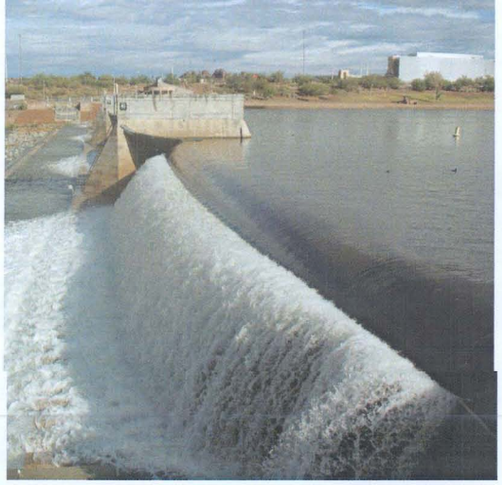
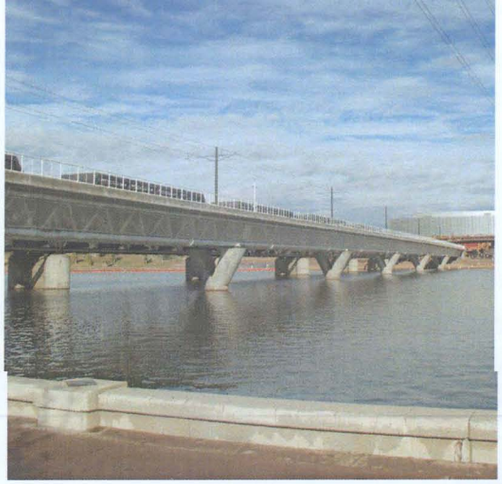
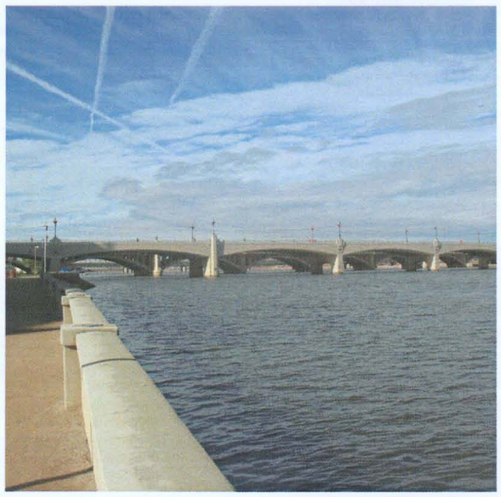
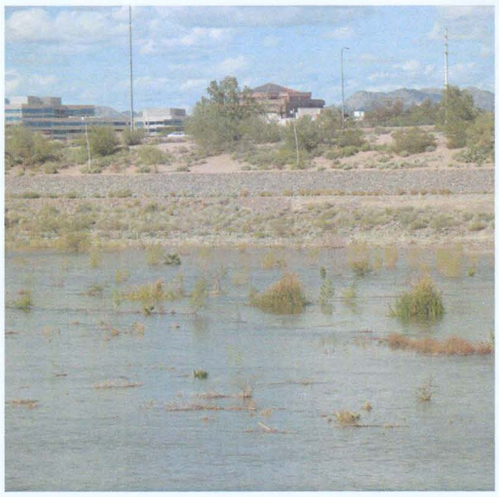
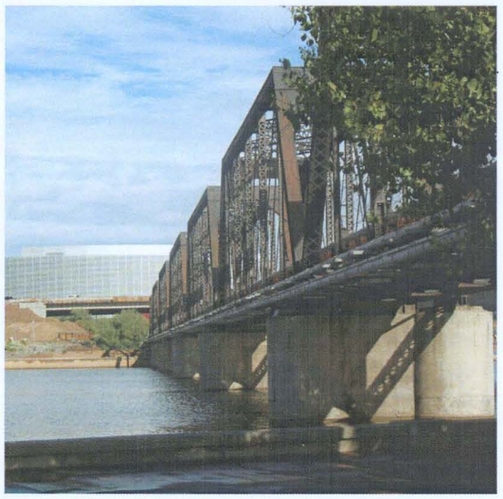
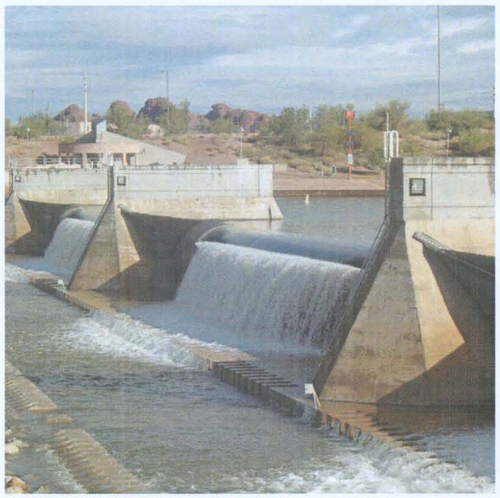
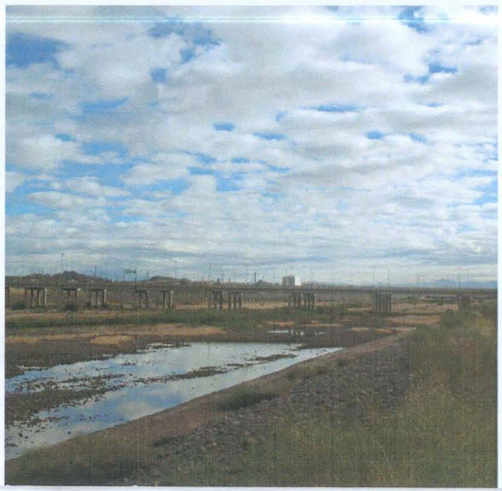








Salt River Hydraulic Master Plan

Prepared for Flood Control District of Maricopa County

FCD 2007C017
Technical Memos

- Effect of Vegetation on Channel Conveyance Memo
- Field Reconnaissance Memo
- Manning's Roughness Sensitivity Model Memo

Prepared by:

Stantec

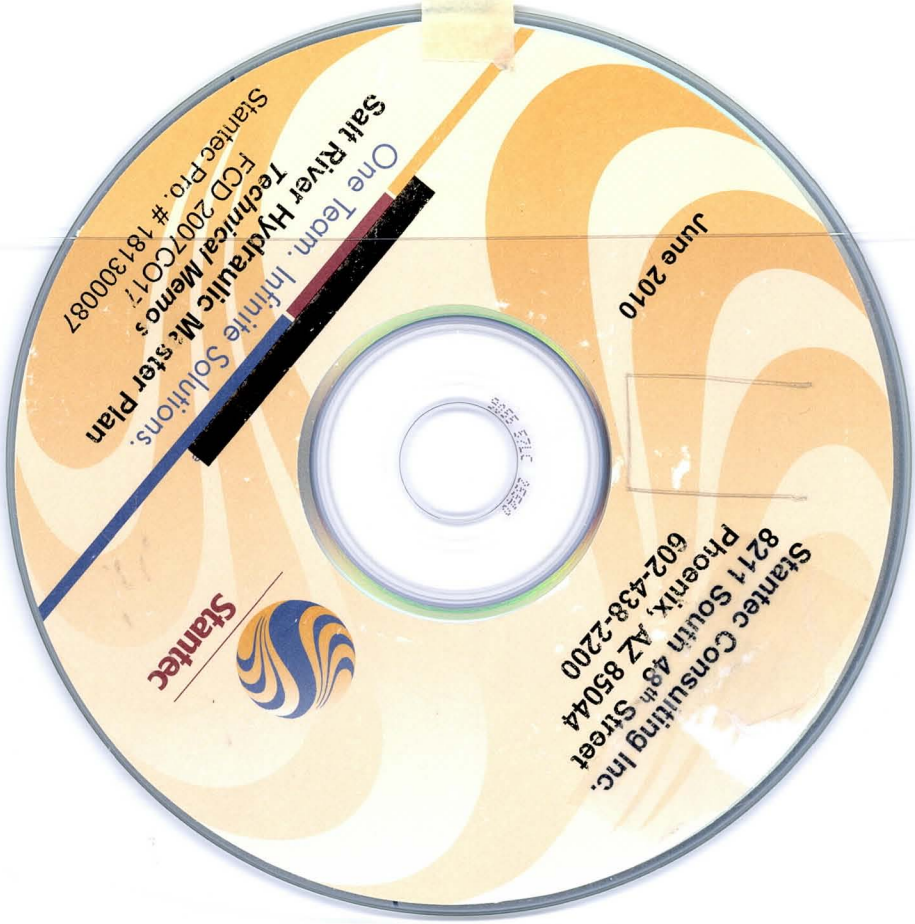
Stantec Consulting Inc.
8211 South 48th Street
Phoenix, Arizona 85044
(602) 438-2200

Stantec Consulting Inc.
Project No. 181300087
June 2010

Salt River Hydraulic Master Plan
Technical Memos

- Effect of Vegetation on Channel Conveyance Memo
- Field Reconnaissance Memo
- Manning's Roughness Sensitivity Model Memo

Master CD



Memo

Stantec

To:	Flood Control District of Maricopa County 2801 W. Durango Street Phoenix, AZ 85009	From:	Stantec Consulting Inc. Pat Ellison, PE 8211 South 48th Street Phoenix, AZ 85042
File:	Stantec #181300035	Date:	November 25, 2009

Reference: Salt River Hydraulic Master Plan
Effect of Vegetation on Channel Conveyance, Freeboard Analyses, Flood Risk Assessments

General

The purpose of this Memo is to report conclusions from analyses and/or assessments conducted for the Salt River Hydraulic Master Plan. Analyses and/or assessments include; the Effect of Vegetation on Channel Conveyance, Levee Freeboard Analyses and Flood Risk Assessments associated with levees.

Evaluations conducted for channel conveyance and freeboard analyses utilized the HEC-RAS hydraulic models developed for the Salt River Hydraulic Master Plan. For the channel conveyance evaluation and freeboard analyses the existing condition model was modified to simulate denser vegetation. Evaluations were conducted for the 100-year, 200-year, 500-year and SPF Post Roosevelt Dam Modifications events. A digital copy of the HEC-RAS model is provided in Attachment 1. Locations of HEC-RAS cross sections are presented in figures located in Attachment 9.

Results of the channels conveyance evaluation are reported by specific reach. A Figure depicting the reach location and name is provided in Attachment 1.

Effect of Vegetation on Channel Conveyance

Flood events alter the physical characteristics of a watercourse. Manning's roughness coefficients which are based on the physical characteristic of the watercourse can change during a flood event and/or over time due to the impacts of multiple events. One characteristic that is susceptible to change is vegetation density. During a flood event, vegetation could be flattened or laid over or removed due to degradation of the channel (Phillips and others, 1998). Impacts on vegetation would change channel flow capacities.

An evaluation was conducted to determine the impacts of vegetation changes on flow conveyance. Procedures cited in *Method to Estimate Effects of Flow-Induced Vegetation Changes on Channel Conveyances of Stream in Central Arizona* (Phillips and others, 1998) were utilized. The procedure utilizes regression equations relating

the bending moment to vegetations height for Mesquite, Palo Verde, Saltceder and Willow. These vegetation types form the basis of the evaluation. No bending moments for Cottonwoods were provided therefore Cottonwoods were not evaluated. Two evaluations were conducted 1) is the stream power great enough to lay over the vegetation and 2) is the shear stress greater than the critical shear stress, such that degradation occurs and vegetation is likely to be removed.

Vegetation-Susceptibility

The Salt River Hydraulic Master Plan HEC-RAS model developed for the existing condition was utilized to estimate stream power and shear stress for two conditions. The conditions are 1) the existing condition with no change to vegetation density and 2) Manning's roughness coefficients were adjusted to be consistent with the potential for denser vegetation. For Condition 2 the existing condition Manning's roughness coefficients were adjusted to simulate 30 to 50 percent flow blockages due to vegetation.

Following the procedures cited by Phillips (1998) Vegetation–Susceptibility Index's were estimated for different conditions and plotted against stream power to determine if vegetation would be laid over or remain erect during a 100-year event. Should vegetation be laid over, a reduction in Manning's roughness coefficients would be realized and the channel conveyance capacity would increase.

The different conditions for which vegetation-susceptibility evaluations were conducted are vegetation type, height and density. The vegetation types evaluated are Willow, Mesquite, and Palo Verde. Vegetation heights used in the evaluation ranged from 5 to 30 feet. Two vegetation densities were considered, less than 30 percent flow blockage due to vegetation and 30 to 50 percent flow blockage. The 30 to 50 percent flow blockage evaluation simulates the mid range vegetation-blocking coefficients cited by Phillips (1998).

Reaches defined in the Salt River Hydraulic Master Plan for which vegetation-susceptibility evaluations were conducted are Reaches 4, 5, 9, and 10. These reaches were chosen for evaluation because they are reaches in which vegetation density may increase in the future due to proposed use.

Results of the vegetation-susceptibility evaluations are provided in Attachment 2 through 5. Attachment 2 presents graphically the existing conditions evaluation. Attachment 3 contains the tabular data for the existing conditions. Attachment 4 presents graphically the increased Manning's roughness coefficient condition. Attachment 5 contains the tabular data for the increased Manning's roughness coefficient condition. Data points that plot above the Vegetation – Susceptibility Threshold line indicates the vegetation will be laid over, where as data points that fall below indicate that vegetation will remain erect. From review of the figures the following observations are offered:

- The majority of the plotted data points for Reaches 4, 5 and 9 indicate that vegetation would be laid over during the 100-year event.
- For Reaches 4, 5 and 9, when the vegetation height approaches the depth of flow, vegetation will have the tendency to remain erect over being laid down.
- Reach 10 plots indicate that when the vegetation height is approximately 20 feet (1/2 to 2/3 the depth of flow) vegetation will remain erect.
- The stream power required to lie over a specific vegetation type increases from Willow to Mesquite to Palo Verde.
- When the vegetation density goes from less than 30% flow blockage to 50% flow blockage stream power increases relative to hydraulic depth and there are a greater number of data points that plot above the Vegetation – Susceptibility Threshold line.
- Should vegetation densities increase to 50% flow blockage, levees in Reaches 4, 5 and 10 would be over topped during the 100-year event.

Vegetation Removal

Phillips (1998) relates that vegetation removal occurs with channel degradation. Channel degradation is influenced by the magnitude of the flow shear stress. When the magnitude of the flow shear stress is greater than the shear stress (critical shear stress) required to move channel material degradation will occur.

In order to infer if the flow shear stress for the 100-year event is sufficient to move bed material, flow shear stress was compared to critical shear stress. Figures presented in Attachments 6 and 7 show the relationship between flow shear stress and critical shear stress for two conditions. The first condition is the existing condition and all reaches are shown on one figure, Attachment 6. In the second condition, Manning's roughness coefficients are adjusted to be consistent with the potential for denser vegetation as what was done in the Vegetation-Susceptibility Analyses. For the second condition plots are provided in Attachment 7 for Reaches, 4, 5 and 10.

The mean diameter size of bed material is required to estimate critical shear stress. The size of bed material was estimated from a sediment gradation curve provided in the *SR143-Sky Harbor Blvd. TI. Initial Salt River Drainage Concept Report (J2 Engineering and Environmental Design, 2009).* The sediment gradation curve is provided as Attachment 8.

Data points in the figures that plot above the value of 1 indicate that the shear stress is greater than the critical shear stress and degradation could occur. The following is offered from the review of the shear stress plots provided in Attachments 6 and 7:

- Under existing conditions degradation would be expected to occur in all reaches except Reaches 8 and 10.
- Under the condition of higher Manning's roughness coefficients, the magnitude of shear stress increases over the existing condition magnitudes.

Levee Condition

An evaluation was conducted for the study reach to determine whether the left and right banks are in a levee condition. A levee condition occurs when the water surface elevation for a given event is higher than the ground elevation on the landward side of a bank embankment. Evaluations were conducted for the 100-year, 200-year, 500-year and SPF events (Post Roosevelt Dam Modifications). Results of the evaluation are presented in Attachment 9.

Freeboard

A freeboard evaluation was conducted to determine the amount of freeboard that occurs at the locations where the right or left bank embankments are in a levee condition. Freeboard was estimated for the 100-year, 200-year, 500-year and SPF events (Post Roosevelt Dam Modifications). Results of the evaluation are presented in table format and graphically in figures located in Attachments 10 and 11. Attachment 10 contains the Left Levee Freeboard for both the existing and proposed conditions. Attachment 11 contains the Right Levee Freeboard for both the existing and proposed conditions.

FEMA Criteria

A literature review was conducted to determine what changes to levee criteria in regards to identification of flood hazards, that might be expected in the future from the Federal Emergency Management Agency (FEMA). Two documents reviewed that cited potential changes are; 1) *FEMA Risk Mapping, Assessment, and Planning (Risk MAP) Multi-Year Plan: Fiscal Years 2010-2014, Fiscal Year 2009 Report to Congress, March 16, 2009* and 2) *The National Levee Challenge, Interagency Levee Policy, Review Committee, September, 2006.* Excerpts of these documents are provided below. Significant passages are highlighted in green. A summary of conclusions from the review is presented after the excerpts.

FEMA Risk Mapping, Assessment, and Planning (Risk MAP) Multi-Year Plan: Fiscal Years 2010-2014, Fiscal Year 2009 Report to Congress, March 16, 2009

Levees (Page 13)

In the longer term, FEMA will evaluate and develop strategies to revise the procedures for mapping associated with non-accredited levees. Currently, mapping of levee-impacted areas is dependent on whether or not the levee provides 1-percent-annual-chance (100-year) protection. An option being considered would enable mapping to be

dependent upon the specific level of protection a levee affords. The identification of the hazard associated with the levee would be more driven by the level of protection provided by that specific levee. FEMA will continue its close collaboration with USACE in the implementation of the levee analyses.

Goal 2: Ensure that a measurable increase of the public's awareness and understanding of risk results in a measurable reduction of current and future vulnerability to flooding (Page 14).

Today, FEMA's flood maps show areas subject to flood hazards. Individuals and communities use these maps to determine flood risk for specific locations and properties. The traditional flood hazard map update identifies the hazard, but does not quantify the risk to people and property. Risk MAP will provide sound flood hazard data to enable broader flood risk communication. Risk assessments systematically combine science, engineering, mathematical modeling, and technology to quantify potential physical, social, and economic losses from natural hazards. Flood risk assessments, developed with credible flood hazard data, will enable FEMA to increase stakeholders' awareness of their flood risk and use of flood hazard data and maps in their economic and planning decisions. Actions taken based on flood risk assessments ultimately result in reducing the risk to life and property from flooding.

During Risk MAP, as flood studies are completed and risk assessments are a product of the updated analyses, the risk assessment will be valuable in conveying the flood risk. Local officials and emergency planners can use this information to develop mitigation strategies needed for the hazard mitigation planning process, the development of hurricane evacuation plans; and to increase public awareness.

In the near term, FEMA will implement an overarching Risk MAP outreach strategy that:

- Conveys risk in terms of consequences and probability, and conveys the social impacts of flood risk.
- Follows the entire Risk MAP life cycle from the continuous update of flood hazard data to the continuous update of a jurisdiction's hazard mitigation plan.
- Establishes a baseline of local understanding of local risk. Communities can use this baseline to measure progress annually.
- Keeps the message simple so that the information is easily conveyed to the public.
- Includes National Dam Safety and National Hurricane Program related messages.

FEMA will find innovative ways to communicate risk through visualization tools and demonstrate the consequences of flood risk. FEMA will increase access to public hazard and risk information and increase use of different media for distributing information.

In the long term, FEMA will enhance the overarching Risk MAP outreach strategy to:

- Better communicate flood risk.
- Ascertain variables important to risk communication that stakeholders need.
- Develop a risk communication plan in collaboration with other federal agencies to ensure a common and consistent federal message.
- Expand the conversation beyond implications of the 1-percent-annual-chance flood and discuss with the public the impact of other flood frequency events.
- Ensure communities have the communication materials needed to inform the public of the risk of flooding.
- Bring communities together to discuss joint risks and consequences around a shared watershed.
- Explain how risk can be tracked, managed and reduced by communities.

The National Levee Challenge, Interagency Levee Policy, Review Committee, September 2006

3.3. Conclusions (Page 24)

Based on its review of current mapping standards and requirements, the committee concludes that:

- Levees only reduce the risk to individuals and structures behind them. They do not eliminate the risk and, in many cases, can create significant and potentially catastrophic residual risk that may increase as conditions in the region change. Levees should be considered as flood risk reduction structures, as opposed to flood protection structures, and treated accordingly. A structure elevated to the 100-year base flood elevation faces significantly less risk that a structure behind a levee designed to withstand the 100-year flood.

3.4. Recommended Changes to FEMA Levee Mapping Requirements (and Attendant Levee Certification) (Page 24)

The committee recommends that:

- FEMA define a new flood insurance zone (Zone XL) for areas behind levees meeting requirements for inclusion in the NFIP and, in

coordination with other agencies, identify the level of risk to those behind these levees. Zone XL would include those areas behind the levee subject to inundation under the 100-year flood in the "without levee" condition. The area between the 100-and 500-year lines would be shown as a shaded Zone X. Levees would also be identified under a scientifically based levee risk classification system (e.g., high, medium, or low) that would be based on factors including potential depth of flooding in the event of failure or overtopping; type and density of development in protected areas behind the levee, and steps taken to ensure that levee failure does not occur during levee capacity exceedance (overtopping), warning times, and the number and types of egress so that people who may be inundated may move out of harm's way. This levee risk classification would be designated on the FIRM and in the FIS report.

- FEMA require levee sponsors to:
  - Conduct annual inspections of the levee systems
  - Submit to FEMA biennially the results of the annual inspections, levee system operation and maintenance records, and an assessment of the levee system during any flood events that occurred within the reporting period Submit to FEMA every 10 years a report, prepared by a registered professional engineer or Federal agency responsible for levee design, that recertifies the engineering and geotechnical conditions of the levee system.
- FEMA should also revise its regulatory and administrative documents as indicated in the following paragraphs.

3.4.1. Regulatory Changes (Page 25)

44 CFR 64.3 Flood Insurance Maps

- Define a new flood insurance zone (Zone XL) for areas behind a levee meeting 44 CFR 65.10 requirements. This will more clearly distinguish areas behind credited levees from the 0.2 percent annual chance floodplain and the I-percent-annual-chance floodplain with depths less than 1 foot and/or drainage areas less than 1 square mile.
- Expand the requirements for maintenance plans to specifically include requirements for ensuring that the flood carrying capacity of the main river channel is maintained, thereby preserving the required level of protection and ensuring that encroachments are controlled and do not affect the integrity of the levee or the ability of its owner to maintain the levee and flood fight. As mentioned previously, there have been some instances in which the main river channel has lost flood-carrying capacity adjacent to a levee due to siltation in the channel, thereby reducing the levees ability to pass the 100-year flood. Levees should not be

considered to be properly maintained unless a plan is in effect and working to control encroachments. In addition, FEMA should require the preparation, as part of operation and maintenance plans, of emergency action plans for those levees where failure would cause catastrophic losses. [65.10(d)].

