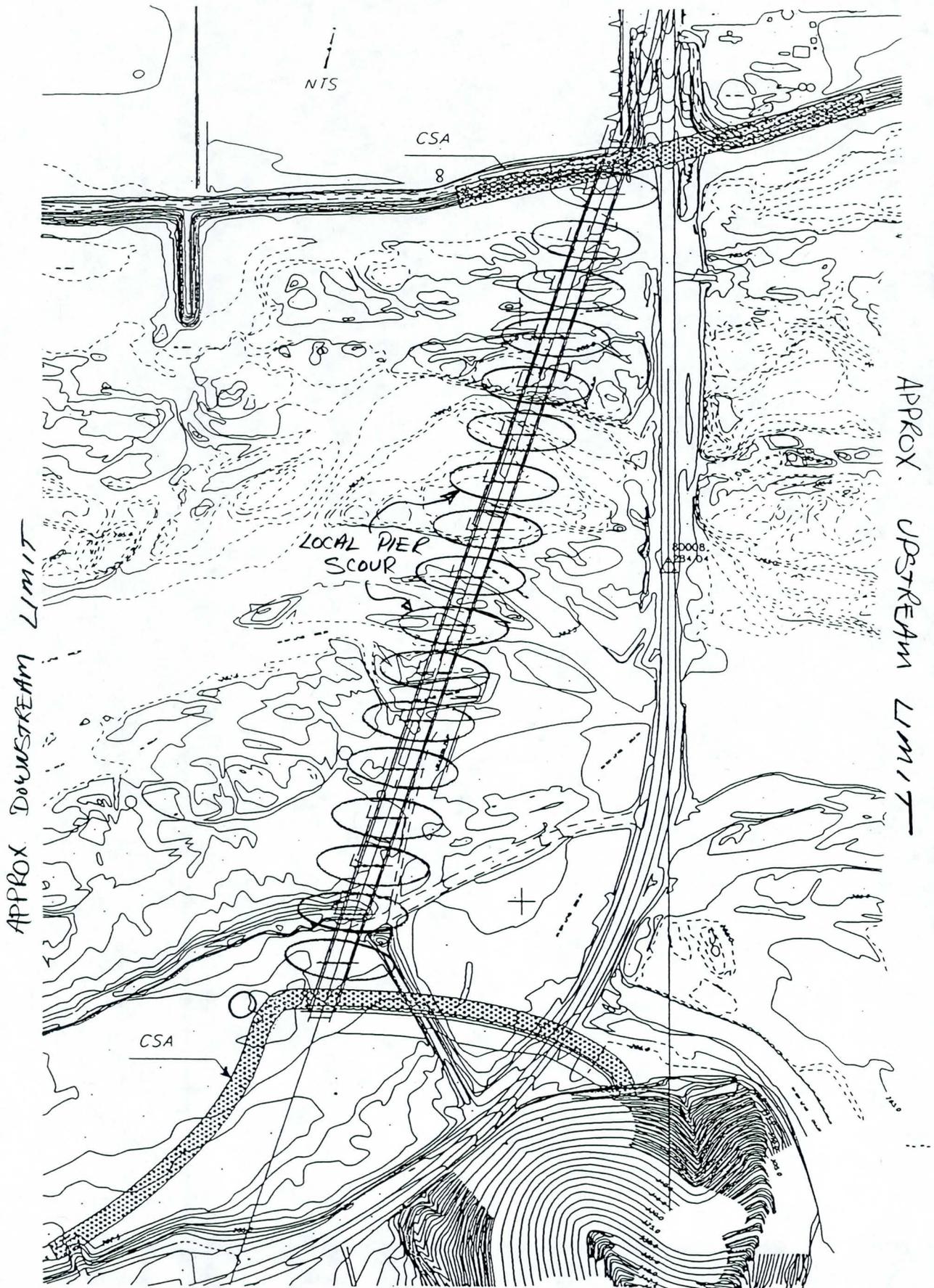


Dennis L. Richards, P.E.
Vice President

DLR/BSB/kb

Attachments

cc: Don Davis, Hoffman-Miller Engineers, Inc.



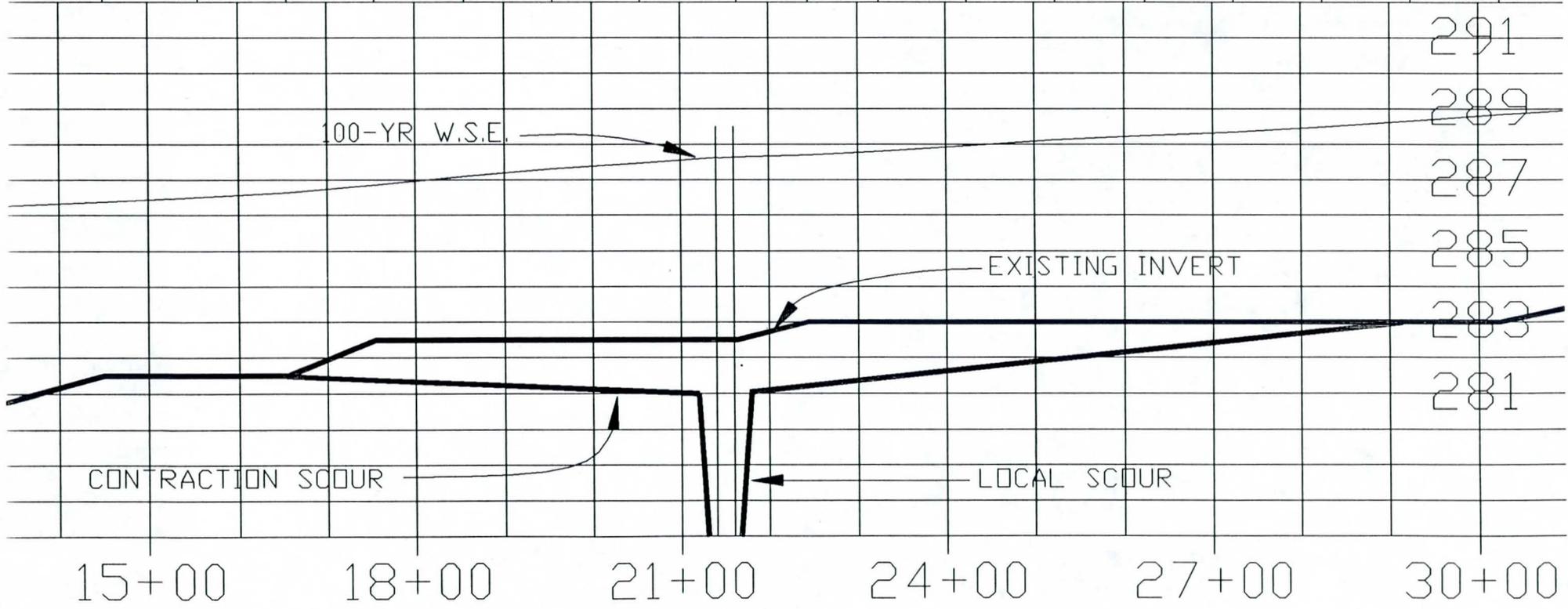
ATTACHMENT 2

CROSS SECTION

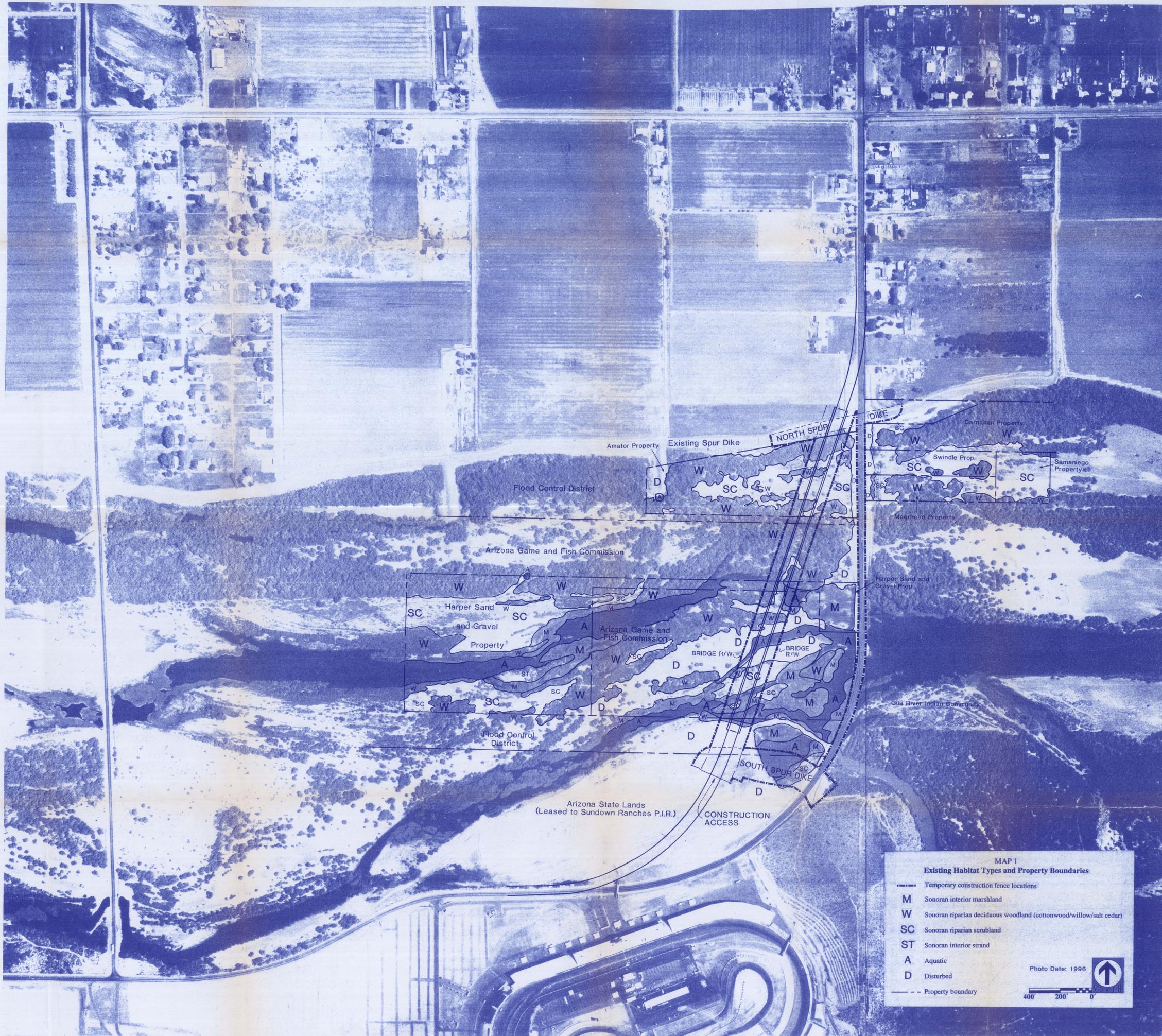
116TH AVE.
BRIDGE

115TH AVE.

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METERS



MAP 1
Existing Habitat Types and Property Boundaries

- Temporary construction fence locations
- M** Sonoran interior marshland
- W** Sonoran riparian deciduous woodland (cottonwood/willow/salt cedar)
- SC** Sonoran riparian scrubland
- ST** Sonoran interior strand
- A** Aquatic
- D** Disturbed
- Property boundary

Photo Date: 1996