3.4.2. Guidelines and Specifications for Flood Hazard Mapping Partners (Page 26)

- Modify the analysis process in Appendix H to more clearly indicate the requirement for analysis of the "without levee" condition for levees meeting 44 CFR 65.10 so that the new Zone XL can be accurately delineated and the "without levee" profile produced.

4.1. Determination of Levee Height (Page 29)

Levees are planned and constructed by Federal, State, and local government agencies, and private businesses. Federal agencies undertake water resource investments for such measures as levees within the broad confines of the Principles and Guidelines (U.S. Water Resource Council, 1983) (P&G). P&G generally requires that Federal projects contribute to national economic development, which means that they must be economically justified (i.e., benefits should exceed costs). USACE has planned and constructed the majority of Federal levees, and most of the levee systems protecting major urban area in the United States. USACE implementation of the P&G requires that flood damage reduction projects, including levees, are planned so that the project scale contributes as much as possible to net national economic development (NED) benefits. For levees, this means that the maximization of net benefits is an important consideration in the determination of the height and other features of the levee system. In most instances in urban areas, USACE levee projects adhering to these principles are higher than required to meet FEMA base flood[17] protection requirements. In those urban settings in which levee height is less than FEMA base flood protection under these principles, the levee heights are generally increased to ensure FEMA base flood protection. The resulting project must still be economically justified and the local sponsor may be required to pay the cost for the difference in levee height between the NED project and the height required for base flood protection.

USACE levee projects protecting agricultural areas are often sized to the NED scale without further efforts to raise the height to that needed to provide FEMA base flood protection. For non-Federal levee projects, the target is often simply to provide protection from the FEMA base flood so that the levee system may be certified and the protected floodplain remain free of development controls. There are, of course, many special cases. Prior to P&G, USACE policy was to seek protection from what was referred to as "Standard Project Flood," or "Standard Project Hurricane" in the case of coastal projects. There are many such projects throughout the country.

The majority of Federal and local levee systems in non-agricultural areas provide protection from the FEMA base flood, or an even higher flood; as a result, the mandatory flood insurance purchase and floodplain management requirements of the National Flood Insurance Program (NFIP) no longer apply in these areas. Local governments are often not willing to pay the incremental cost of providing additional protection once this level of protection is achieved. The FEMA base flood has increasingly become the de facto design standard for levees.

4.2. Freeboard (Page 29)

As indicated previously, freeboard is an increment of levee height added to the design flood height to increase the likelihood of containing a specified level of flood. Most definitions of freeboard center on height addition to accommodate uncertainty in the design flood elevation. This, in turn, may reflect uncertainty in estimating the design discharge and uncertainty in computing design elevations from design discharge. In USACE design guidance, prior to the risk and uncertainty policies discussed below, freeboard was to be designed to reflect the site-specific conditions of each project. Small additional height increments above the base-designed freeboard are added to ensure protection for critical features such as bridges and water and waste treatment plants during overtopping floods. There are references to 3-feet freeboard in several USACE guidance documents, but that does not appear to be stated as a required minimum. Over time, Federal and local agencies tended to implement 3 feet as a minimum freeboard for the majority of levee projects. There are notable exceptions: for the major levees in the Mississippi Valley and the Central Valley of California freeboards up to 5 feet are common.

With the publication of 44 CFR 65.10 (FEMA guidelines for levee certification) in 1986, which specified a minimum of 3 feet, this number effectively became the default standard for many non-USACE levees throughout the United States. 44 CFR 65.10 specifies slightly different minimums for coastal environments, reflecting the unique setting of tides, storm surges, and wind generated waves.

4.3. USACE Risk Analysis Approach -1996 (Page 30)

USACE evolved its present risk analysis policy in response to challenges to flood damage reduction project proposals and justification documents by the Office of Management and Budget (OMB) and an array of local and special interests,. The substance of the policy developed over a period of 3 to 4 years in the mid-1990s and culminated in the publication of ER 1110-2 101, *Risk Analysis for Flood Damage Reduction Studies,* in March 1996, updated in January 2006. The thrust of the policy is to improve decision making and confidence in the project formulation/evaluation process by quantifying and disclosing risk and uncertainty in key data and parameters. The policy and associated methods are contained in several USACE Engineer Regulations, Engineer Manuals, Engineer Technical Letters, and policy letters.

The fundamental tenets of the policy may be summarized as:

- Make accurate and unbiased estimates of the probability of flooding and of exposure, and publish and communicate those findings.
- Acknowledge uncertainties associated with a project and its performance, and quantify, publish, and communicate that information. The key items of information that must be addressed are discharge-frequency and uncertainty, stage-flow and uncertainty, geotechnical and structural performance and uncertainty, operational uncertainty, and project benefits and uncertainty. Other key elements, depending on the specific setting, must also be addressed.
- Emphasize residual risk (the probability and the consequences of that the project capacity may be exceeded) by conducting residual risk analysis and document and communicate findings.

USACE recognized that its risk analysis policy and methods had implications for floodplain management and the associated task of levee certification, and immediately engaged FEMA leadership in discussions. In 1997, USACE and FEMA agreed on an approach to levee certification that embraced risk analysis, and published a policy letter to USACE field offices. The essential elements of the 1997 risk analysis levee certification guidance are: (2a). Respect the elements and principles of 44 CFR 65.10 (i.e., demonstrate a degree of assurance that the base flood will be contained); (2b). Replace the fixed, minimum freeboard criterion of the certification with a quantified assurance (Conditional Non-Exceedance Probability -referred to as "assurance") as follows: Use 44 CFR 65.10 minimums provided that they achieve at least a 90-percent assurance of containing the base flood (may require higher, stronger levees); but protection need not be greater than that necessary to provide 95-percent assurance of containing the base flood (may certify for lower-height levees than 44 CFR 65.10 minimums); and (2c) to the extent possible, quantify and include in the analysis uncertainty in the performance of the geotechnical and structural features of the levee system. The risk analysis levee certification policy has been in place since the policy letter was issued in 1997.

4.4. Implementing Risk Analysis Concepts in 44 CFR 65.10 (Page 31)

When the 1982 NRC Report was issued, the freeboard approach was the most feasible approach to dealing with the uncertainty and natural variability factors involved in the calculation of flood heights and structural integrity. Over time, technology and increased computational capabilities made it possible to consider more accurately uncertainty and variability through the application of risk analysis methodologies; these methodologies now are generally accepted as a more accurate way to establish levee and floodwall heights. A 2000 study by the NRC, "Risk Analysis and Uncertainty in Flood Damage Reduction Studies," was targeted specifically at USACE initiation of such studies, and commended USACE " ... for adopting the new techniques and departing from the traditional freeboard approach. The risk analysis paradigm for flood damage reduction studies represents a step forward...."

4.5. Conclusion (Page 31)

The committee concludes that:

- Advances in technology and computational capabilities have made possible the widespread adoption within the engineering community of risk analysis methodology for determination of levee heights and that this methodology represents the appropriate approach for use by FEMA in 44 CFR 65.10 in place of the current freeboard methodology.

4.6. Recommendation (Page 31)

The committee recommends that:

- FEMA modify CFR 65.10 to phase out use of the freeboard-based approach over the next ten years and to substitute the risk analysis methodology at a 90-percent assurance of passing the base flood. During the transition period, FEMA should permit either approach to be used in levee design and in recertification analysis. The existing 44 CFR 65.10 is shown in Appendix B. The committee provides, in Appendix C, two alternative proposed revisions to 44 CFR 65.10. In one, it updates 44 CFR 65.10 to reflect both use of the current approach and use of the risk analysis methodology. In the second, the committee replaces entirely the current freeboard methodology with the risk analysis methodology. It defines the risk analysis framework throughout the document. The revision distinguishes between new levees, in which design criteria and levee height required to contain the base flood and the associated uncertainty are the primary factors; and existing, aged, and aging levee systems, in which the levee system in its as-constructed and currently maintained state and up-to-date data about base flood stages and geotechnical and structure integrity are the key factors. Freeboard is no longer referenced in favor of quantified assurance related to levee height and structural integrity. The committee includes additional information on what must be demonstrated, how to reflect uncertainty in stage and structural integrity, and what the specific requirements are for operation and maintenance plans and records. It also adds a new section to define and address residual risk and public safety as an important certification requirement.

Conclusions

From review of the documents the following conclusions are offered.

- Flood hazard identification associated with levees should be driven by the level of protection that the levee provides.

Reference: Salt River Hydraulic Master Plan
Effect of Vegetation on Channel Conveyance, Freeboard Analyses, Flood Risk Assessments

- Levees do not eliminate the risk of flooding.
- Risk assessments should be conducted to identify flood hazards associated with levees.
- When delineating flood hazards associated with levees, evaluate events greater than the 100-year event.
- The magnitude and extent of residual risk should be determined.
- A new flood hazard zone to be mapped on the landward side of the levee utilizing the 500-year event is recommended.
- The USACE Risk Analysis Approach in assessing the risks associated with levees should be used to better define freeboard criteria.

STANTEC CONSULTING INC.

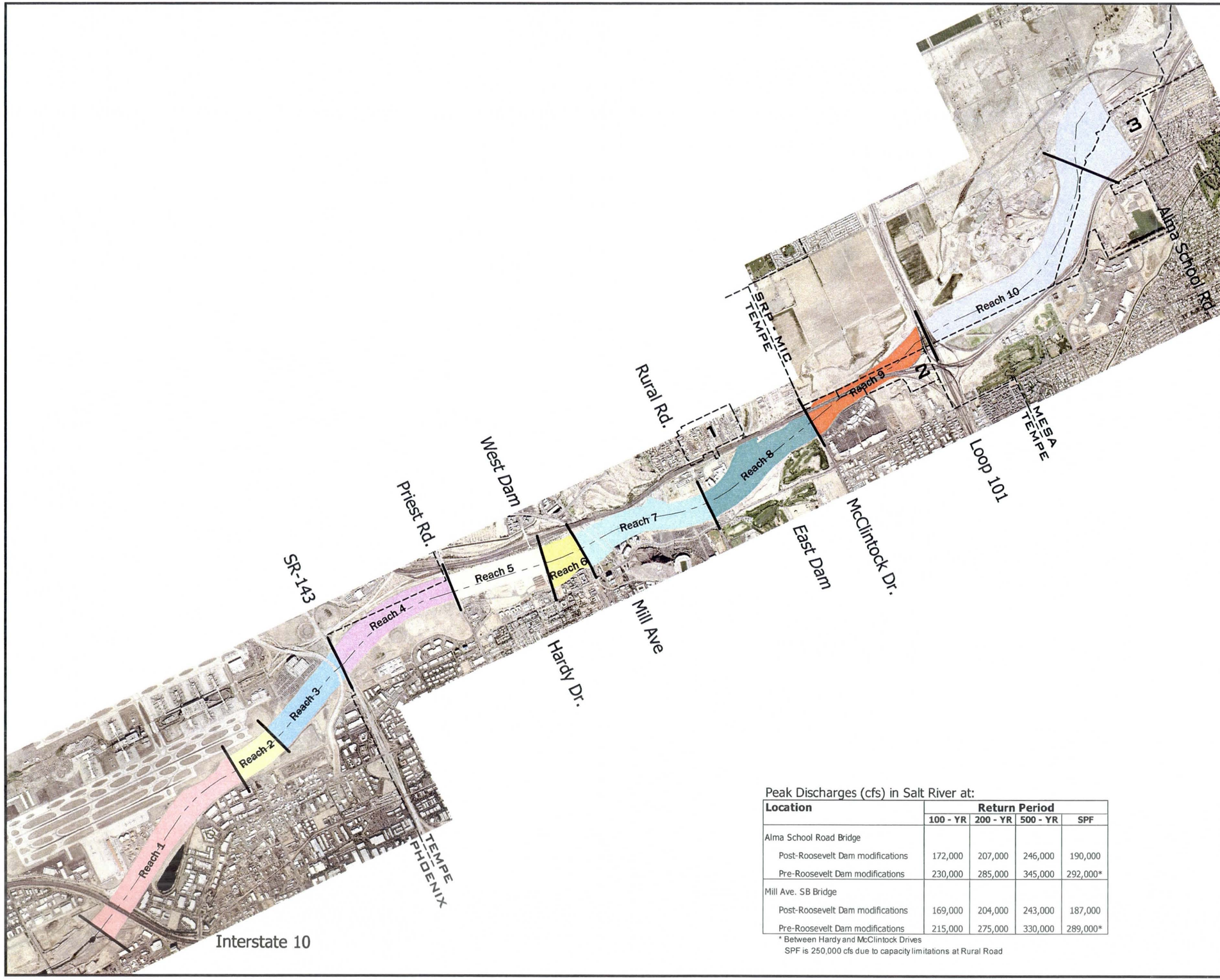
Patrick J. Ellison, PE
Associate
pat.ellison@stantec.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
31680
PATRICK J.
ELLISON
Date Signed 6/30/2010
ARIZONA U.S.A.
Expires 9/30/2012

ATTACHMENT 1

Reach Location Map and HEC-RAS Digital Files

Reach Location Map



Peak Discharges (cfs) in Salt River at:

Location	Return Period			
	100 - YR	200 - YR	500 - YR	SPF
Alma School Road Bridge				
Post-Roosevelt Dam modifications	172,000	207,000	246,000	190,000
Pre-Roosevelt Dam modifications	230,000	285,000	345,000	292,000*
Mill Ave. SB Bridge				
Post-Roosevelt Dam modifications	169,000	204,000	243,000	187,000
Pre-Roosevelt Dam modifications	215,000	275,000	330,000	289,000*

* Between Hardy and McClintock Drives
SPF is 250,000 cfs due to capacity limitations at Rural Road

LEGEND

FLOW CAPACITY REACHES

	Reach 1	363,000 cfs
	Reach 2	261,000 cfs
	Reach 3	375,000 cfs
	Reach 4	360,000 cfs
	Reach 5	380,000 cfs
	Reach 6	210,000 cfs
	Reach 7	260,000 cfs
	Reach 8	280,000 cfs
	Reach 9	230,050 cfs
	Reach 10	217,000 cfs

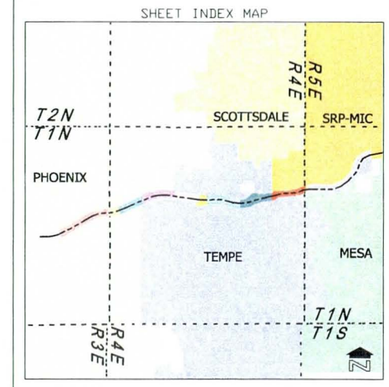
HYDRAULIC BASE LINE

CORPORATE LIMITS

NOTES

Areas Labeled 1 through 3 are Unincorporated Maricopa County

SHEET INDEX MAP



N.T.S.

NO.	REVISION	BY	DATE
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Salt River Hydraulic Master Plan

Flow Capacity Reaches

Existing Conditions – Initial Breakout Discharges

FCD Contract 2007C017 / PCN 126.06.20

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 1 OF 1

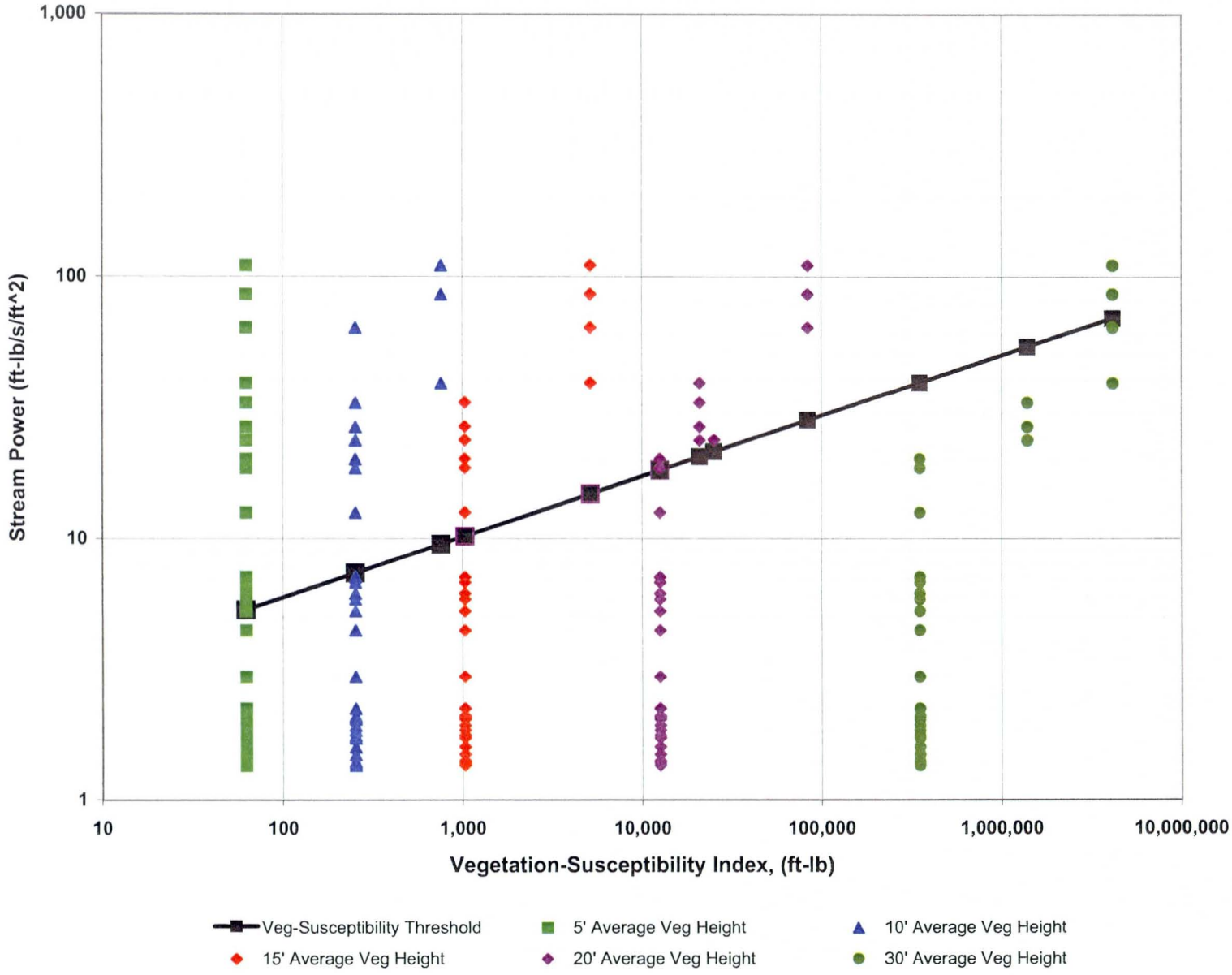
Disc with HEC-RAS model

Model is provided digitally on the Master CD located at the front of this binder.

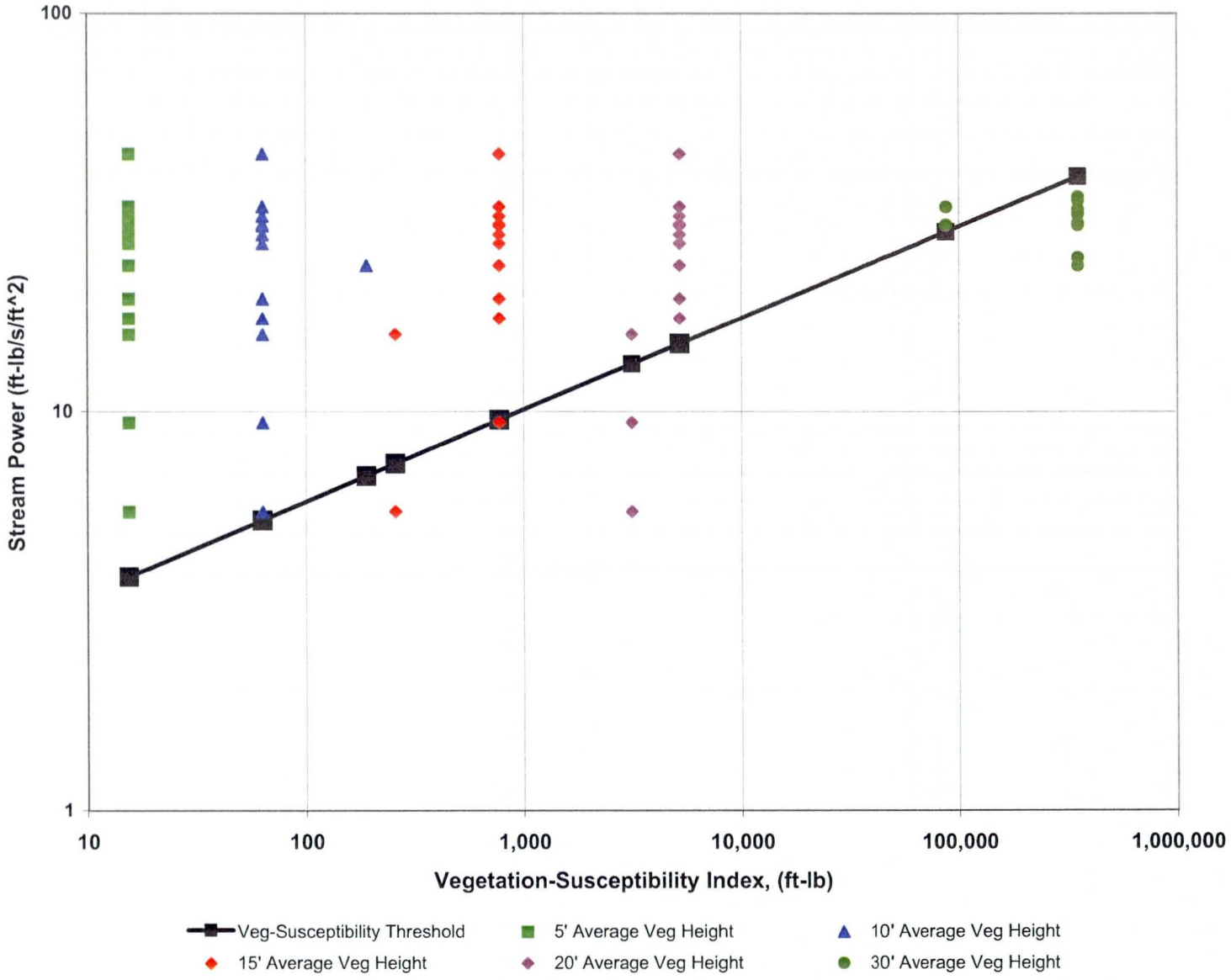
ATTACHMENT 2

Vegetation-Susceptibility Plots
Existing Condition

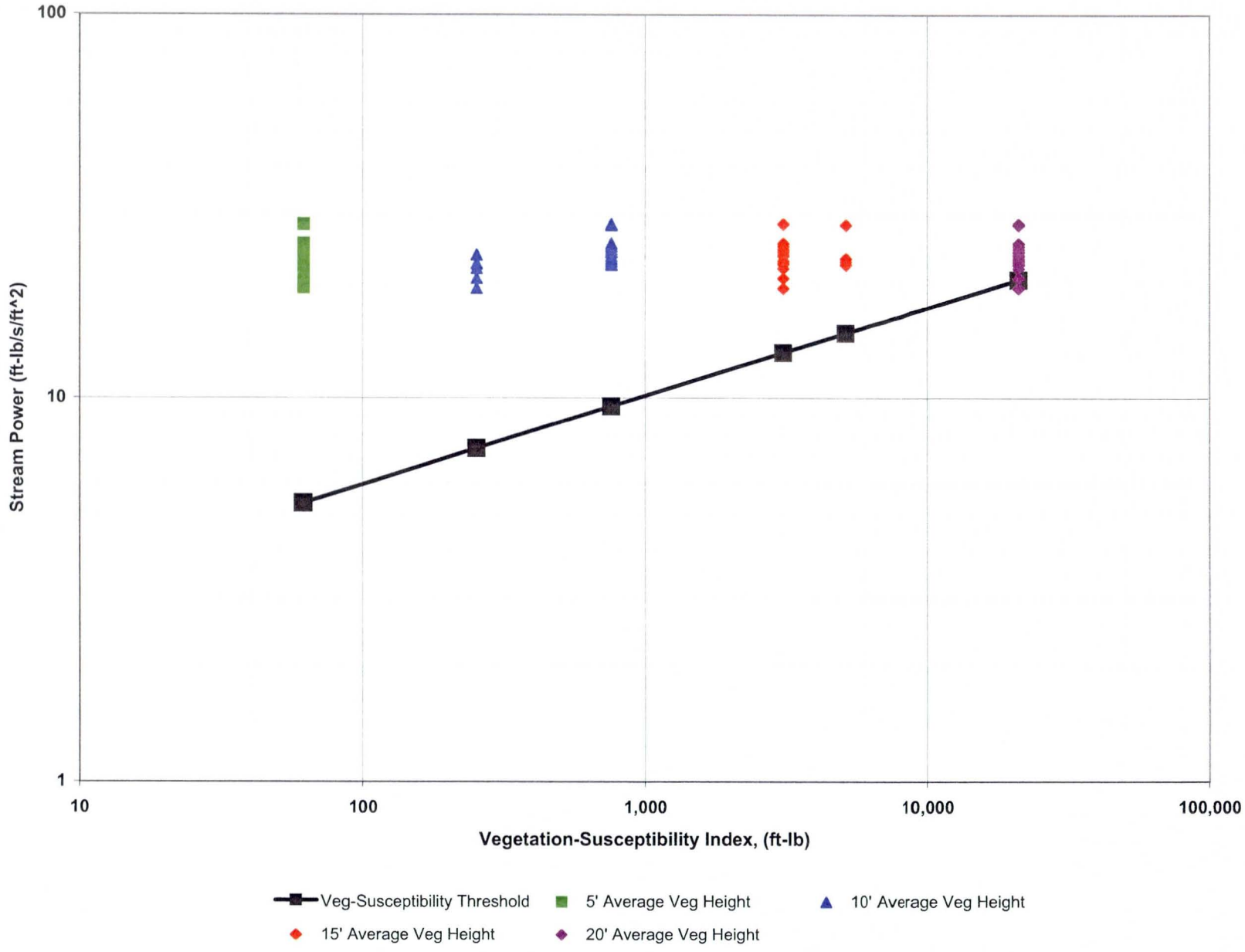
Willow - Reach 10 - Existing Conditions



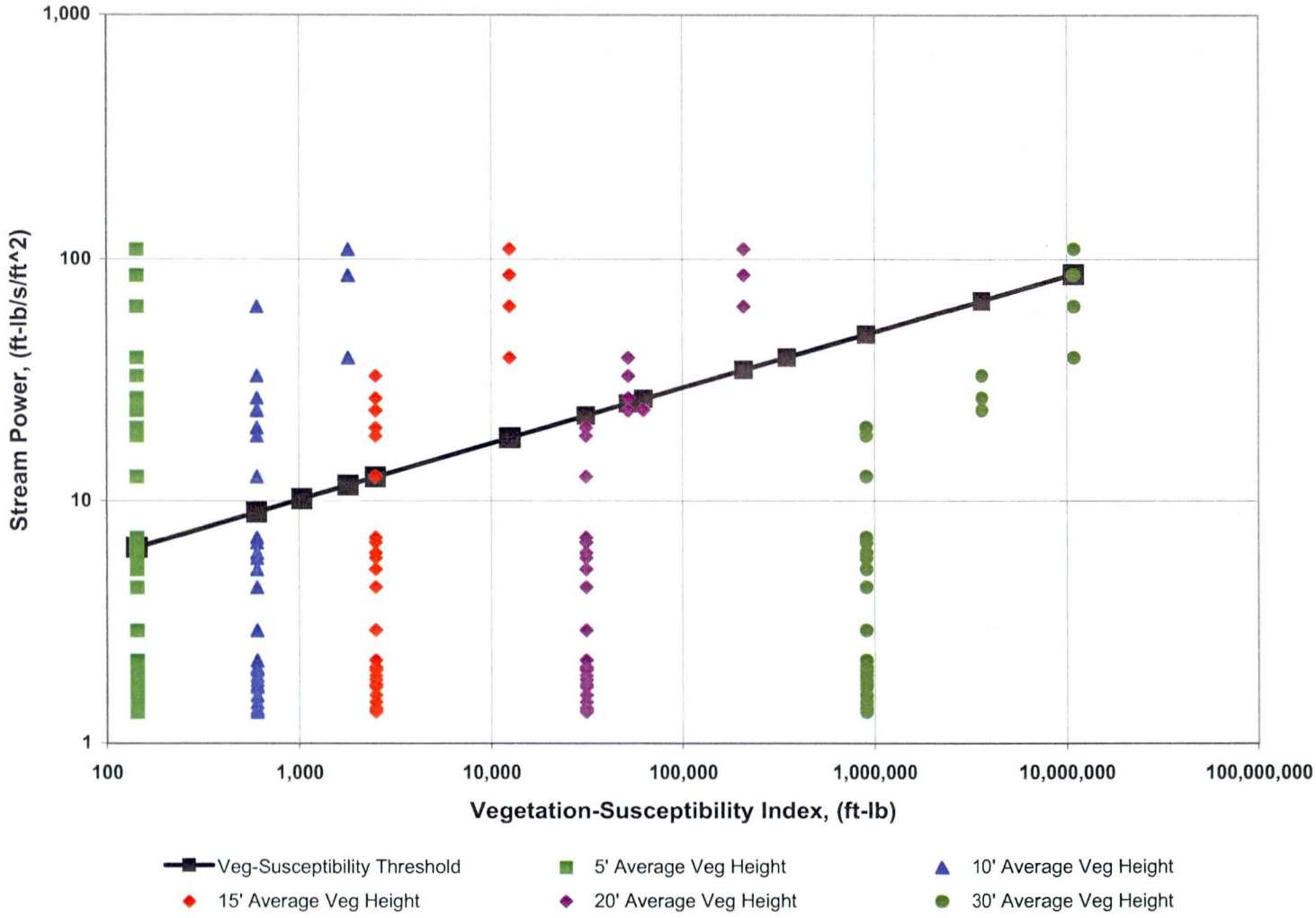
Willow - Reach 9 - Existing Conditions

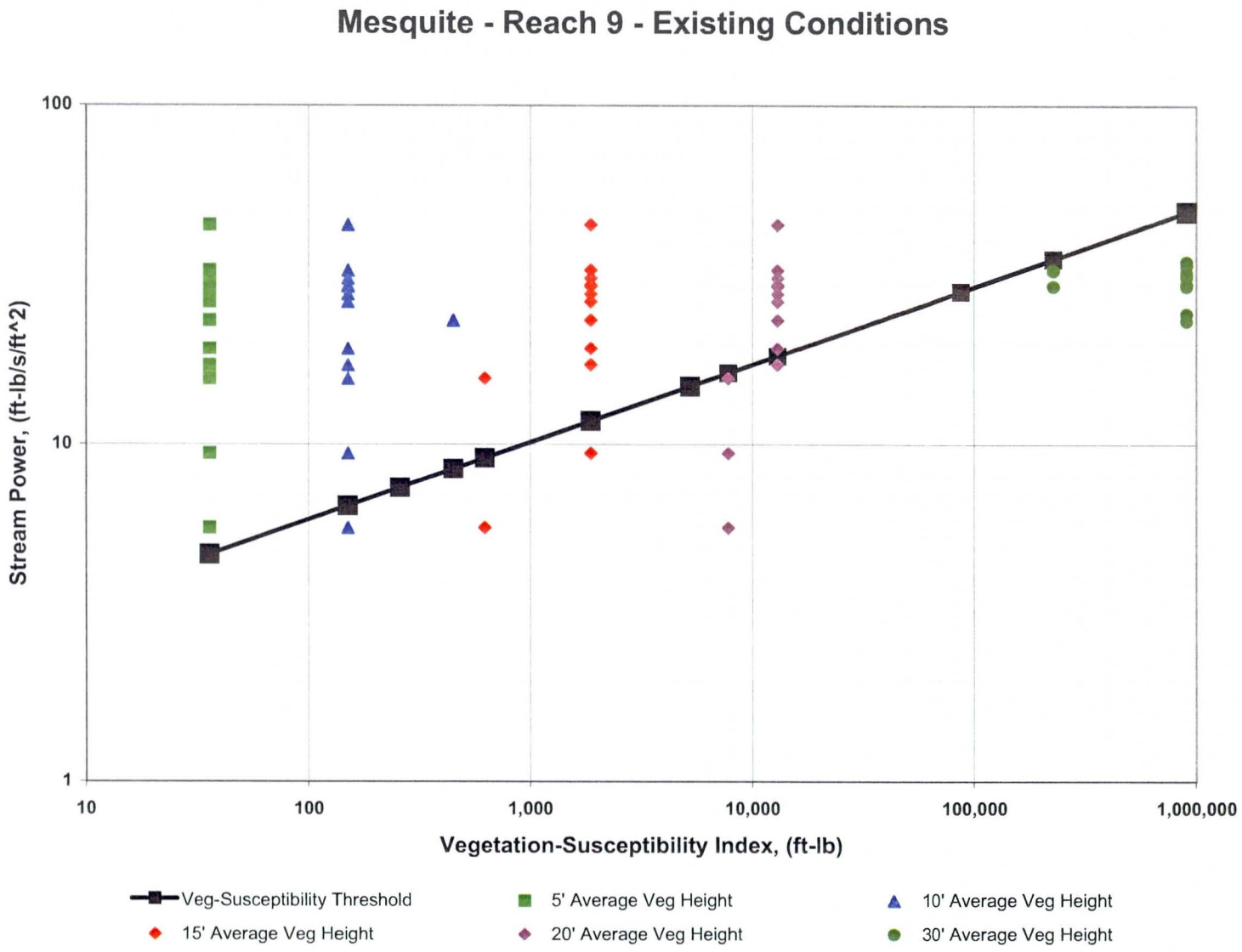


Willow - Reaches 4 and 5 - Existing Conditions

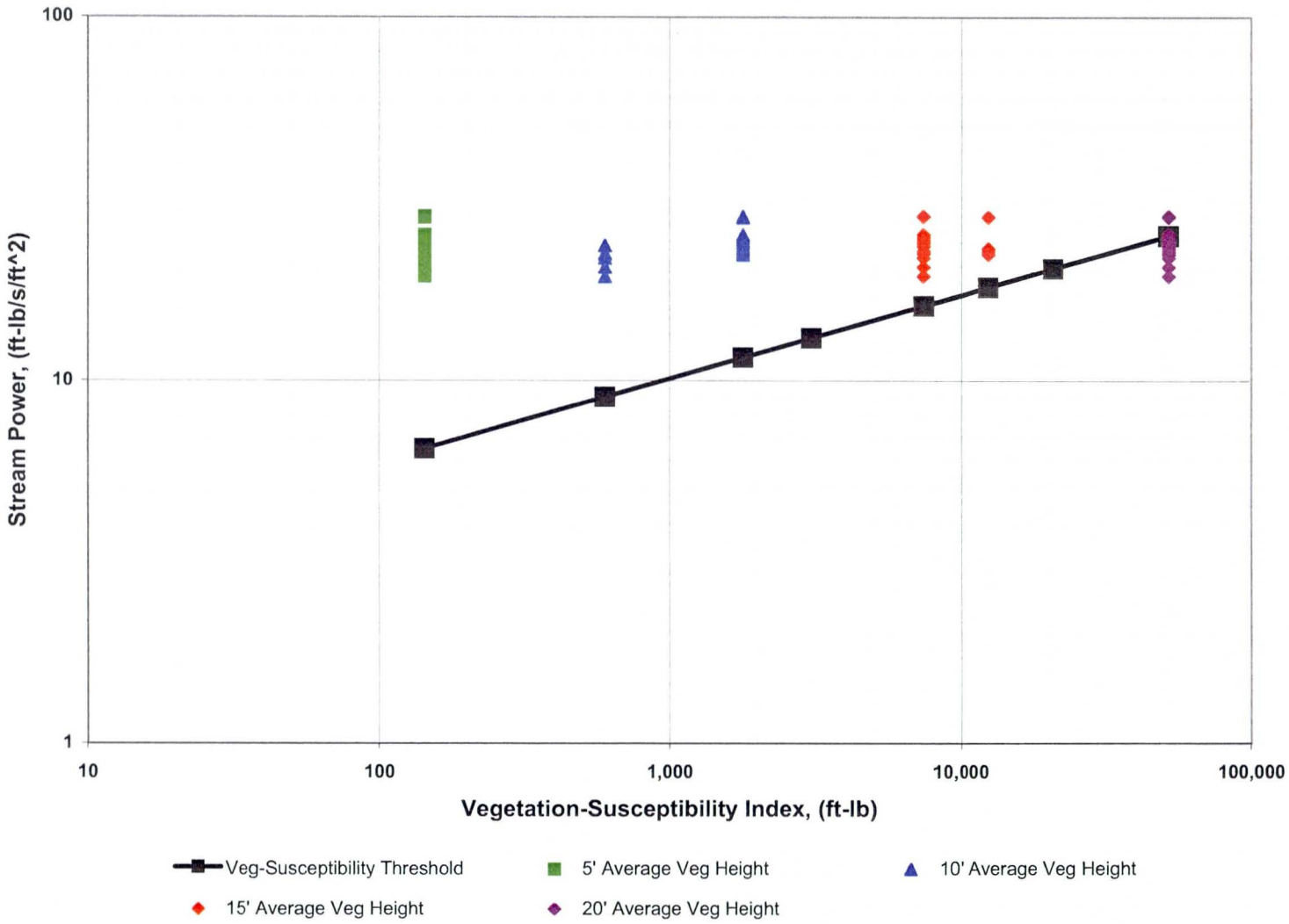


Mesquite - Reach 10 - Existing Conditions

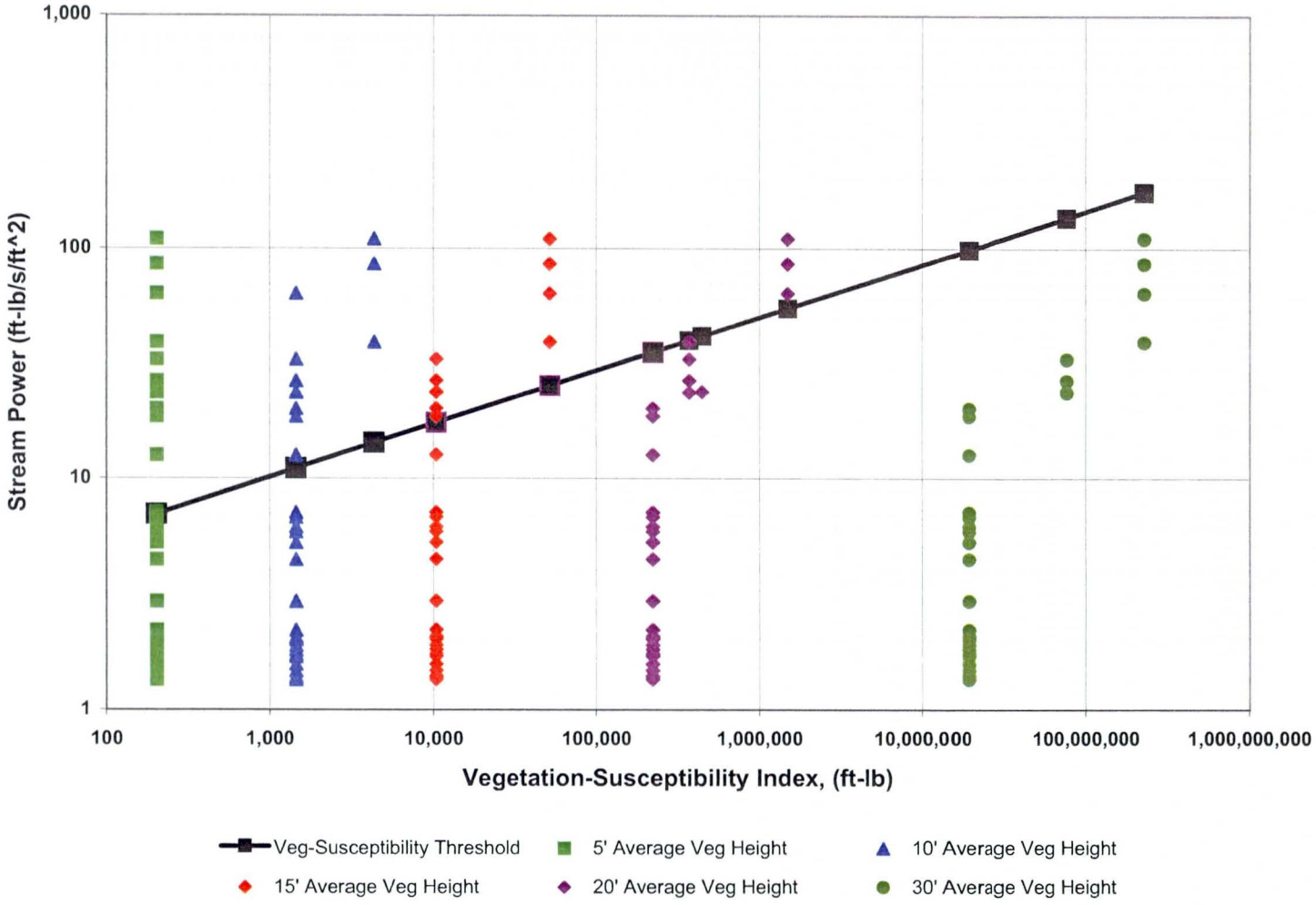



Mesquite - Reach 9 - Existing Conditions
100
10
1
Stream Power, (ft-lb/s/ft^2)
10
100
1,000
10,000
100,000
1,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height

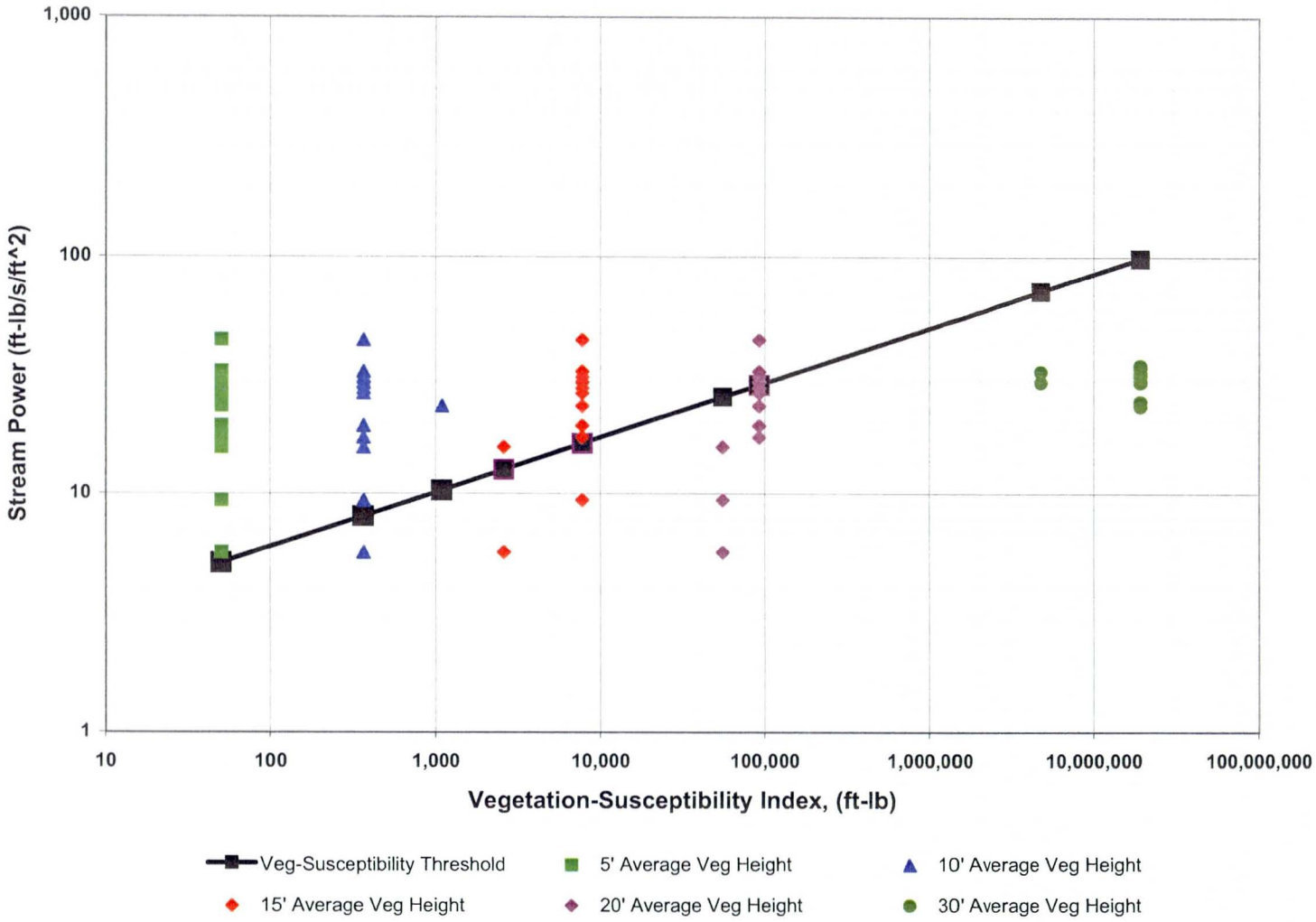
Mesquite - Reaches 4 and 5 - Existing Conditions



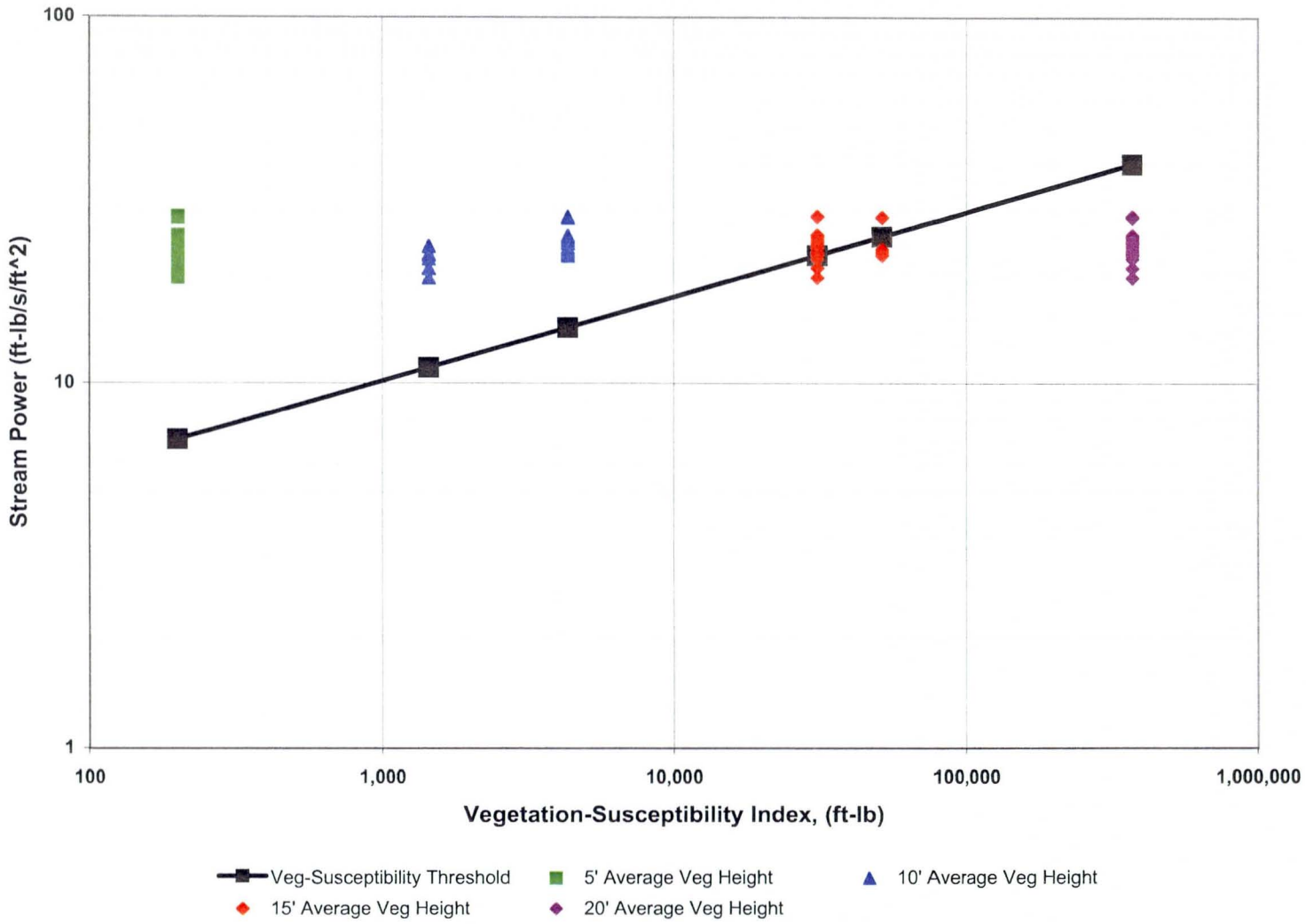
Palo Verde - Reach 10 - Existing Conditions



Palo Verde - Reach 9 - Existing Conditions



Palo Verde - Reaches 4 & 5 - Existing Conditions



ATTACHMENT 3

Vegetation-Susceptibility Tabular Data
Existing Condition

Reaches 4 & 5 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Willow	5	15.52	4	1	2.8	1	62	5	22.44	17.73
219.24	14.05	Willow	5	15.52	4	1	2.8	1	62	5	22.38	18.02
219.33	14.01	Willow	5	15.52	4	1	2.8	1	62	5	22.83	17.68
219.42	14.15	Willow	5	15.52	4	1	2.8	1	62	5	23.23	17.63
219.52	14.28	Willow	5	15.52	4	1	2.9	1	62	5	22.92	18.16
219.61	14.27	Willow	5	15.52	4	1	2.9	1	62	5	24.14	18.33
219.7	14.45	Willow	5	15.52	4	1	2.9	1	62	5	25.02	18.28
219.79	14.13	Willow	5	15.52	4	1	2.8	1	62	5	28.36	17.19
219.89	14.33	Willow	5	15.52	4	1	2.9	1	62	5	28.54	17.49
220.05	15.11	Willow	5	15.52	4	1	3.0	1	62	5	25.41	16.94
220.06	15.3	Willow	5	15.52	4	1	3.1	1	62	5	24.26	0
220.063	15.26	Willow	5	15.52	4	1	3.1	1	62	5	24.58	17.32
220.07	15.45	Willow	5	15.52	4	1	3.1	1	62	5	23.62	17.33
220.17	15.54	Willow	5	15.52	4	1	3.1	1	62	5	23.73	0
220.26	15.59	Willow	5	15.52	4	1	3.1	1	62	5	22.5	17.8
220.35	15.62	Willow	5	15.52	4	1	3.1	1	62	5	22.59	18.28
220.45	15.97	Willow	5	15.52	4	1	3.2	1	62	5	21.92	18.72
220.54	16.06	Willow	5	15.52	4	1	3.2	1	62	5	20.67	19.17
220.64	16.42	Willow	5	15.52	4	1	3.3	1	62	5	19.45	19.6

Reaches 4 & 5 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Willow	10	63.24	4	1	1.4	3	759	10	22.44	17.73
219.24	14.05	Willow	10	63.24	4	1	1.4	3	759	10	22.38	18.02
219.33	14.01	Willow	10	63.24	4	1	1.4	3	759	10	22.83	17.68
219.42	14.15	Willow	10	63.24	4	1	1.4	3	759	10	23.23	17.63
219.52	14.28	Willow	10	63.24	4	1	1.4	3	759	10	22.92	18.16
219.61	14.27	Willow	10	63.24	4	1	1.4	3	759	10	24.14	18.33
219.7	14.45	Willow	10	63.24	4	1	1.4	3	759	10	25.02	18.28
219.79	14.13	Willow	10	63.24	4	1	1.4	3	759	10	28.36	17.19
219.89	14.33	Willow	10	63.24	4	1	1.4	3	759	10	28.54	17.49
220.05	15.11	Willow	10	63.24	4	1	1.5	3	759	10	25.41	16.94
220.06	15.3	Willow	10	63.24	4	1	1.5	3	759	10	24.26	0
220.063	15.26	Willow	10	63.24	4	1	1.5	3	759	10	24.58	17.32
220.07	15.45	Willow	10	63.24	4	1	1.5	3	759	10	23.62	17.33
220.17	15.54	Willow	10	63.24	4	1	1.6	1	253	7	23.73	0
220.26	15.59	Willow	10	63.24	4	1	1.6	1	253	7	22.5	17.8
220.35	15.62	Willow	10	63.24	4	1	1.6	1	253	7	22.59	18.28
220.45	15.97	Willow	10	63.24	4	1	1.6	1	253	7	21.92	18.72
220.54	16.06	Willow	10	63.24	4	1	1.6	1	253	7	20.67	19.17
220.64	16.42	Willow	10	63.24	4	1	1.6	1	253	7	19.45	19.6

Reaches 4 & 5 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Willow	15	257.63	4	1	0.9	5	5153	15	22.44	17.7
219.24	14.05	Willow	15	257.63	4	1	0.9	5	5153	15	22.38	18.0
219.33	14.01	Willow	15	257.63	4	1	0.9	5	5153	15	22.83	17.7
219.42	14.15	Willow	15	257.63	4	1	0.9	5	5153	15	23.23	17.6
219.52	14.28	Willow	15	257.63	4	1	1.0	3	3092	13	22.92	18.2
219.61	14.27	Willow	15	257.63	4	1	1.0	3	3092	13	24.14	18.3
219.7	14.45	Willow	15	257.63	4	1	1.0	3	3092	13	25.02	18.3
219.79	14.13	Willow	15	257.63	4	1	0.9	5	5153	15	28.36	17.2
219.89	14.33	Willow	15	257.63	4	1	1.0	3	3092	13	28.54	17.5
220.05	15.11	Willow	15	257.63	4	1	1.0	3	3092	13	25.41	16.9
220.06	15.3	Willow	15	257.63	4	1	1.0	3	3092	13	24.26	0.0
220.063	15.26	Willow	15	257.63	4	1	1.0	3	3092	13	24.58	17.3
220.07	15.45	Willow	15	257.63	4	1	1.0	3	3092	13	23.62	17.3
220.17	15.54	Willow	15	257.63	4	1	1.0	3	3092	13	23.73	0.0
220.26	15.59	Willow	15	257.63	4	1	1.0	3	3092	13	22.5	17.8
220.35	15.62	Willow	15	257.63	4	1	1.0	3	3092	13	22.59	18.3
220.45	15.97	Willow	15	257.63	4	1	1.1	3	3092	13	21.92	18.7
220.54	16.06	Willow	15	257.63	4	1	1.1	3	3092	13	20.67	19.2
220.64	16.42	Willow	15	257.63	4	1	1.1	3	3092	13	19.45	19.6

Reaches 4 & 5 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Willow	20	1049.54	4	1	0.7	5	20991	20	22.44	17.7
219.24	14.05	Willow	20	1049.54	4	1	0.7	5	20991	20	22.38	18.0
219.33	14.01	Willow	20	1049.54	4	1	0.7	5	20991	20	22.83	17.7
219.42	14.15	Willow	20	1049.54	4	1	0.7	5	20991	20	23.23	17.6
219.52	14.28	Willow	20	1049.54	4	1	0.7	5	20991	20	22.92	18.2
219.61	14.27	Willow	20	1049.54	4	1	0.7	5	20991	20	24.14	18.3
219.7	14.45	Willow	20	1049.54	4	1	0.7	5	20991	20	25.02	18.3
219.79	14.13	Willow	20	1049.54	4	1	0.7	5	20991	20	28.36	17.2
219.89	14.33	Willow	20	1049.54	4	1	0.7	5	20991	20	28.54	17.5
220.05	15.11	Willow	20	1049.54	4	1	0.8	5	20991	20	25.41	16.9
220.06	15.3	Willow	20	1049.54	4	1	0.8	5	20991	20	24.26	0.0
220.063	15.26	Willow	20	1049.54	4	1	0.8	5	20991	20	24.58	17.3
220.07	15.45	Willow	20	1049.54	4	1	0.8	5	20991	20	23.62	17.3
220.17	15.54	Willow	20	1049.54	4	1	0.8	5	20991	20	23.73	0.0
220.26	15.59	Willow	20	1049.54	4	1	0.8	5	20991	20	22.5	17.8
220.35	15.62	Willow	20	1049.54	4	1	0.8	5	20991	20	22.59	18.3
220.45	15.97	Willow	20	1049.54	4	1	0.8	5	20991	20	21.92	18.7
220.54	16.06	Willow	20	1049.54	4	1	0.8	5	20991	20	20.67	19.2
220.64	16.42	Willow	20	1049.54	4	1	0.8	5	20991	20	19.45	19.6

Reach 9 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Willow	5	16	1	1	2.7	1	16	4	23.41	23.35
223.2	16.4	Willow	5	16	1	1	3.3	1	16	4	17.23	24.43
223.3	15.65	Willow	5	16	1	1	3.1	1	16	4	29.46	31.37
223.39	16.06	Willow	5	16	1	1	3.2	1	16	4	31.15	34.02
223.49	16.59	Willow	5	16	1	1	3.3	1	16	4	29.73	29.5
223.58	15.84	Willow	5	16	1	1	3.2	1	16	4	44.65	34.79
223.68	17.59	Willow	5	16	1	1	3.5	1	16	4	27.95	33.95
223.77	20.05	Willow	5	16	1	1	4.0	1	16	4	19.28	32.36
223.87	21.67	Willow	5	16	1	1	4.3	1	16	4	9.4	34.78
223.95	27.58	Willow	5	16	1	1	5.5	1	16	4	5.63	32.79
224.03	26.63	Willow	5	16	1	1	5.3	1	16	4	15.68	29.53
224.13	16.68	Willow	5	16	1	1	3.3	1	16	4	32.88	29.89
224.15	18.68	Willow	5	16	1	1	3.7	1	16	4	26.57	31.69
223.1	13.7	Willow	10	63	1	1	1.4	3	190	7	23.41	23.35
223.2	16.4	Willow	10	63	1	1	1.6	1	63	5	17.23	24.43
223.3	15.65	Willow	10	63	1	1	1.6	1	63	5	29.46	31.37
223.39	16.06	Willow	10	63	1	1	1.6	1	63	5	31.15	34.02
223.49	16.59	Willow	10	63	1	1	1.7	1	63	5	29.73	29.5
223.58	15.84	Willow	10	63	1	1	1.6	1	63	5	44.65	34.79
223.68	17.59	Willow	10	63	1	1	1.8	1	63	5	27.95	33.95
223.77	20.05	Willow	10	63	1	1	2.0	1	63	5	19.28	32.36
223.87	21.67	Willow	10	63	1	1	2.2	1	63	5	9.4	34.78
223.95	27.58	Willow	10	63	1	1	2.8	1	63	5	5.63	32.79
224.03	26.63	Willow	10	63	1	1	2.7	1	63	5	15.68	29.53
224.13	16.68	Willow	10	63	1	1	1.7	1	63	5	32.88	29.89
224.15	18.68	Willow	10	63	1	1	1.9	1	63	5	26.57	31.69

Reach 9 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Willow	15	258	1	1	0.9	3	773	10	23.41	23.35
223.2	16.4	Willow	15	258	1	1	1.1	3	773	10	17.23	24.43
223.3	15.65	Willow	15	258	1	1	1.0	3	773	10	29.46	31.37
223.39	16.06	Willow	15	258	1	1	1.1	3	773	10	31.15	34.02
223.49	16.59	Willow	15	258	1	1	1.1	3	773	10	29.73	29.50
223.58	15.84	Willow	15	258	1	1	1.1	3	773	10	44.65	34.79
223.68	17.59	Willow	15	258	1	1	1.2	3	773	10	27.95	33.95
223.77	20.05	Willow	15	258	1	1	1.3	3	773	10	19.28	32.36
223.87	21.67	Willow	15	258	1	1	1.4	3	773	10	9.4	34.78
223.95	27.58	Willow	15	258	1	1	1.8	1	258	7	5.63	32.79
224.03	26.63	Willow	15	258	1	1	1.8	1	258	7	15.68	29.53
224.13	16.68	Willow	15	258	1	1	1.1	3	773	10	32.88	29.89
224.15	18.68	Willow	15	258	1	1	1.2	3	773	10	26.57	31.69
223.1	13.7	Willow	20	1050	1	1	0.7	5	5248	15	23.41	23.35
223.3	16.4	Willow	20	1050	1	1	0.8	5	5248	15	17.23	24.43
223.39	15.65	Willow	20	1050	1	1	0.8	5	5248	15	29.46	31.37
223.49	16.06	Willow	20	1050	1	1	0.8	5	5248	15	31.15	34.02
223.58	16.59	Willow	20	1050	1	1	0.8	5	5248	15	29.73	29.5
223.68	15.84	Willow	20	1050	1	1	0.8	5	5248	15	44.65	34.79
223.77	17.59	Willow	20	1050	1	1	0.9	5	5248	15	27.95	33.95
223.87	20.05	Willow	20	1050	1	1	1.0	5	5248	15	19.28	32.36
223.95	21.67	Willow	20	1050	1	1	1.1	3	3149	13	9.4	34.78
224.03	27.58	Willow	20	1050	1	1	1.4	3	3149	13	5.63	32.79
224.13	26.63	Willow	20	1050	1	1	1.3	3	3149	13	15.68	29.53
224.15	16.68	Willow	20	1050	1	1	0.8	5	5248	15	32.88	29.89
224.17	18.68	Willow	20	1050	1	1	0.9	5	5248	15	26.57	31.69

Reach 9 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Willow	30	17418	1	1	0.5	20	348361	39	23.41	23.35
223.3	16.4	Willow	30	17418	1	1	0.5	20	348361	39	17.23	24.43
223.39	15.65	Willow	30	17418	1	1	0.5	20	348361	39	29.46	31.37
223.49	16.06	Willow	30	17418	1	1	0.5	20	348361	39	31.15	34.02
223.58	16.59	Willow	30	17418	1	1	0.6	20	348361	39	29.73	29.5
223.68	15.84	Willow	30	17418	1	1	0.5	20	348361	39	44.65	34.79
223.77	17.59	Willow	30	17418	1	1	0.6	20	348361	39	27.95	33.95
223.87	20.05	Willow	30	17418	1	1	0.7	20	348361	39	19.28	32.36
223.95	21.67	Willow	30	17418	1	1	0.7	20	348361	39	9.4	34.78
224.03	27.58	Willow	30	17418	1	1	0.9	5	87090	28	5.63	32.79
224.13	26.63	Willow	30	17418	1	1	0.9	5	87090	28	15.68	29.53
224.15	16.68	Willow	30	17418	1	1	0.6	20	348361	39	32.88	29.89
224.17	18.68	Willow	30	17418	1	1	0.6	20	348361	39	26.57	31.69

Reach 10 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Willow	5	16	4	1	3.3	1	62	5	32.88	29.53
224.15	18.68	Willow	5	16	4	1	3.7	1	62	5	26.57	29.89
224.17	25.71	Willow	5	16	4	1	5.1	1	62	5	20.02	31.69
224.21	26	Willow	5	16	4	1	5.2	1	62	5	18.53	31.09
224.22	18.4	Willow	5	16	4	1	3.7	1	62	5	23.56	31.01
224.23	18.65	Willow	5	16	4	1	3.7	1	62	5	23.69	31.3
224.33	26.07	Willow	5	16	4	1	5.2	1	62	5	7.11	30.96
224.44	26.31	Willow	5	16	4	1	5.3	1	62	5	5.27	30.41
224.54	26.57	Willow	5	16	4	1	5.3	1	62	5	6.79	30.55
224.64	27.34	Willow	5	16	4	1	5.5	1	62	5	2.95	38.34
224.73	26.55	Willow	5	16	4	1	5.3	1	62	5	4.45	30.98
224.84	25.62	Willow	5	16	4	1	5.1	1	62	5	2.22	30.57
224.93	25.46	Willow	5	16	4	1	5.1	1	62	5	1.91	30.67
225.02	24.13	Willow	5	16	4	1	4.8	1	62	5	2.08	29.91
225.08	24.25	Willow	5	16	4	1	4.9	1	62	5	2.02	30.02
225.13	25.09	Willow	5	16	4	1	5.0	1	62	5	1.75	31.92
225.22	25.25	Willow	5	16	4	1	5.1	1	62	5	5.86	29.97
225.31	24.56	Willow	5	16	4	1	4.9	1	62	5	1.83	29.78
225.4	24.65	Willow	5	16	4	1	4.9	1	62	5	1.71	30.71
225.47	24.93	Willow	5	16	4	1	5.0	1	62	5	1.48	30.82
225.57	25.44	Willow	5	16	4	1	5.1	1	62	5	1.38	30.14
225.66	26.16	Willow	5	16	4	1	5.2	1	62	5	1.35	31.36
225.76	25.09	Willow	5	16	4	1	5.0	1	62	5	2.05	30.93
225.84	25.23	Willow	5	16	4	1	5.0	1	62	5	1.58	30.8
225.95	26.37	Willow	5	16	4	1	5.3	1	62	5	0.64	31
226.06	26.71	Willow	5	16	4	1	5.3	1	62	5	0.55	31.08
226.16	26.82	Willow	5	16	4	1	5.4	1	62	5	1.4	31.02
226.27	26.35	Willow	5	16	4	1	5.3	1	62	5	6.16	30.86
226.33	25.41	Willow	5	16	4	1	5.1	1	62	5	12.58	30.29
226.42	12.85	Willow	5	16	4	1	2.6	1	62	5	63.74	29.18
226.49	11.48	Willow	5	16	4	1	2.3	1	62	5	110.29	30.38
226.59	13.36	Willow	5	16	4	1	2.7	1	62	5	38.99	16.7
226.6	10.75	Willow	5	16	4	1	2.2	1	62	5	85.73	12.08

Reach 10 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.68	Willow	10	63	4	1	1.7	1	253	7	32.88	29.53
224.15	18.68	Willow	10	63	4	1	1.9	1	253	7	26.57	29.89
224.17	25.71	Willow	10	63	4	1	2.6	1	253	7	20.02	31.69
224.21	26	Willow	10	63	4	1	2.6	1	253	7	18.53	31.09
224.22	18.4	Willow	10	63	4	1	1.8	1	253	7	23.56	31.01
224.23	18.65	Willow	10	63	4	1	1.9	1	253	7	23.69	31.3
224.33	26.07	Willow	10	63	4	1	2.6	1	253	7	7.11	30.96
224.44	26.31	Willow	10	63	4	1	2.6	1	253	7	5.27	30.41
224.54	26.57	Willow	10	63	4	1	2.7	1	253	7	6.79	30.55
224.64	27.34	Willow	10	63	4	1	2.7	1	253	7	2.95	38.34
224.73	26.55	Willow	10	63	4	1	2.7	1	253	7	4.45	30.98
224.84	25.62	Willow	10	63	4	1	2.6	1	253	7	2.22	30.57
224.93	25.46	Willow	10	63	4	1	2.5	1	253	7	1.91	30.67
225.02	24.13	Willow	10	63	4	1	2.4	1	253	7	2.08	29.91
225.08	24.25	Willow	10	63	4	1	2.4	1	253	7	2.02	30.02
225.13	25.09	Willow	10	63	4	1	2.5	1	253	7	1.75	31.92
225.22	25.25	Willow	10	63	4	1	2.5	1	253	7	5.86	29.97
225.31	24.56	Willow	10	63	4	1	2.5	1	253	7	1.83	29.78
225.4	24.65	Willow	10	63	4	1	2.5	1	253	7	1.71	30.71
225.47	24.93	Willow	10	63	4	1	2.5	1	253	7	1.48	30.82
225.57	25.44	Willow	10	63	4	1	2.5	1	253	7	1.38	30.14
225.66	26.16	Willow	10	63	4	1	2.6	1	253	7	1.35	31.36
225.76	25.09	Willow	10	63	4	1	2.5	1	253	7	2.05	30.93
225.84	25.23	Willow	10	63	4	1	2.5	1	253	7	1.58	30.8
225.95	26.37	Willow	10	63	4	1	2.6	1	253	7	0.64	31
226.06	26.71	Willow	10	63	4	1	2.7	1	253	7	0.55	31.08
226.16	26.82	Willow	10	63	4	1	2.7	1	253	7	1.4	31.02
226.27	26.35	Willow	10	63	4	1	2.6	1	253	7	6.16	30.86
226.33	25.41	Willow	10	63	4	1	2.5	1	253	7	12.58	30.29
226.42	12.85	Willow	10	63	4	1	1.3	1	253	7	63.74	29.18
226.49	11.48	Willow	10	63	4	1	1.1	3	759	10	110.29	30.38
226.59	13.36	Willow	10	63	4	1	1.3	3	759	10	38.99	16.7
226.6	10.75	Willow	10	63	4	1	1.1	3	759	10	85.73	12.08

Reach 10 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Willow	15	258	4	1	1.1	1	1031	10	32.88	29.53
224.15	18.68	Willow	15	258	4	1	1.2	1	1031	10	26.57	29.89
224.17	25.71	Willow	15	258	4	1	1.7	1	1031	10	20.02	31.69
224.21	26	Willow	15	258	4	1	1.7	1	1031	10	18.53	31.09
224.22	18.4	Willow	15	258	4	1	1.2	1	1031	10	23.56	31.01
224.23	18.65	Willow	15	258	4	1	1.2	1	1031	10	23.69	31.3
224.33	26.07	Willow	15	258	4	1	1.7	1	1031	10	7.11	30.96
224.44	26.31	Willow	15	258	4	1	1.8	1	1031	10	5.27	30.41
224.54	26.57	Willow	15	258	4	1	1.8	1	1031	10	6.79	30.55
224.64	27.34	Willow	15	258	4	1	1.8	1	1031	10	2.95	38.34
224.73	26.55	Willow	15	258	4	1	1.8	1	1031	10	4.45	30.98
224.84	25.62	Willow	15	258	4	1	1.7	1	1031	10	2.22	30.57
224.93	25.46	Willow	15	258	4	1	1.7	1	1031	10	1.91	30.67
225.02	24.13	Willow	15	258	4	1	1.6	1	1031	10	2.08	29.91
225.08	24.25	Willow	15	258	4	1	1.6	1	1031	10	2.02	30.02
225.13	25.09	Willow	15	258	4	1	1.7	1	1031	10	1.75	31.92
225.22	25.25	Willow	15	258	4	1	1.7	1	1031	10	5.86	29.97
225.31	24.56	Willow	15	258	4	1	1.6	1	1031	10	1.83	29.78
225.4	24.65	Willow	15	258	4	1	1.6	1	1031	10	1.71	30.71
225.47	24.93	Willow	15	258	4	1	1.7	1	1031	10	1.48	30.82
225.57	25.44	Willow	15	258	4	1	1.7	1	1031	10	1.38	30.14
225.66	26.16	Willow	15	258	4	1	1.7	1	1031	10	1.35	31.36
225.76	25.09	Willow	15	258	4	1	1.7	1	1031	10	2.05	30.93
225.84	25.23	Willow	15	258	4	1	1.7	1	1031	10	1.58	30.8
225.95	26.37	Willow	15	258	4	1	1.8	1	1031	10	0.64	31
226.06	26.71	Willow	15	258	4	1	1.8	1	1031	10	0.55	31.08
226.16	26.82	Willow	15	258	4	1	1.8	1	1031	10	1.4	31.02
226.27	26.35	Willow	15	258	4	1	1.8	1	1031	10	6.16	30.86
226.33	25.41	Willow	15	258	4	1	1.7	1	1031	10	12.58	30.29
226.42	12.85	Willow	15	258	4	1	0.9	5	5153	15	63.74	29.18
226.49	11.48	Willow	15	258	4	1	0.8	5	5153	15	110.29	30.38
226.59	13.36	Willow	15	258	4	1	0.9	5	5153	15	38.99	16.7
226.6	10.75	Willow	15	258	4	1	0.7	5	5153	15	85.73	12.08

Reach 10 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Willow	20	1050	4	1	0.8	5	20991	20	32.88	29.53
224.15	18.68	Willow	20	1050	4	1	0.9	5	20991	20	26.57	29.89
224.17	25.71	Willow	20	1050	4	1	1.3	3	12595	18	20.02	31.69
224.21	26	Willow	20	1050	4	1	1.3	3	12595	18	18.53	31.09
224.22	18.4	Willow	20	1050	4	1	0.9	5	20991	20	23.56	31.01
224.23	18.65	Willow	20	1050	4	1	0.9	6	25189	21	23.69	31.3
224.33	26.07	Willow	20	1050	4	1	1.3	3	12595	18	7.11	30.96
224.44	26.31	Willow	20	1050	4	1	1.3	3	12595	18	5.27	30.41
224.54	26.57	Willow	20	1050	4	1	1.3	3	12595	18	6.79	30.55
224.64	27.34	Willow	20	1050	4	1	1.4	3	12595	18	2.95	38.34
224.73	26.55	Willow	20	1050	4	1	1.3	3	12595	18	4.45	30.98
224.84	25.62	Willow	20	1050	4	1	1.3	3	12595	18	2.22	30.57
224.93	25.46	Willow	20	1050	4	1	1.3	3	12595	18	1.91	30.67
225.02	24.13	Willow	20	1050	4	1	1.2	3	12595	18	2.08	29.91
225.08	24.25	Willow	20	1050	4	1	1.2	3	12595	18	2.02	30.02
225.13	25.09	Willow	20	1050	4	1	1.3	3	12595	18	1.75	31.92
225.22	25.25	Willow	20	1050	4	1	1.3	3	12595	18	5.86	29.97
225.31	24.56	Willow	20	1050	4	1	1.2	3	12595	18	1.83	29.78
225.4	24.65	Willow	20	1050	4	1	1.2	3	12595	18	1.71	30.71
225.47	24.93	Willow	20	1050	4	1	1.2	3	12595	18	1.48	30.82
225.57	25.44	Willow	20	1050	4	1	1.3	3	12595	18	1.38	30.14
225.66	26.16	Willow	20	1050	4	1	1.3	3	12595	18	1.35	31.36
225.76	25.09	Willow	20	1050	4	1	1.3	3	12595	18	2.05	30.93
225.84	25.23	Willow	20	1050	4	1	1.3	3	12595	18	1.58	30.8
225.95	26.37	Willow	20	1050	4	1	1.3	3	12595	18	0.64	31
226.06	26.71	Willow	20	1050	4	1	1.3	3	12595	18	0.55	31.08
226.16	26.82	Willow	20	1050	4	1	1.3	3	12595	18	1.4	31.02
226.27	26.35	Willow	20	1050	4	1	1.3	3	12595	18	6.16	30.86
226.33	25.41	Willow	20	1050	4	1	1.3	3	12595	18	12.58	30.29
226.42	12.85	Willow	20	1050	4	1	0.6	20	83963	28	63.74	29.18
226.49	11.48	Willow	20	1050	4	1	0.6	20	83963	28	110.29	30.38
226.59	13.36	Willow	20	1050	4	1	0.7	5	20991	20	38.99	16.7
226.6	10.75	Willow	20	1050	4	1	0.5	20	83963	28	85.73	12.08

Reach 10 – Willow Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Willow	30	17418	4	1	0.6	20	1393445	54	32.88	29.53
224.15	18.68	Willow	30	17418	4	1	0.6	20	1393445	54	26.57	29.89
224.17	25.71	Willow	30	17418	4	1	0.9	5	348361	39	20.02	31.69
224.21	26	Willow	30	17418	4	1	0.9	5	348361	39	18.53	31.09
224.22	18.4	Willow	30	17418	4	1	0.6	20	1393445	54	23.56	31.01
224.23	18.65	Willow	30	17418	4	1	0.6	20	1393445	54	23.69	31.3
224.33	26.07	Willow	30	17418	4	1	0.9	5	348361	39	7.11	30.96
224.44	26.31	Willow	30	17418	4	1	0.9	5	348361	39	5.27	30.41
224.54	26.57	Willow	30	17418	4	1	0.9	5	348361	39	6.79	30.55
224.64	27.34	Willow	30	17418	4	1	0.9	5	348361	39	2.95	38.34
224.73	26.55	Willow	30	17418	4	1	0.9	5	348361	39	4.45	30.98
224.84	25.62	Willow	30	17418	4	1	0.9	5	348361	39	2.22	30.57
224.93	25.46	Willow	30	17418	4	1	0.8	5	348361	39	1.91	30.67
225.02	24.13	Willow	30	17418	4	1	0.8	5	348361	39	2.08	29.91
225.08	24.25	Willow	30	17418	4	1	0.8	5	348361	39	2.02	30.02
225.13	25.09	Willow	30	17418	4	1	0.8	5	348361	39	1.75	31.92
225.22	25.25	Willow	30	17418	4	1	0.8	5	348361	39	5.86	29.97
225.31	24.56	Willow	30	17418	4	1	0.8	5	348361	39	1.83	29.78
225.4	24.65	Willow	30	17418	4	1	0.8	5	348361	39	1.71	30.71
225.47	24.93	Willow	30	17418	4	1	0.8	5	348361	39	1.48	30.82
225.57	25.44	Willow	30	17418	4	1	0.8	5	348361	39	1.38	30.14
225.66	26.16	Willow	30	17418	4	1	0.9	5	348361	39	1.35	31.36
225.76	25.09	Willow	30	17418	4	1	0.8	5	348361	39	2.05	30.93
225.84	25.23	Willow	30	17418	4	1	0.8	5	348361	39	1.58	30.8
225.95	26.37	Willow	30	17418	4	1	0.9	5	348361	39	0.64	31
226.06	26.71	Willow	30	17418	4	1	0.9	5	348361	39	0.55	31.08
226.16	26.82	Willow	30	17418	4	1	0.9	5	348361	39	1.4	31.02
226.27	26.35	Willow	30	17418	4	1	0.9	5	348361	39	6.16	30.86
226.33	25.41	Willow	30	17418	4	1	0.8	5	348361	39	12.58	30.29
226.42	12.85	Willow	30	17418	4	1	0.4	60	4180336	70	63.74	29.18
226.49	11.48	Willow	30	17418	4	1	0.4	60	4180336	70	110.29	30.38
226.59	13.36	Willow	30	17418	4	1	0.4	60	4180336	70	38.99	16.7
226.6	10.75	Willow	30	17418	4	1	0.4	60	4180336	70	85.73	12.08

Reaches 4 & 5 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic depth to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Mesquite	5	36	4	1	2.8	1	144	6	22.44	17.73
219.24	14.05	Mesquite	5	36	4	1	2.8	1	144	6	22.38	18.02
219.33	14.01	Mesquite	5	36	4	1	2.8	1	144	6	22.83	17.68
219.42	14.15	Mesquite	5	36	4	1	2.8	1	144	6	23.23	17.63
219.52	14.28	Mesquite	5	36	4	1	2.9	1	144	6	22.92	18.16
219.61	14.27	Mesquite	5	36	4	1	2.9	1	144	6	24.14	18.33
219.7	14.45	Mesquite	5	36	4	1	2.9	1	144	6	25.02	18.28
219.79	14.13	Mesquite	5	36	4	1	2.8	1	144	6	28.36	17.19
219.89	14.33	Mesquite	5	36	4	1	2.9	1	144	6	28.54	17.49
220.05	15.11	Mesquite	5	36	4	1	3.0	1	144	6	25.41	16.94
220.06	15.3	Mesquite	5	36	4	1	3.1	1	144	6	24.26	0
220.063	15.26	Mesquite	5	36	4	1	3.1	1	144	6	24.58	17.32
220.07	15.45	Mesquite	5	36	4	1	3.1	1	144	6	23.62	17.33
220.17	15.54	Mesquite	5	36	4	1	3.1	1	144	6	23.73	0
220.26	15.59	Mesquite	5	36	4	1	3.1	1	144	6	22.5	17.8
220.35	15.62	Mesquite	5	36	4	1	3.1	1	144	6	22.59	18.28
220.45	15.97	Mesquite	5	36	4	1	3.2	1	144	6	21.92	18.72
220.54	16.06	Mesquite	5	36	4	1	3.2	1	144	6	20.67	19.17
220.64	16.42	Mesquite	5	36	4	1	3.3	1	144	6	19.45	19.6

Reaches 4 & 5 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic depth to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Mesquite	10	150	4	1	1.4	3	1795	12	22.44	17.73
219.24	14.05	Mesquite	10	150	4	1	1.4	3	1795	12	22.38	18.02
219.33	14.01	Mesquite	10	150	4	1	1.4	3	1795	12	22.83	17.68
219.42	14.15	Mesquite	10	150	4	1	1.4	3	1795	12	23.23	17.63
219.52	14.28	Mesquite	10	150	4	1	1.4	3	1795	12	22.92	18.16
219.61	14.27	Mesquite	10	150	4	1	1.4	3	1795	12	24.14	18.33
219.7	14.45	Mesquite	10	150	4	1	1.4	3	1795	12	25.02	18.28
219.79	14.13	Mesquite	10	150	4	1	1.4	3	1795	12	28.36	17.19
219.89	14.33	Mesquite	10	150	4	1	1.4	3	1795	12	28.54	17.49
220.05	15.11	Mesquite	10	150	4	1	1.5	3	1795	12	25.41	16.94
220.06	15.3	Mesquite	10	150	4	1	1.5	3	1795	12	24.26	0
220.063	15.26	Mesquite	10	150	4	1	1.5	3	1795	12	24.58	17.32
220.07	15.45	Mesquite	10	150	4	1	1.5	3	1795	12	23.62	17.33
220.17	15.54	Mesquite	10	150	4	1	1.6	1	598	9	23.73	0
220.26	15.59	Mesquite	10	150	4	1	1.6	1	598	9	22.5	17.8
220.35	15.62	Mesquite	10	150	4	1	1.6	1	598	9	22.59	18.28
220.45	15.97	Mesquite	10	150	4	1	1.6	1	598	9	21.92	18.72
220.54	16.06	Mesquite	10	150	4	1	1.6	1	598	9	20.67	19.17
220.64	16.42	Mesquite	10	150	4	1	1.6	1	598	9	19.45	19.6

Reaches 4 & 5 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic depth to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Mesquite	15	624	4	1	0.9	5	12475	18	22.44	17.7
219.24	14.05	Mesquite	15	624	4	1	0.9	5	12475	18	22.38	18.0
219.33	14.01	Mesquite	15	624	4	1	0.9	5	12475	18	22.83	17.7
219.42	14.15	Mesquite	15	624	4	1	0.9	5	12475	18	23.23	17.6
219.52	14.28	Mesquite	15	624	4	1	1.0	3	7485	16	22.92	18.2
219.61	14.27	Mesquite	15	624	4	1	1.0	3	7485	16	24.14	18.3
219.7	14.45	Mesquite	15	624	4	1	1.0	3	7485	16	25.02	18.3
219.79	14.13	Mesquite	15	624	4	1	0.9	5	12475	18	28.36	17.2
219.89	14.33	Mesquite	15	624	4	1	1.0	3	7485	16	28.54	17.5
220.05	15.11	Mesquite	15	624	4	1	1.0	3	7485	16	25.41	16.9
220.06	15.3	Mesquite	15	624	4	1	1.0	3	7485	16	24.26	0.0
220.063	15.26	Mesquite	15	624	4	1	1.0	3	7485	16	24.58	17.3
220.07	15.45	Mesquite	15	624	4	1	1.0	3	7485	16	23.62	17.3
220.17	15.54	Mesquite	15	624	4	1	1.0	3	7485	16	23.73	0.0
220.26	15.59	Mesquite	15	624	4	1	1.0	3	7485	16	22.5	17.8
220.35	15.62	Mesquite	15	624	4	1	1.0	3	7485	16	22.59	18.3
220.45	15.97	Mesquite	15	624	4	1	1.1	3	7485	16	21.92	18.7
220.54	16.06	Mesquite	15	624	4	1	1.1	3	7485	16	20.67	19.2
220.64	16.42	Mesquite	15	624	4	1	1.1	3	7485	16	19.45	19.6

Reaches 4 & 5 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic depth to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Mesquite	20	2600	4	1	0.7	5	52003	25	22.44	17.7
219.24	14.05	Mesquite	20	2600	4	1	0.7	5	52003	25	22.38	18.0
219.33	14.01	Mesquite	20	2600	4	1	0.7	5	52003	25	22.83	17.7
219.42	14.15	Mesquite	20	2600	4	1	0.7	5	52003	25	23.23	17.6
219.52	14.28	Mesquite	20	2600	4	1	0.7	5	52003	25	22.92	18.2
219.61	14.27	Mesquite	20	2600	4	1	0.7	5	52003	25	24.14	18.3
219.7	14.45	Mesquite	20	2600	4	1	0.7	5	52003	25	25.02	18.3
219.79	14.13	Mesquite	20	2600	4	1	0.7	5	52003	25	28.36	17.2
219.89	14.33	Mesquite	20	2600	4	1	0.7	5	52003	25	28.54	17.5
220.05	15.11	Mesquite	20	2600	4	1	0.8	5	52003	25	25.41	16.9
220.06	15.3	Mesquite	20	2600	4	1	0.8	5	52003	25	24.26	0.0
220.063	15.26	Mesquite	20	2600	4	1	0.8	5	52003	25	24.58	17.3
220.07	15.45	Mesquite	20	2600	4	1	0.8	5	52003	25	23.62	17.3
220.17	15.54	Mesquite	20	2600	4	1	0.8	5	52003	25	23.73	0.0
220.26	15.59	Mesquite	20	2600	4	1	0.8	5	52003	25	22.5	17.8
220.35	15.62	Mesquite	20	2600	4	1	0.8	5	52003	25	22.59	18.3
220.45	15.97	Mesquite	20	2600	4	1	0.8	5	52003	25	21.92	18.7
220.54	16.06	Mesquite	20	2600	4	1	0.8	5	52003	25	20.67	19.2
220.64	16.42	Mesquite	20	2600	4	1	0.8	5	52003	25	19.45	19.6

Reach 9 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Mesquite	5	36	1	1	2.7	1	36	5	23.41	23.35
223.2	16.4	Mesquite	5	36	1	1	3.3	1	36	5	17.23	24.43
223.3	15.65	Mesquite	5	36	1	1	3.1	1	36	5	29.46	31.37
223.39	16.06	Mesquite	5	36	1	1	3.2	1	36	5	31.15	34.02
223.49	16.59	Mesquite	5	36	1	1	3.3	1	36	5	29.73	29.5
223.58	15.84	Mesquite	5	36	1	1	3.2	1	36	5	44.65	34.79
223.68	17.59	Mesquite	5	36	1	1	3.5	1	36	5	27.95	33.95
223.77	20.05	Mesquite	5	36	1	1	4.0	1	36	5	19.28	32.36
223.87	21.67	Mesquite	5	36	1	1	4.3	1	36	5	9.4	34.78
223.95	27.58	Mesquite	5	36	1	1	5.5	1	36	5	5.63	32.79
224.03	26.63	Mesquite	5	36	1	1	5.3	1	36	5	15.68	29.53
224.13	16.68	Mesquite	5	36	1	1	3.3	1	36	5	32.88	29.89
224.15	18.68	Mesquite	5	36	1	1	3.7	1	36	5	26.57	31.69
223.1	13.7	Mesquite	10	150	1	1	1.4	3	449	8	23.41	23.35
223.2	16.4	Mesquite	10	150	1	1	1.6	1	150	7	17.23	24.43
223.3	15.65	Mesquite	10	150	1	1	1.6	1	150	7	29.46	31.37
223.39	16.06	Mesquite	10	150	1	1	1.6	1	150	7	31.15	34.02
223.49	16.59	Mesquite	10	150	1	1	1.7	1	150	7	29.73	29.5
223.58	15.84	Mesquite	10	150	1	1	1.6	1	150	7	44.65	34.79
223.68	17.59	Mesquite	10	150	1	1	1.8	1	150	7	27.95	33.95
223.77	20.05	Mesquite	10	150	1	1	2.0	1	150	7	19.28	32.36
223.87	21.67	Mesquite	10	150	1	1	2.2	1	150	7	9.4	34.78
223.95	27.58	Mesquite	10	150	1	1	2.8	1	150	7	5.63	32.79
224.03	26.63	Mesquite	10	150	1	1	2.7	1	150	7	15.68	29.53
224.13	16.68	Mesquite	10	150	1	1	1.7	1	150	7	32.88	29.89
224.15	18.68	Mesquite	10	150	1	1	1.9	1	150	7	26.57	31.69

Reach 9 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Mesquite	15	624	1	1	0.9	3	1871	12	23.41	23.35
223.2	16.4	Mesquite	15	624	1	1	1.1	3	1871	12	17.23	24.43
223.3	15.65	Mesquite	15	624	1	1	1.0	3	1871	12	29.46	31.37
223.39	16.06	Mesquite	15	624	1	1	1.1	3	1871	12	31.15	34.02
223.49	16.59	Mesquite	15	624	1	1	1.1	3	1871	12	29.73	29.50
223.58	15.84	Mesquite	15	624	1	1	1.1	3	1871	12	44.65	34.79
223.68	17.59	Mesquite	15	624	1	1	1.2	3	1871	12	27.95	33.95
223.77	20.05	Mesquite	15	624	1	1	1.3	3	1871	12	19.28	32.36
223.87	21.67	Mesquite	15	624	1	1	1.4	3	1871	12	9.4	34.78
223.95	27.58	Mesquite	15	624	1	1	1.8	1	624	9	5.63	32.79
224.03	26.63	Mesquite	15	624	1	1	1.8	1	624	9	15.68	29.53
224.13	16.68	Mesquite	15	624	1	1	1.1	3	1871	12	32.88	29.89
224.15	18.68	Mesquite	15	624	1	1	1.2	3	1871	12	26.57	31.69
223.1	13.7	Mesquite	20	2600	1	1	0.7	5	13001	18	23.41	23.35
223.3	16.4	Mesquite	20	2600	1	1	0.8	5	13001	18	17.23	24.43
223.39	15.65	Mesquite	20	2600	1	1	0.8	5	13001	18	29.46	31.37
223.49	16.06	Mesquite	20	2600	1	1	0.8	5	13001	18	31.15	34.02
223.58	16.59	Mesquite	20	2600	1	1	0.8	5	13001	18	29.73	29.5
223.68	15.84	Mesquite	20	2600	1	1	0.8	5	13001	18	44.65	34.79
223.77	17.59	Mesquite	20	2600	1	1	0.9	5	13001	18	27.95	33.95
223.87	20.05	Mesquite	20	2600	1	1	1.0	5	13001	18	19.28	32.36
223.95	21.67	Mesquite	20	2600	1	1	1.1	3	7800	16	9.4	34.78
224.03	27.58	Mesquite	20	2600	1	1	1.4	3	7800	16	5.63	32.79
224.13	26.63	Mesquite	20	2600	1	1	1.3	3	7800	16	15.68	29.53
224.15	16.68	Mesquite	20	2600	1	1	0.8	5	13001	18	32.88	29.89
224.17	18.68	Mesquite	20	2600	1	1	0.9	5	13001	18	26.57	31.69

Reach 9 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	13.7	Mesquite	30	45186	1	1	0.5	20	903712	49	23.41	23.35
223.3	16.4	Mesquite	30	45186	1	1	0.5	20	903712	49	17.23	24.43
223.39	15.65	Mesquite	30	45186	1	1	0.5	20	903712	49	29.46	31.37
223.49	16.06	Mesquite	30	45186	1	1	0.5	20	903712	49	31.15	34.02
223.58	16.59	Mesquite	30	45186	1	1	0.6	20	903712	49	29.73	29.5
223.68	15.84	Mesquite	30	45186	1	1	0.5	20	903712	49	44.65	34.79
223.77	17.59	Mesquite	30	45186	1	1	0.6	20	903712	49	27.95	33.95
223.87	20.05	Mesquite	30	45186	1	1	0.7	20	903712	49	19.28	32.36
223.95	21.67	Mesquite	30	45186	1	1	0.7	20	903712	49	9.4	34.78
224.03	27.58	Mesquite	30	45186	1	1	0.9	5	225928	35	5.63	32.79
224.13	26.63	Mesquite	30	45186	1	1	0.9	5	225928	35	15.68	29.53
224.15	16.68	Mesquite	30	45186	1	1	0.6	20	903712	49	32.88	29.89
224.17	18.68	Mesquite	30	45186	1	1	0.6	20	903712	49	26.57	31.69

Reach 10 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Mesquite	5	36	4	1	3.3	1	144	6	32.88	29.53
224.15	18.68	Mesquite	5	36	4	1	3.7	1	144	6	26.57	29.89
224.17	25.71	Mesquite	5	36	4	1	5.1	1	144	6	20.02	31.69
224.21	26	Mesquite	5	36	4	1	5.2	1	144	6	18.53	31.09
224.22	18.4	Mesquite	5	36	4	1	3.7	1	144	6	23.56	31.01
224.23	18.65	Mesquite	5	36	4	1	3.7	1	144	6	23.69	31.3
224.33	26.07	Mesquite	5	36	4	1	5.2	1	144	6	7.11	30.96
224.44	26.31	Mesquite	5	36	4	1	5.3	1	144	6	5.27	30.41
224.54	26.57	Mesquite	5	36	4	1	5.3	1	144	6	6.79	30.55
224.64	27.34	Mesquite	5	36	4	1	5.5	1	144	6	2.95	38.34
224.73	26.55	Mesquite	5	36	4	1	5.3	1	144	6	4.45	30.98
224.84	25.62	Mesquite	5	36	4	1	5.1	1	144	6	2.22	30.57
224.93	25.46	Mesquite	5	36	4	1	5.1	1	144	6	1.91	30.67
225.02	24.13	Mesquite	5	36	4	1	4.8	1	144	6	2.08	29.91
225.08	24.25	Mesquite	5	36	4	1	4.9	1	144	6	2.02	30.02
225.13	25.09	Mesquite	5	36	4	1	5.0	1	144	6	1.75	31.92
225.22	25.25	Mesquite	5	36	4	1	5.1	1	144	6	5.86	29.97
225.31	24.56	Mesquite	5	36	4	1	4.9	1	144	6	1.83	29.78
225.4	24.65	Mesquite	5	36	4	1	4.9	1	144	6	1.71	30.71
225.47	24.93	Mesquite	5	36	4	1	5.0	1	144	6	1.48	30.82
225.57	25.44	Mesquite	5	36	4	1	5.1	1	144	6	1.38	30.14
225.66	26.16	Mesquite	5	36	4	1	5.2	1	144	6	1.35	31.36
225.76	25.09	Mesquite	5	36	4	1	5.0	1	144	6	2.05	30.93
225.84	25.23	Mesquite	5	36	4	1	5.0	1	144	6	1.58	30.8
225.95	26.37	Mesquite	5	36	4	1	5.3	1	144	6	0.64	31
226.06	26.71	Mesquite	5	36	4	1	5.3	1	144	6	0.55	31.08
226.16	26.82	Mesquite	5	36	4	1	5.4	1	144	6	1.4	31.02
226.27	26.35	Mesquite	5	36	4	1	5.3	1	144	6	6.16	30.86
226.33	25.41	Mesquite	5	36	4	1	5.1	1	144	6	12.58	30.29
226.42	12.85	Mesquite	5	36	4	1	2.6	1	144	6	63.74	29.18
226.49	11.48	Mesquite	5	36	4	1	2.3	1	144	6	110.29	30.38
226.59	13.36	Mesquite	5	36	4	1	2.7	1	144	6	38.99	16.7
226.6	10.75	Mesquite	5	36	4	1	2.2	1	144	6	85.73	12.08

Reach 10 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Mesquite	10	150	4	1	1.7	1	598	9	32.88	29.53
224.15	18.68	Mesquite	10	150	4	1	1.9	1	598	9	26.57	29.89
224.17	25.71	Mesquite	10	150	4	1	2.6	1	598	9	20.02	31.69
224.21	26	Mesquite	10	150	4	1	2.6	1	598	9	18.53	31.09
224.22	18.4	Mesquite	10	150	4	1	1.8	1	598	9	23.56	31.01
224.23	18.65	Mesquite	10	150	4	1	1.9	1	598	9	23.69	31.3
224.33	26.07	Mesquite	10	150	4	1	2.6	1	598	9	7.11	30.96
224.44	26.31	Mesquite	10	150	4	1	2.6	1	598	9	5.27	30.41
224.54	26.57	Mesquite	10	150	4	1	2.7	1	598	9	6.79	30.55
224.64	27.34	Mesquite	10	150	4	1	2.7	1	598	9	2.95	38.34
224.73	26.55	Mesquite	10	150	4	1	2.7	1	598	9	4.45	30.98
224.84	25.62	Mesquite	10	150	4	1	2.6	1	598	9	2.22	30.57
224.93	25.46	Mesquite	10	150	4	1	2.5	1	598	9	1.91	30.67
225.02	24.13	Mesquite	10	150	4	1	2.4	1	598	9	2.08	29.91
225.08	24.25	Mesquite	10	150	4	1	2.4	1	598	9	2.02	30.02
225.13	25.09	Mesquite	10	150	4	1	2.5	1	598	9	1.75	31.92
225.22	25.25	Mesquite	10	150	4	1	2.5	1	598	9	5.86	29.97
225.31	24.56	Mesquite	10	150	4	1	2.5	1	598	9	1.83	29.78
225.4	24.65	Mesquite	10	150	4	1	2.5	1	598	9	1.71	30.71
225.47	24.93	Mesquite	10	150	4	1	2.5	1	598	9	1.48	30.82
225.57	25.44	Mesquite	10	150	4	1	2.5	1	598	9	1.38	30.14
225.66	26.16	Mesquite	10	150	4	1	2.6	1	598	9	1.35	31.36
225.76	25.09	Mesquite	10	150	4	1	2.5	1	598	9	2.05	30.93
225.84	25.23	Mesquite	10	150	4	1	2.5	1	598	9	1.58	30.8
225.95	26.37	Mesquite	10	150	4	1	2.6	1	598	9	0.64	31
226.06	26.71	Mesquite	10	150	4	1	2.7	1	598	9	0.55	31.08
226.16	26.82	Mesquite	10	150	4	1	2.7	1	598	9	1.4	31.02
226.27	26.35	Mesquite	10	150	4	1	2.6	1	598	9	6.16	30.86
226.33	25.41	Mesquite	10	150	4	1	2.5	1	598	9	12.58	30.29
226.42	12.85	Mesquite	10	150	4	1	1.3	1	598	9	63.74	29.18
226.49	11.48	Mesquite	10	150	4	1	1.1	3	1795	12	110.29	30.38
226.59	13.36	Mesquite	10	150	4	1	1.3	3	1795	12	38.99	16.7
226.6	10.75	Mesquite	10	150	4	1	1.1	3	1795	12	85.73	12.08

Reach 10 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Mesquite	15	624	4	1	1.1	1	2495	13	32.88	29.53
224.15	18.68	Mesquite	15	624	4	1	1.2	1	2495	13	26.57	29.89
224.17	25.71	Mesquite	15	624	4	1	1.7	1	2495	13	20.02	31.69
224.21	26	Mesquite	15	624	4	1	1.7	1	2495	13	18.53	31.09
224.22	18.4	Mesquite	15	624	4	1	1.2	1	2495	13	23.56	31.01
224.23	18.65	Mesquite	15	624	4	1	1.2	1	2495	13	23.69	31.3
224.33	26.07	Mesquite	15	624	4	1	1.7	1	2495	13	7.11	30.96
224.44	26.31	Mesquite	15	624	4	1	1.8	1	2495	13	5.27	30.41
224.54	26.57	Mesquite	15	624	4	1	1.8	1	2495	13	6.79	30.55
224.64	27.34	Mesquite	15	624	4	1	1.8	1	2495	13	2.95	38.34
224.73	26.55	Mesquite	15	624	4	1	1.8	1	2495	13	4.45	30.98
224.84	25.62	Mesquite	15	624	4	1	1.7	1	2495	13	2.22	30.57
224.93	25.46	Mesquite	15	624	4	1	1.7	1	2495	13	1.91	30.67
225.02	24.13	Mesquite	15	624	4	1	1.6	1	2495	13	2.08	29.91
225.08	24.25	Mesquite	15	624	4	1	1.6	1	2495	13	2.02	30.02
225.13	25.09	Mesquite	15	624	4	1	1.7	1	2495	13	1.75	31.92
225.22	25.25	Mesquite	15	624	4	1	1.7	1	2495	13	5.86	29.97
225.31	24.56	Mesquite	15	624	4	1	1.6	1	2495	13	1.83	29.78
225.4	24.65	Mesquite	15	624	4	1	1.6	1	2495	13	1.71	30.71
225.47	24.93	Mesquite	15	624	4	1	1.7	1	2495	13	1.48	30.82
225.57	25.44	Mesquite	15	624	4	1	1.7	1	2495	13	1.38	30.14
225.66	26.16	Mesquite	15	624	4	1	1.7	1	2495	13	1.35	31.36
225.76	25.09	Mesquite	15	624	4	1	1.7	1	2495	13	2.05	30.93
225.84	25.23	Mesquite	15	624	4	1	1.7	1	2495	13	1.58	30.8
225.95	26.37	Mesquite	15	624	4	1	1.8	1	2495	13	0.64	31
226.06	26.71	Mesquite	15	624	4	1	1.8	1	2495	13	0.55	31.08
226.16	26.82	Mesquite	15	624	4	1	1.8	1	2495	13	1.4	31.02
226.27	26.35	Mesquite	15	624	4	1	1.8	1	2495	13	6.16	30.86
226.33	25.41	Mesquite	15	624	4	1	1.7	1	2495	13	12.58	30.29
226.42	12.85	Mesquite	15	624	4	1	0.9	5	12475	18	63.74	29.18
226.49	11.48	Mesquite	15	624	4	1	0.8	5	12475	18	110.29	30.38
226.59	13.36	Mesquite	15	624	4	1	0.9	5	12475	18	38.99	16.7
226.6	10.75	Mesquite	15	624	4	1	0.7	5	12475	18	85.73	12.08

Reach 10 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Mesquite	20	2600	4	1	0.8	5	52003	25	32.88	29.53
224.15	18.68	Mesquite	20	2600	4	1	0.9	5	52003	25	26.57	29.89
224.17	25.71	Mesquite	20	2600	4	1	1.3	3	31202	22	20.02	31.69
224.21	26	Mesquite	20	2600	4	1	1.3	3	31202	22	18.53	31.09
224.22	18.4	Mesquite	20	2600	4	1	0.9	5	52003	25	23.56	31.01
224.23	18.65	Mesquite	20	2600	4	1	0.9	6	62404	26	23.69	31.3
224.33	26.07	Mesquite	20	2600	4	1	1.3	3	31202	22	7.11	30.96
224.44	26.31	Mesquite	20	2600	4	1	1.3	3	31202	22	5.27	30.41
224.54	26.57	Mesquite	20	2600	4	1	1.3	3	31202	22	6.79	30.55
224.64	27.34	Mesquite	20	2600	4	1	1.4	3	31202	22	2.95	38.34
224.73	26.55	Mesquite	20	2600	4	1	1.3	3	31202	22	4.45	30.98
224.84	25.62	Mesquite	20	2600	4	1	1.3	3	31202	22	2.22	30.57
224.93	25.46	Mesquite	20	2600	4	1	1.3	3	31202	22	1.91	30.67
225.02	24.13	Mesquite	20	2600	4	1	1.2	3	31202	22	2.08	29.91
225.08	24.25	Mesquite	20	2600	4	1	1.2	3	31202	22	2.02	30.02
225.13	25.09	Mesquite	20	2600	4	1	1.3	3	31202	22	1.75	31.92
225.22	25.25	Mesquite	20	2600	4	1	1.3	3	31202	22	5.86	29.97
225.31	24.56	Mesquite	20	2600	4	1	1.2	3	31202	22	1.83	29.78
225.4	24.65	Mesquite	20	2600	4	1	1.2	3	31202	22	1.71	30.71
225.47	24.93	Mesquite	20	2600	4	1	1.2	3	31202	22	1.48	30.82
225.57	25.44	Mesquite	20	2600	4	1	1.3	3	31202	22	1.38	30.14
225.66	26.16	Mesquite	20	2600	4	1	1.3	3	31202	22	1.35	31.36
225.76	25.09	Mesquite	20	2600	4	1	1.3	3	31202	22	2.05	30.93
225.84	25.23	Mesquite	20	2600	4	1	1.3	3	31202	22	1.58	30.8
225.95	26.37	Mesquite	20	2600	4	1	1.3	3	31202	22	0.64	31
226.06	26.71	Mesquite	20	2600	4	1	1.3	3	31202	22	0.55	31.08
226.16	26.82	Mesquite	20	2600	4	1	1.3	3	31202	22	1.4	31.02
226.27	26.35	Mesquite	20	2600	4	1	1.3	3	31202	22	6.16	30.86
226.33	25.41	Mesquite	20	2600	4	1	1.3	3	31202	22	12.58	30.29
226.42	12.85	Mesquite	20	2600	4	1	0.6	20	208013	35	63.74	29.18
226.49	11.48	Mesquite	20	2600	4	1	0.6	20	208013	35	110.29	30.38
226.59	13.36	Mesquite	20	2600	4	1	0.7	5	52003	25	38.99	16.7
226.6	10.75	Mesquite	20	2600	4	1	0.5	20	208013	35	85.73	12.08

Reach 10 – Mesquite Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Mesquite	30	45186	4	1	0.6	20	3614848	67	32.88	29.53
224.15	18.68	Mesquite	30	45186	4	1	0.6	20	3614848	67	26.57	29.89
224.17	25.71	Mesquite	30	45186	4	1	0.9	5	903712	49	20.02	31.69
224.21	26	Mesquite	30	45186	4	1	0.9	5	903712	49	18.53	31.09
224.22	18.4	Mesquite	30	45186	4	1	0.6	20	3614848	67	23.56	31.01
224.23	18.65	Mesquite	30	45186	4	1	0.6	20	3614848	67	23.69	31.3
224.33	26.07	Mesquite	30	45186	4	1	0.9	5	903712	49	7.11	30.96
224.44	26.31	Mesquite	30	45186	4	1	0.9	5	903712	49	5.27	30.41
224.54	26.57	Mesquite	30	45186	4	1	0.9	5	903712	49	6.79	30.55
224.64	27.34	Mesquite	30	45186	4	1	0.9	5	903712	49	2.95	38.34
224.73	26.55	Mesquite	30	45186	4	1	0.9	5	903712	49	4.45	30.98
224.84	25.62	Mesquite	30	45186	4	1	0.9	5	903712	49	2.22	30.57
224.93	25.46	Mesquite	30	45186	4	1	0.8	5	903712	49	1.91	30.67
225.02	24.13	Mesquite	30	45186	4	1	0.8	5	903712	49	2.08	29.91
225.08	24.25	Mesquite	30	45186	4	1	0.8	5	903712	49	2.02	30.02
225.13	25.09	Mesquite	30	45186	4	1	0.8	5	903712	49	1.75	31.92
225.22	25.25	Mesquite	30	45186	4	1	0.8	5	903712	49	5.86	29.97
225.31	24.56	Mesquite	30	45186	4	1	0.8	5	903712	49	1.83	29.78
225.4	24.65	Mesquite	30	45186	4	1	0.8	5	903712	49	1.71	30.71
225.47	24.93	Mesquite	30	45186	4	1	0.8	5	903712	49	1.48	30.82
225.57	25.44	Mesquite	30	45186	4	1	0.8	5	903712	49	1.38	30.14
225.66	26.16	Mesquite	30	45186	4	1	0.9	5	903712	49	1.35	31.36
225.76	25.09	Mesquite	30	45186	4	1	0.8	5	903712	49	2.05	30.93
225.84	25.23	Mesquite	30	45186	4	1	0.8	5	903712	49	1.58	30.8
225.95	26.37	Mesquite	30	45186	4	1	0.9	5	903712	49	0.64	31
226.06	26.71	Mesquite	30	45186	4	1	0.9	5	903712	49	0.55	31.08
226.16	26.82	Mesquite	30	45186	4	1	0.9	5	903712	49	1.4	31.02
226.27	26.35	Mesquite	30	45186	4	1	0.9	5	903712	49	6.16	30.86
226.33	25.41	Mesquite	30	45186	4	1	0.8	5	903712	49	12.58	30.29
226.42	12.85	Mesquite	30	45186	4	1	0.4	60	10844543	87	63.74	29.18
226.49	11.48	Mesquite	30	45186	4	1	0.4	60	10844543	87	110.29	30.38
226.59	13.36	Mesquite	30	45186	4	1	0.4	60	10844543	87	38.99	16.7
226.6	10.75	Mesquite	30	45186	4	1	0.4	60	10844543	87	85.73	12.08

Reaches 4 & 5 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Palo Verde	5	50.47	4	1	2.8	1	202	7	22.44	17.73
219.24	14.05	Palo Verde	5	50.47	4	1	2.8	1	202	7	22.38	18.02
219.33	14.01	Palo Verde	5	50.47	4	1	2.8	1	202	7	22.83	17.68
219.42	14.15	Palo Verde	5	50.47	4	1	2.8	1	202	7	23.23	17.63
219.52	14.28	Palo Verde	5	50.47	4	1	2.9	1	202	7	22.92	18.16
219.61	14.27	Palo Verde	5	50.47	4	1	2.9	1	202	7	24.14	18.33
219.7	14.45	Palo Verde	5	50.47	4	1	2.9	1	202	7	25.02	18.28
219.79	14.13	Palo Verde	5	50.47	4	1	2.8	1	202	7	28.36	17.19
219.89	14.33	Palo Verde	5	50.47	4	1	2.9	1	202	7	28.54	17.49
220.05	15.11	Palo Verde	5	50.47	4	1	3.0	1	202	7	25.41	16.94
220.06	15.3	Palo Verde	5	50.47	4	1	3.1	1	202	7	24.26	0
220.063	15.26	Palo Verde	5	50.47	4	1	3.1	1	202	7	24.58	17.32
220.07	15.45	Palo Verde	5	50.47	4	1	3.1	1	202	7	23.62	17.33
220.17	15.54	Palo Verde	5	50.47	4	1	3.1	1	202	7	23.73	0
220.26	15.59	Palo Verde	5	50.47	4	1	3.1	1	202	7	22.5	17.8
220.35	15.62	Palo Verde	5	50.47	4	1	3.1	1	202	7	22.59	18.28
220.45	15.97	Palo Verde	5	50.47	4	1	3.2	1	202	7	21.92	18.72
220.54	16.06	Palo Verde	5	50.47	4	1	3.2	1	202	7	20.67	19.17
220.64	16.42	Palo Verde	5	50.47	4	1	3.3	1	202	7	19.45	19.6

Reaches 4 & 5 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	14.15	Palo Verde	10	361.41	4	1	1.4	3	4337	14	22.44	17.73
219.24	14.05	Palo Verde	10	361.41	4	1	1.4	3	4337	14	22.38	18.02
219.33	14.01	Palo Verde	10	361.41	4	1	1.4	3	4337	14	22.83	17.68
219.42	14.15	Palo Verde	10	361.41	4	1	1.4	3	4337	14	23.23	17.63
219.52	14.28	Palo Verde	10	361.41	4	1	1.4	3	4337	14	22.92	18.16
219.61	14.27	Palo Verde	10	361.41	4	1	1.4	3	4337	14	24.14	18.33
219.7	14.45	Palo Verde	10	361.41	4	1	1.4	3	4337	14	25.02	18.28
219.79	14.13	Palo Verde	10	361.41	4	1	1.4	3	4337	14	28.36	17.19
219.89	14.33	Palo Verde	10	361.41	4	1	1.4	3	4337	14	28.54	17.49
220.05	15.11	Palo Verde	10	361.41	4	1	1.5	3	4337	14	25.41	16.94
220.06	15.3	Palo Verde	10	361.41	4	1	1.5	3	4337	14	24.26	0
220.063	15.26	Palo Verde	10	361.41	4	1	1.5	3	4337	14	24.58	17.32
220.07	15.45	Palo Verde	10	361.41	4	1	1.5	3	4337	14	23.62	17.33
220.17	15.54	Palo Verde	10	361.41	4	1	1.6	1	1446	11	23.73	0
220.26	15.59	Palo Verde	10	361.41	4	1	1.6	1	1446	11	22.5	17.8
220.35	15.62	Palo Verde	10	361.41	4	1	1.6	1	1446	11	22.59	18.28
220.45	15.97	Palo Verde	10	361.41	4	1	1.6	1	1446	11	21.92	18.72
220.54	16.06	Palo Verde	10	361.41	4	1	1.6	1	1446	11	20.67	19.17
220.64	16.42	Palo Verde	10	361.41	4	1	1.6	1	1446	11	19.45	19.6

Reaches 4 & 5 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	14.15	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	22.44	17.7
219.24	14.05	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	22.38	18.0
219.33	14.01	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	22.83	17.7
219.42	14.15	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	23.23	17.6
219.52	14.28	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	22.92	18.2
219.61	14.27	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	24.14	18.3
219.7	14.45	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	25.02	18.3
219.79	14.13	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	28.36	17.2
219.89	14.33	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	28.54	17.5
220.05	15.11	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	25.41	16.9
220.06	15.3	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	24.26	0.0
220.063	15.26	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	24.58	17.3
220.07	15.45	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	23.62	17.3
220.17	15.54	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	23.73	0.0
220.26	15.59	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	22.5	17.8
220.35	15.62	Palo Verde	15	2588.21	4	1	1.0	3	31059	22	22.59	18.3
220.45	15.97	Palo Verde	15	2588.21	4	1	1.1	3	31059	22	21.92	18.7
220.54	16.06	Palo Verde	15	2588.21	4	1	1.1	3	31059	22	20.67	19.2
220.64	16.42	Palo Verde	15	2588.21	4	1	1.1	3	31059	22	19.45	19.6

Reaches 4 & 5 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	14.15	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	22.44	17.7
219.24	14.05	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	22.38	18.0
219.33	14.01	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	22.83	17.7
219.42	14.15	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	23.23	17.6
219.52	14.28	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	22.92	18.2
219.61	14.27	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	24.14	18.3
219.7	14.45	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	25.02	18.3
219.79	14.13	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	28.36	17.2
219.89	14.33	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	28.54	17.5
220.05	15.11	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	25.41	16.9
220.06	15.3	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	24.26	0.0
220.063	15.26	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	24.58	17.3
220.07	15.45	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	23.62	17.3
220.17	15.54	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	23.73	0.0
220.26	15.59	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	22.5	17.8
220.35	15.62	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	22.59	18.3
220.45	15.97	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	21.92	18.7
220.54	16.06	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	20.67	19.2
220.64	16.42	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	19.45	19.6

Reach 9 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg heigth (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	13.7	Palo Verde	5	50.47	1	1	2.7	1	50	5	23.41	23.35
223.2	16.4	Palo Verde	5	50.47	1	1	3.3	1	50	5	17.23	24.43
223.3	15.65	Palo Verde	5	50.47	1	1	3.1	1	50	5	29.46	31.37
223.39	16.06	Palo Verde	5	50.47	1	1	3.2	1	50	5	31.15	34.02
223.49	16.59	Palo Verde	5	50.47	1	1	3.3	1	50	5	29.73	29.5
223.58	15.84	Palo Verde	5	50.47	1	1	3.2	1	50	5	44.65	34.79
223.68	17.59	Palo Verde	5	50.47	1	1	3.5	1	50	5	27.95	33.95
223.77	20.05	Palo Verde	5	50.47	1	1	4.0	1	50	5	19.28	32.36
223.87	21.67	Palo Verde	5	50.47	1	1	4.3	1	50	5	9.4	34.78
223.95	27.58	Palo Verde	5	50.47	1	1	5.5	1	50	5	5.63	32.79
224.03	26.63	Palo Verde	5	50.47	1	1	5.3	1	50	5	15.68	29.53
224.13	16.68	Palo Verde	5	50.47	1	1	3.3	1	50	5	32.88	29.89
224.15	18.68	Palo Verde	5	50.47	1	1	3.7	1	50	5	26.57	31.69
223.1	13.7	Palo Verde	10	361.41	1	1	1.4	3	1084	10	23.41	23.35
223.2	16.4	Palo Verde	10	361.41	1	1	1.6	1	361	8	17.23	24.43
223.3	15.65	Palo Verde	10	361.41	1	1	1.6	1	361	8	29.46	31.37
223.39	16.06	Palo Verde	10	361.41	1	1	1.6	1	361	8	31.15	34.02
223.49	16.59	Palo Verde	10	361.41	1	1	1.7	1	361	8	29.73	29.5
223.58	15.84	Palo Verde	10	361.41	1	1	1.6	1	361	8	44.65	34.79
223.68	17.59	Palo Verde	10	361.41	1	1	1.8	1	361	8	27.95	33.95
223.77	20.05	Palo Verde	10	361.41	1	1	2.0	1	361	8	19.28	32.36
223.87	21.67	Palo Verde	10	361.41	1	1	2.2	1	361	8	9.4	34.78
223.95	27.58	Palo Verde	10	361.41	1	1	2.8	1	361	8	5.63	32.79
224.03	26.63	Palo Verde	10	361.41	1	1	2.7	1	361	8	15.68	29.53
224.13	16.68	Palo Verde	10	361.41	1	1	1.7	1	361	8	32.88	29.89
224.15	18.68	Palo Verde	10	361.41	1	1	1.9	1	361	8	26.57	31.69

Reach 9 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg heigth (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	13.7	Palo Verde	15	2588.21	1	1	0.9	3	7765	16	23.41	23.35
223.2	16.4	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	17.23	24.43
223.3	15.65	Palo Verde	15	2588.21	1	1	1.0	3	7765	16	29.46	31.37
223.39	16.06	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	31.15	34.02
223.49	16.59	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	29.73	29.50
223.58	15.84	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	44.65	34.79
223.68	17.59	Palo Verde	15	2588.21	1	1	1.2	3	7765	16	27.95	33.95
223.77	20.05	Palo Verde	15	2588.21	1	1	1.3	3	7765	16	19.28	32.36
223.87	21.67	Palo Verde	15	2588.21	1	1	1.4	3	7765	16	9.4	34.78
223.95	27.58	Palo Verde	15	2588.21	1	1	1.8	1	2588	13	5.63	32.79
224.03	26.63	Palo Verde	15	2588.21	1	1	1.8	1	2588	13	15.68	29.53
224.13	16.68	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	32.88	29.89
224.15	18.68	Palo Verde	15	2588.21	1	1	1.2	3	7765	16	26.57	31.69
223.1	13.7	Palo Verde	20	18535.32	1	1	0.7	5	92677	29	23.41	23.35
223.3	16.4	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	17.23	24.43
223.39	15.65	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	29.46	31.37
223.49	16.06	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	31.15	34.02
223.58	16.59	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	29.73	29.5
223.68	15.84	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	44.65	34.79
223.77	17.59	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	27.95	33.95
223.87	20.05	Palo Verde	20	18535.32	1	1	1.0	5	92677	29	19.28	32.36
223.95	21.67	Palo Verde	20	18535.32	1	1	1.1	3	55606	26	9.4	34.78
224.03	27.58	Palo Verde	20	18535.32	1	1	1.4	3	55606	26	5.63	32.79
224.13	26.63	Palo Verde	20	18535.32	1	1	1.3	3	55606	26	15.68	29.53
224.15	16.68	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	32.88	29.89
224.17	18.68	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	26.57	31.69

Reach 9 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg heigth (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	13.7	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	23.41	23.35
223.3	16.4	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	17.23	24.43
223.39	15.65	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	29.46	31.37
223.49	16.06	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	31.15	34.02
223.58	16.59	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	29.73	29.5
223.68	15.84	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	44.65	34.79
223.77	17.59	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	27.95	33.95
223.87	20.05	Palo Verde	30	950604.79	1	1	0.7	20	19012096	99	19.28	32.36
223.95	21.67	Palo Verde	30	950604.79	1	1	0.7	20	19012096	99	9.4	34.78
224.03	27.58	Palo Verde	30	950604.79	1	1	0.9	5	4753024	72	5.63	32.79
224.13	26.63	Palo Verde	30	950604.79	1	1	0.9	5	4753024	72	15.68	29.53
224.15	16.68	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	32.88	29.89
224.17	18.68	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	26.57	31.69

Reach 10 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.68	Palo Verde	5	50.47	4	1	3.3	1	202	7	32.88	29.53
224.15	18.68	Palo Verde	5	50.47	4	1	3.7	1	202	7	26.57	29.89
224.17	25.71	Palo Verde	5	50.47	4	1	5.1	1	202	7	20.02	31.69
224.21	26	Palo Verde	5	50.47	4	1	5.2	1	202	7	18.53	31.09
224.22	18.4	Palo Verde	5	50.47	4	1	3.7	1	202	7	23.56	31.01
224.23	18.65	Palo Verde	5	50.47	4	1	3.7	1	202	7	23.69	31.3
224.33	26.07	Palo Verde	5	50.47	4	1	5.2	1	202	7	7.11	30.96
224.44	26.31	Palo Verde	5	50.47	4	1	5.3	1	202	7	5.27	30.41
224.54	26.57	Palo Verde	5	50.47	4	1	5.3	1	202	7	6.79	30.55
224.64	27.34	Palo Verde	5	50.47	4	1	5.5	1	202	7	2.95	38.34
224.73	26.55	Palo Verde	5	50.47	4	1	5.3	1	202	7	4.45	30.98
224.84	25.62	Palo Verde	5	50.47	4	1	5.1	1	202	7	2.22	30.57
224.93	25.46	Palo Verde	5	50.47	4	1	5.1	1	202	7	1.91	30.67
225.02	24.13	Palo Verde	5	50.47	4	1	4.8	1	202	7	2.08	29.91
225.08	24.25	Palo Verde	5	50.47	4	1	4.9	1	202	7	2.02	30.02
225.13	25.09	Palo Verde	5	50.47	4	1	5.0	1	202	7	1.75	31.92
225.22	25.25	Palo Verde	5	50.47	4	1	5.1	1	202	7	5.86	29.97
225.31	24.56	Palo Verde	5	50.47	4	1	4.9	1	202	7	1.83	29.78
225.4	24.65	Palo Verde	5	50.47	4	1	4.9	1	202	7	1.71	30.71
225.47	24.93	Palo Verde	5	50.47	4	1	5.0	1	202	7	1.48	30.82
225.57	25.44	Palo Verde	5	50.47	4	1	5.1	1	202	7	1.38	30.14
225.66	26.16	Palo Verde	5	50.47	4	1	5.2	1	202	7	1.35	31.36
225.76	25.09	Palo Verde	5	50.47	4	1	5.0	1	202	7	2.05	30.93
225.84	25.23	Palo Verde	5	50.47	4	1	5.0	1	202	7	1.58	30.8
225.95	26.37	Palo Verde	5	50.47	4	1	5.3	1	202	7	0.64	31
226.06	26.71	Palo Verde	5	50.47	4	1	5.3	1	202	7	0.55	31.08
226.16	26.82	Palo Verde	5	50.47	4	1	5.4	1	202	7	1.4	31.02
226.27	26.35	Palo Verde	5	50.47	4	1	5.3	1	202	7	6.16	30.86
226.33	25.41	Palo Verde	5	50.47	4	1	5.1	1	202	7	12.58	30.29
226.42	12.85	Palo Verde	5	50.47	4	1	2.6	1	202	7	63.74	29.18
226.49	11.48	Palo Verde	5	50.47	4	1	2.3	1	202	7	110.29	30.38
226.59	13.36	Palo Verde	5	50.47	4	1	2.7	1	202	7	38.99	16.7
226.6	10.75	Palo Verde	5	50.47	4	1	2.2	1	202	7	85.73	12.08

Reach 10 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.68	Palo Verde	10	361.41	4	1	1.7	1	1446	11	32.88	29.53
224.15	18.68	Palo Verde	10	361.41	4	1	1.9	1	1446	11	26.57	29.89
224.17	25.71	Palo Verde	10	361.41	4	1	2.6	1	1446	11	20.02	31.69
224.21	26	Palo Verde	10	361.41	4	1	2.6	1	1446	11	18.53	31.09
224.22	18.4	Palo Verde	10	361.41	4	1	1.8	1	1446	11	23.56	31.01
224.23	18.65	Palo Verde	10	361.41	4	1	1.9	1	1446	11	23.69	31.3
224.33	26.07	Palo Verde	10	361.41	4	1	2.6	1	1446	11	7.11	30.96
224.44	26.31	Palo Verde	10	361.41	4	1	2.6	1	1446	11	5.27	30.41
224.54	26.57	Palo Verde	10	361.41	4	1	2.7	1	1446	11	6.79	30.55
224.64	27.34	Palo Verde	10	361.41	4	1	2.7	1	1446	11	2.95	38.34
224.73	26.55	Palo Verde	10	361.41	4	1	2.7	1	1446	11	4.45	30.98
224.84	25.62	Palo Verde	10	361.41	4	1	2.6	1	1446	11	2.22	30.57
224.93	25.46	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.91	30.67
225.02	24.13	Palo Verde	10	361.41	4	1	2.4	1	1446	11	2.08	29.91
225.08	24.25	Palo Verde	10	361.41	4	1	2.4	1	1446	11	2.02	30.02
225.13	25.09	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.75	31.92
225.22	25.25	Palo Verde	10	361.41	4	1	2.5	1	1446	11	5.86	29.97
225.31	24.56	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.83	29.78
225.4	24.65	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.71	30.71
225.47	24.93	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.48	30.82
225.57	25.44	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.38	30.14
225.66	26.16	Palo Verde	10	361.41	4	1	2.6	1	1446	11	1.35	31.36
225.76	25.09	Palo Verde	10	361.41	4	1	2.5	1	1446	11	2.05	30.93
225.84	25.23	Palo Verde	10	361.41	4	1	2.5	1	1446	11	1.58	30.8
225.95	26.37	Palo Verde	10	361.41	4	1	2.6	1	1446	11	0.64	31
226.06	26.71	Palo Verde	10	361.41	4	1	2.7	1	1446	11	0.55	31.08
226.16	26.82	Palo Verde	10	361.41	4	1	2.7	1	1446	11	1.4	31.02
226.27	26.35	Palo Verde	10	361.41	4	1	2.6	1	1446	11	6.16	30.86
226.33	25.41	Palo Verde	10	361.41	4	1	2.5	1	1446	11	12.58	30.29
226.42	12.85	Palo Verde	10	361.41	4	1	1.3	1	1446	11	63.74	29.18
226.49	11.48	Palo Verde	10	361.41	4	1	1.1	3	4337	14	110.29	30.38
226.59	13.36	Palo Verde	10	361.41	4	1	1.3	3	4337	14	38.99	16.7
226.6	10.75	Palo Verde	10	361.41	4	1	1.1	3	4337	14	85.73	12.08

Reach 10 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.68	Palo Verde	15	2588.21	4	1	1.1	1	10353	17	32.88	29.53
224.15	18.68	Palo Verde	15	2588.21	4	1	1.2	1	10353	17	26.57	29.89
224.17	25.71	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	20.02	31.69
224.21	26	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	18.53	31.09
224.22	18.4	Palo Verde	15	2588.21	4	1	1.2	1	10353	17	23.56	31.01
224.23	18.65	Palo Verde	15	2588.21	4	1	1.2	1	10353	17	23.69	31.3
224.33	26.07	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	7.11	30.96
224.44	26.31	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	5.27	30.41
224.54	26.57	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	6.79	30.55
224.64	27.34	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	2.95	38.34
224.73	26.55	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	4.45	30.98
224.84	25.62	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	2.22	30.57
224.93	25.46	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.91	30.67
225.02	24.13	Palo Verde	15	2588.21	4	1	1.6	1	10353	17	2.08	29.91
225.08	24.25	Palo Verde	15	2588.21	4	1	1.6	1	10353	17	2.02	30.02
225.13	25.09	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.75	31.92
225.22	25.25	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	5.86	29.97
225.31	24.56	Palo Verde	15	2588.21	4	1	1.6	1	10353	17	1.83	29.78
225.4	24.65	Palo Verde	15	2588.21	4	1	1.6	1	10353	17	1.71	30.71
225.47	24.93	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.48	30.82
225.57	25.44	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.38	30.14
225.66	26.16	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.35	31.36
225.76	25.09	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	2.05	30.93
225.84	25.23	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	1.58	30.8
225.95	26.37	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	0.64	31
226.06	26.71	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	0.55	31.08
226.16	26.82	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	1.4	31.02
226.27	26.35	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	6.16	30.86
226.33	25.41	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	12.58	30.29
226.42	12.85	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	63.74	29.18
226.49	11.48	Palo Verde	15	2588.21	4	1	0.8	5	51764	25	110.29	30.38
226.59	13.36	Palo Verde	15	2588.21	4	1	0.9	5	51764	25	38.99	16.7
226.6	10.75	Palo Verde	15	2588.21	4	1	0.7	5	51764	25	85.73	12.08

Reach 10 – Palo Verde Susceptibility Index – Existing Conditions

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.68	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	32.88	29.53
224.15	18.68	Palo Verde	20	18535.32	4	1	0.9	5	370706	40	26.57	29.89
224.17	25.71	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	20.02	31.69
224.21	26	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	18.53	31.09
224.22	18.4	Palo Verde	20	18535.32	4	1	0.9	5	370706	40	23.56	31.01
224.23	18.65	Palo Verde	20	18535.32	4	1	0.9	6	444848	41	23.69	31.3
224.33	26.07	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	7.11	30.96
224.44	26.31	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	5.27	30.41
224.54	26.57	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	6.79	30.55
224.64	27.34	Palo Verde	20	18535.32	4	1	1.4	3	222424	35	2.95	38.34
224.73	26.55	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	4.45	30.98
224.84	25.62	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	2.22	30.57
224.93	25.46	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.91	30.67
225.02	24.13	Palo Verde	20	18535.32	4	1	1.2	3	222424	35	2.08	29.91
225.08	24.25	Palo Verde	20	18535.32	4	1	1.2	3	222424	35	2.02	30.02
225.13	25.09	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.75	31.92
225.22	25.25	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	5.86	29.97
225.31	24.56	Palo Verde	20	18535.32	4	1	1.2	3	222424	35	1.83	29.78
225.4	24.65	Palo Verde	20	18535.32	4	1	1.2	3	222424	35	1.71	30.71
225.47	24.93	Palo Verde	20	18535.32	4	1	1.2	3	222424	35	1.48	30.82
225.57	25.44	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.38	30.14
225.66	26.16	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.35	31.36
225.76	25.09	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	2.05	30.93
225.84	25.23	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.58	30.8
225.95	26.37	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	0.64	31
226.06	26.71	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	0.55	31.08
226.16	26.82	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	1.4	31.02
226.27	26.35	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	6.16	30.86
226.33	25.41	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	12.58	30.29
226.42	12.85	Palo Verde	20	18535.32	4	1	0.6	20	1482825	55	63.74	29.18
226.49	11.48	Palo Verde	20	18535.32	4	1	0.6	20	1482825	55	110.29	30.38
226.59	13.36	Palo Verde	20	18535.32	4	1	0.7	5	370706	40	38.99	16.7
226.6	10.75	Palo Verde	20	18535.32	4	1	0.5	20	1482825	55	85.73	12.08

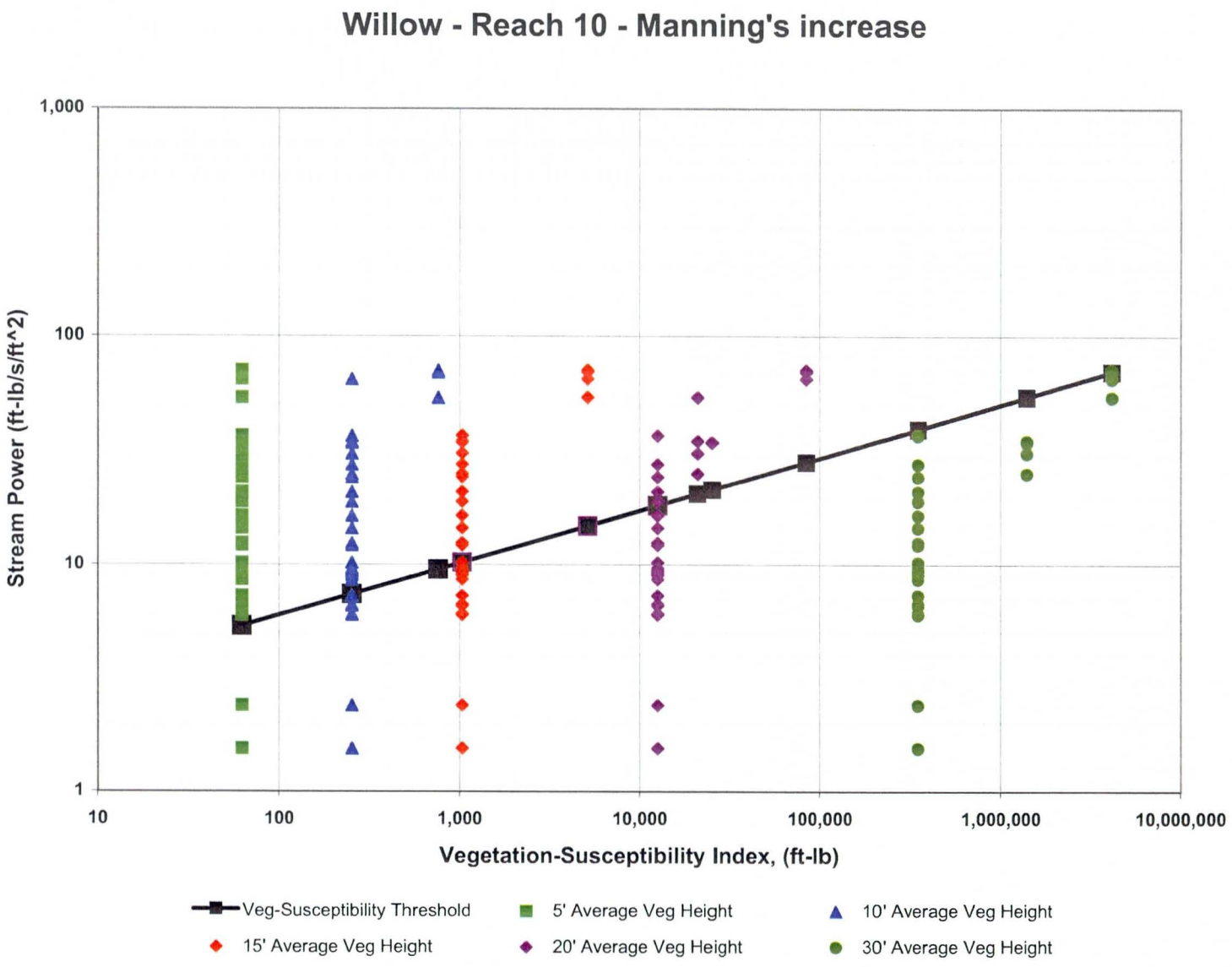
Reach 10 – Palo Verde Susceptibility Index – Existing Conditions

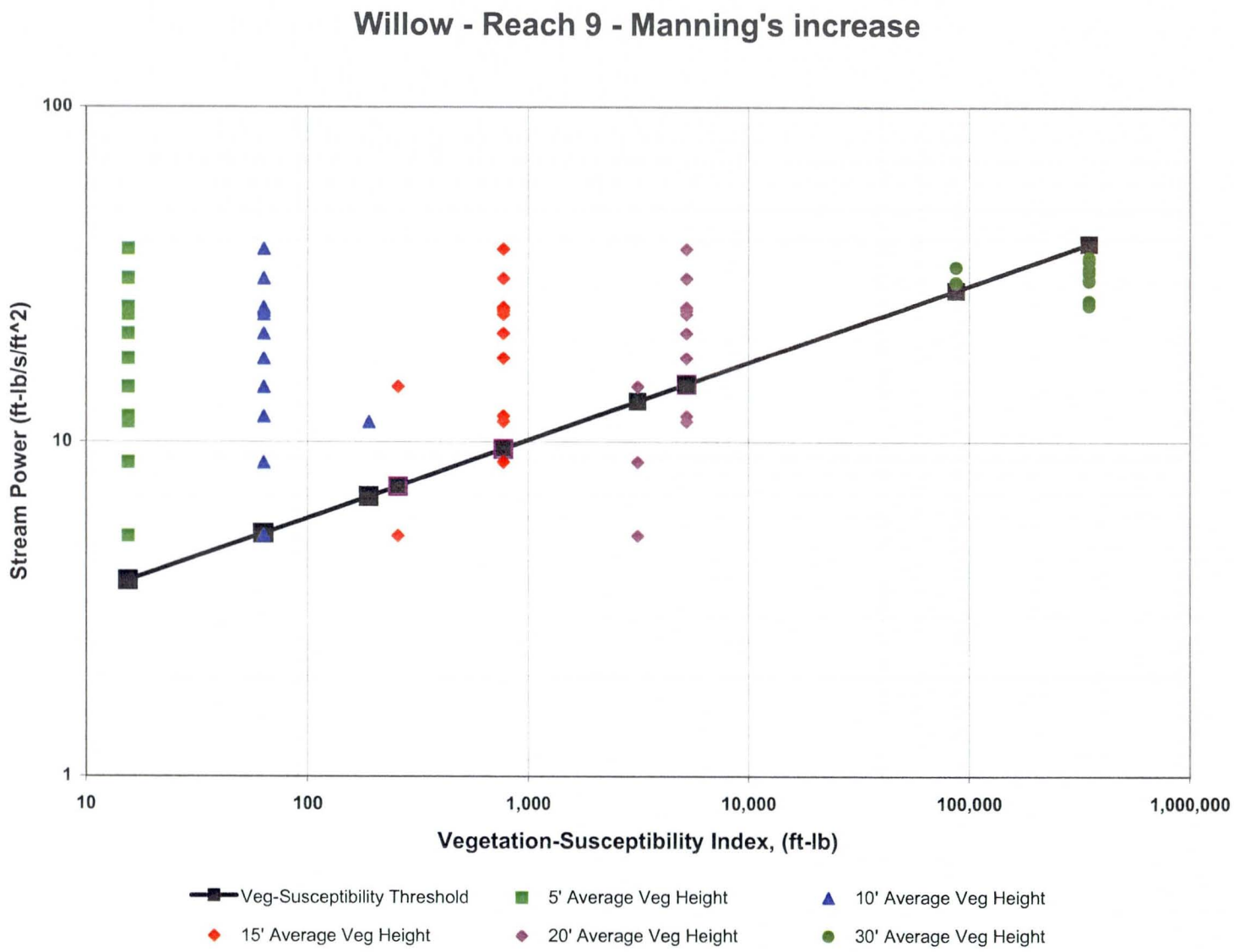
$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

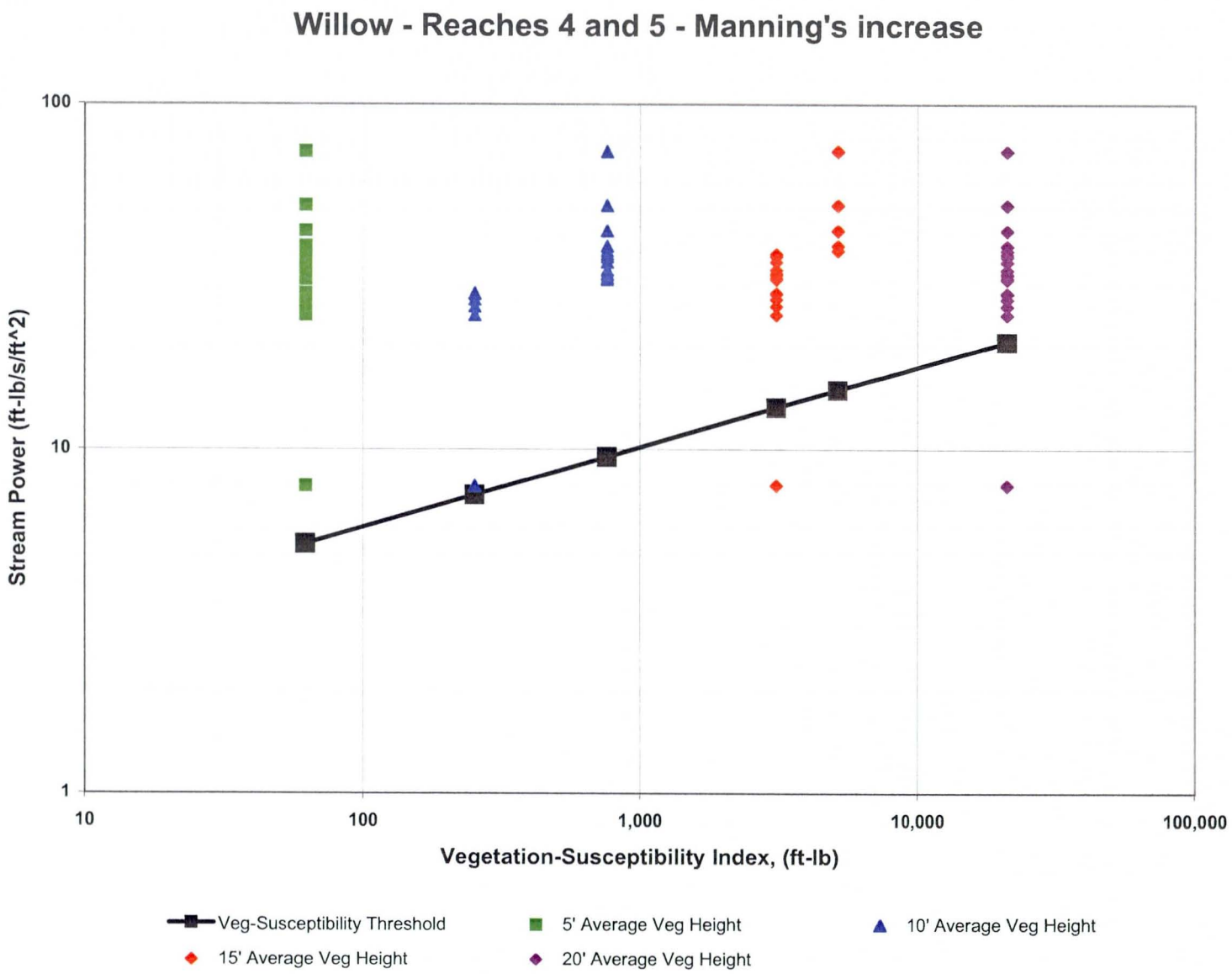
Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.68	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	32.88	29.53
224.15	18.68	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	26.57	29.89
224.17	25.71	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	20.02	31.69
224.21	26	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	18.53	31.09
224.22	18.4	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	23.56	31.01
224.23	18.65	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	23.69	31.3
224.33	26.07	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	7.11	30.96
224.44	26.31	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	5.27	30.41
224.54	26.57	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	6.79	30.55
224.64	27.34	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	2.95	38.34
224.73	26.55	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	4.45	30.98
224.84	25.62	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	2.22	30.57
224.93	25.46	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.91	30.67
225.02	24.13	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	2.08	29.91
225.08	24.25	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	2.02	30.02
225.13	25.09	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.75	31.92
225.22	25.25	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	5.86	29.97
225.31	24.56	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.83	29.78
225.4	24.65	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.71	30.71
225.47	24.93	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.48	30.82
225.57	25.44	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.38	30.14
225.66	26.16	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	1.35	31.36
225.76	25.09	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	2.05	30.93
225.84	25.23	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	1.58	30.8
225.95	26.37	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	0.64	31
226.06	26.71	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	0.55	31.08
226.16	26.82	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	1.4	31.02
226.27	26.35	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	6.16	30.86
226.33	25.41	Palo Verde	30	950604.79	4	1	0.8	5	19012096	99	12.58	30.29
226.42	12.85	Palo Verde	30	950604.79	4	1	0.4	60	228145150	175	63.74	29.18
226.49	11.48	Palo Verde	30	950604.79	4	1	0.4	60	228145150	175	110.29	30.38
226.59	13.36	Palo Verde	30	950604.79	4	1	0.4	60	228145150	175	38.99	16.7
226.6	10.75	Palo Verde	30	950604.79	4	1	0.4	60	228145150	175	85.73	12.08

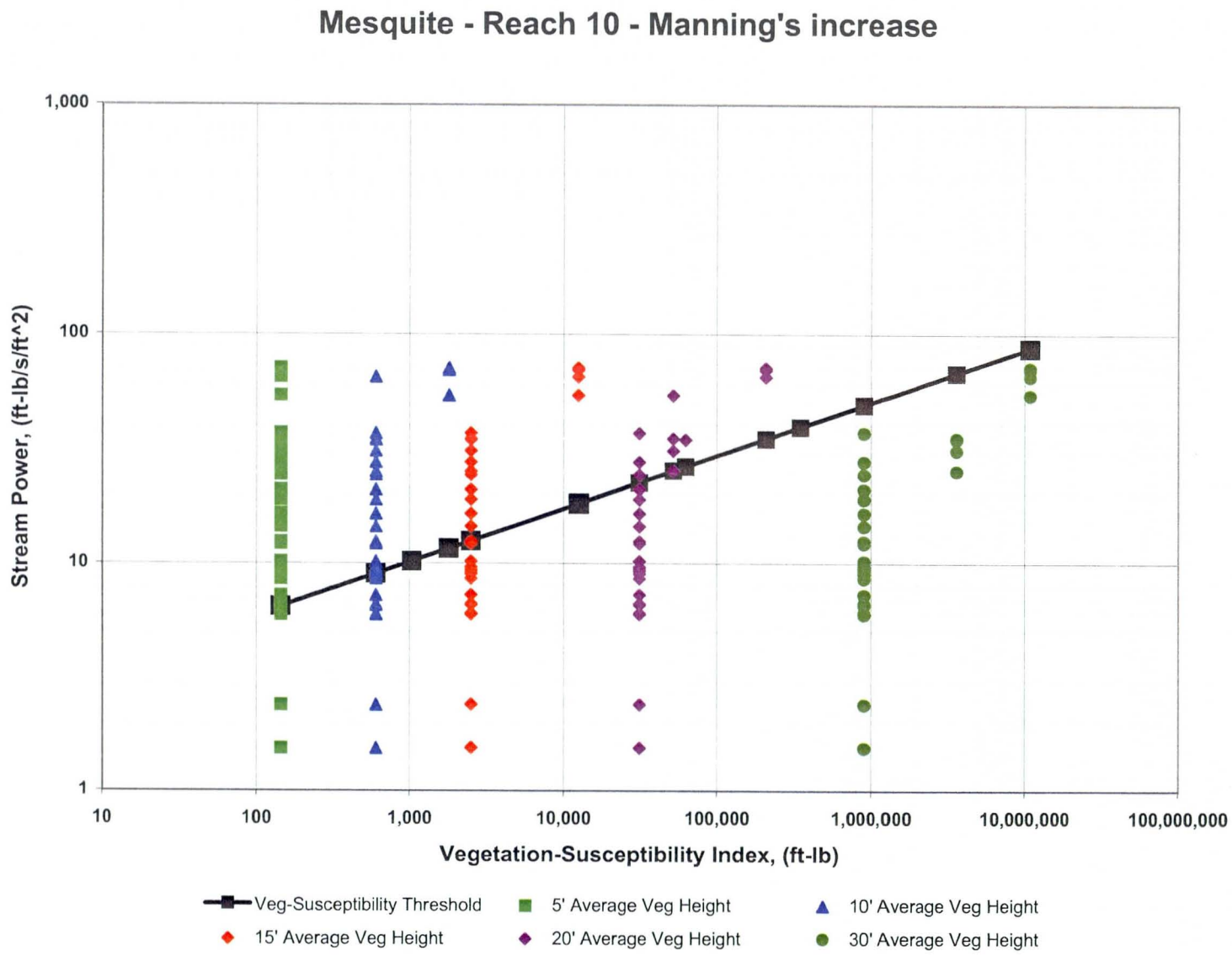
ATTACHMENT 4

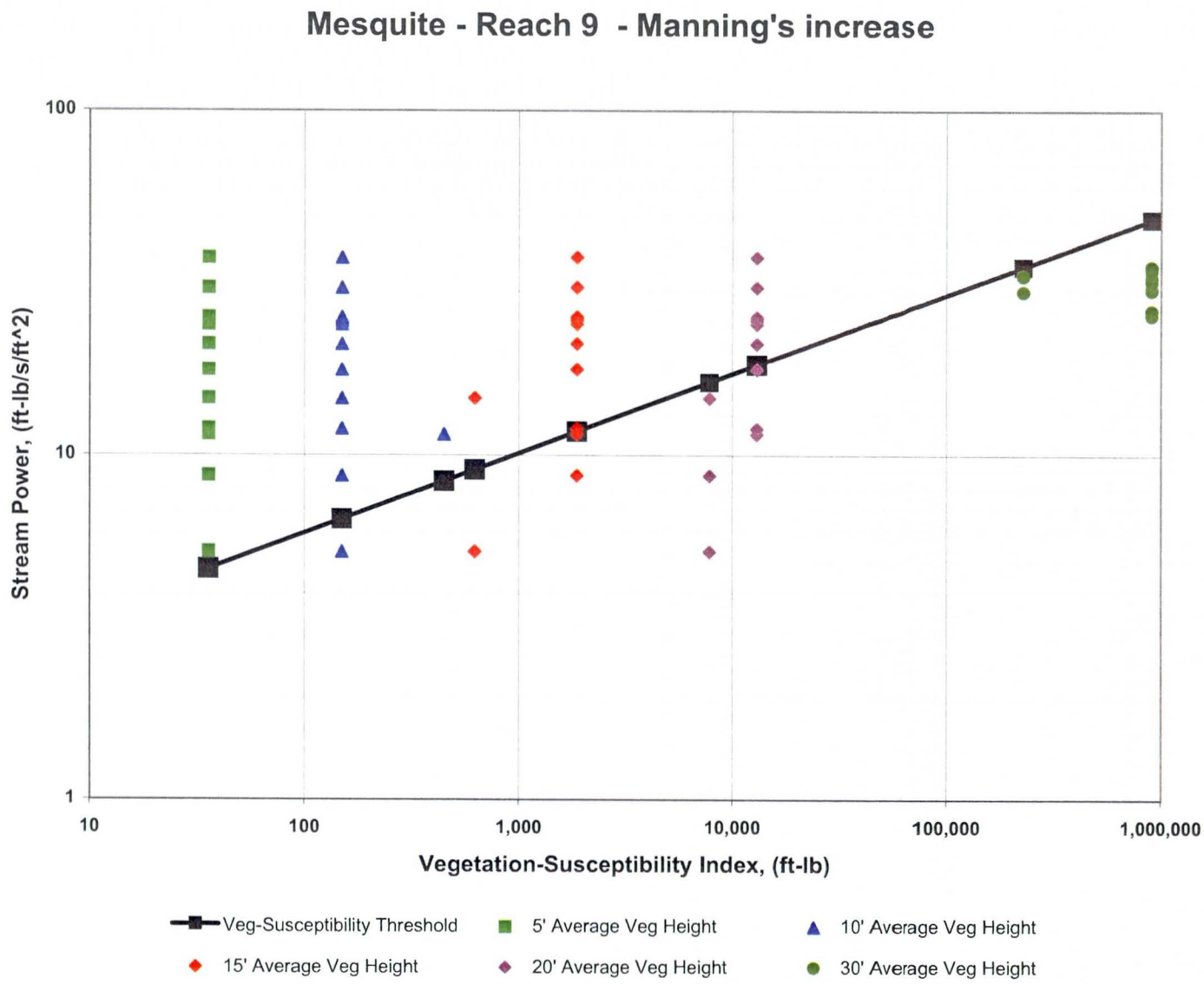
Vegetation-Susceptibility Plots
Manning's Roughness Coefficient Increased

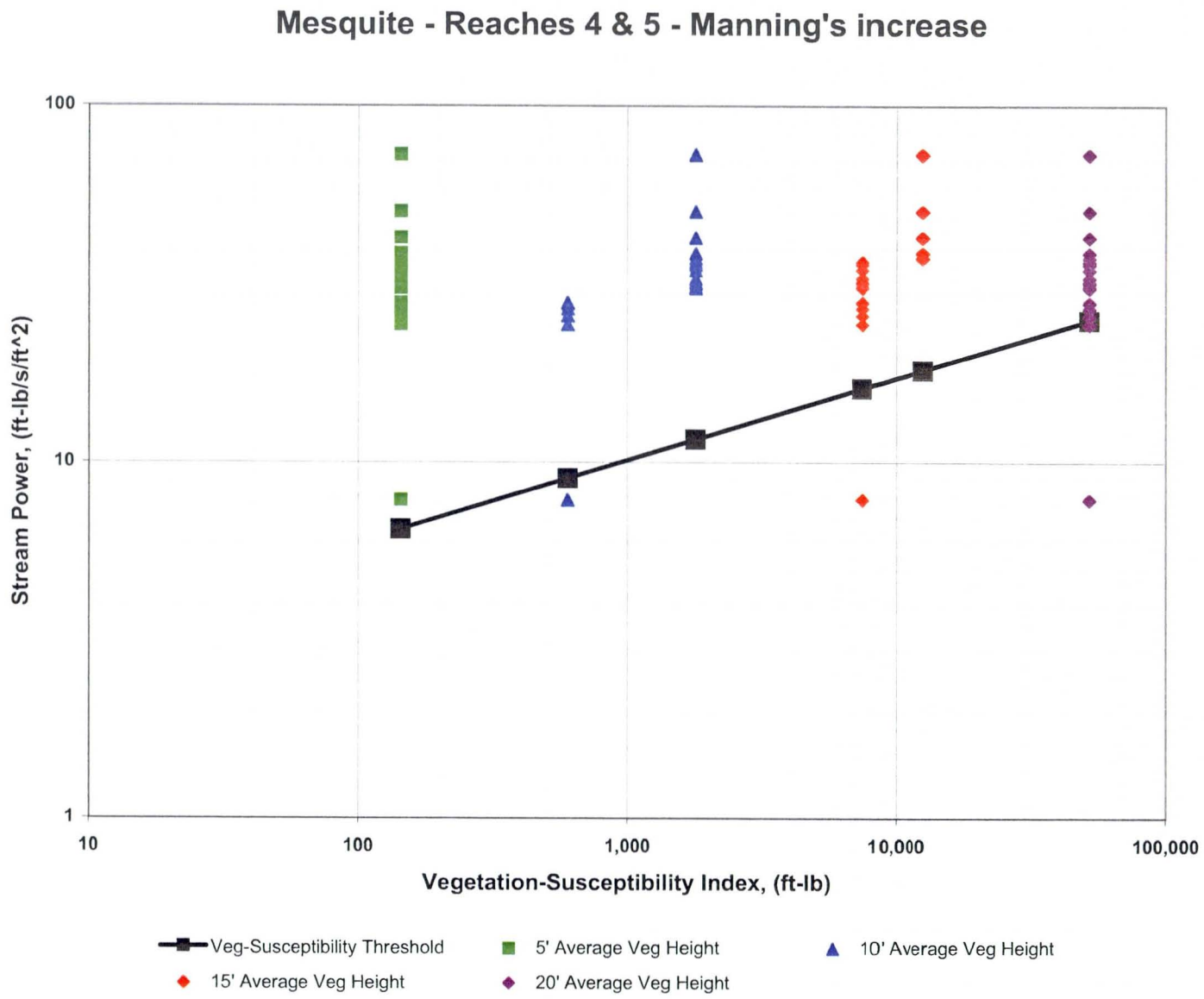

Willow - Reach 10 - Manning's increase
Stream Power (ft-lb/s/ft^2)
1,000
100
10
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height

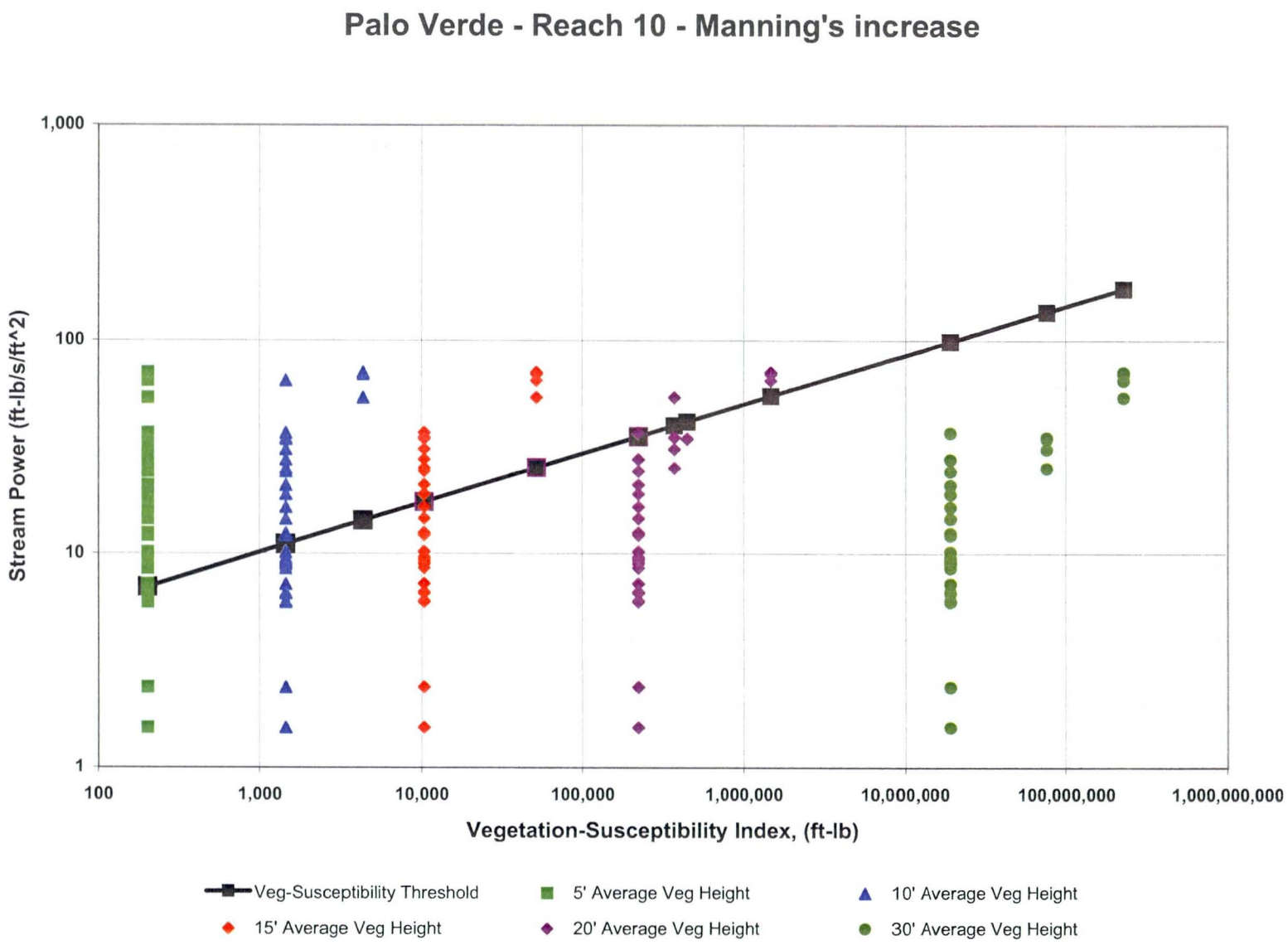

Willow - Reach 9 - Manning's increase
Stream Power (ft-lb/s/ft^2)
100
10
1
10
100
1,000
10,000
100,000
1,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height

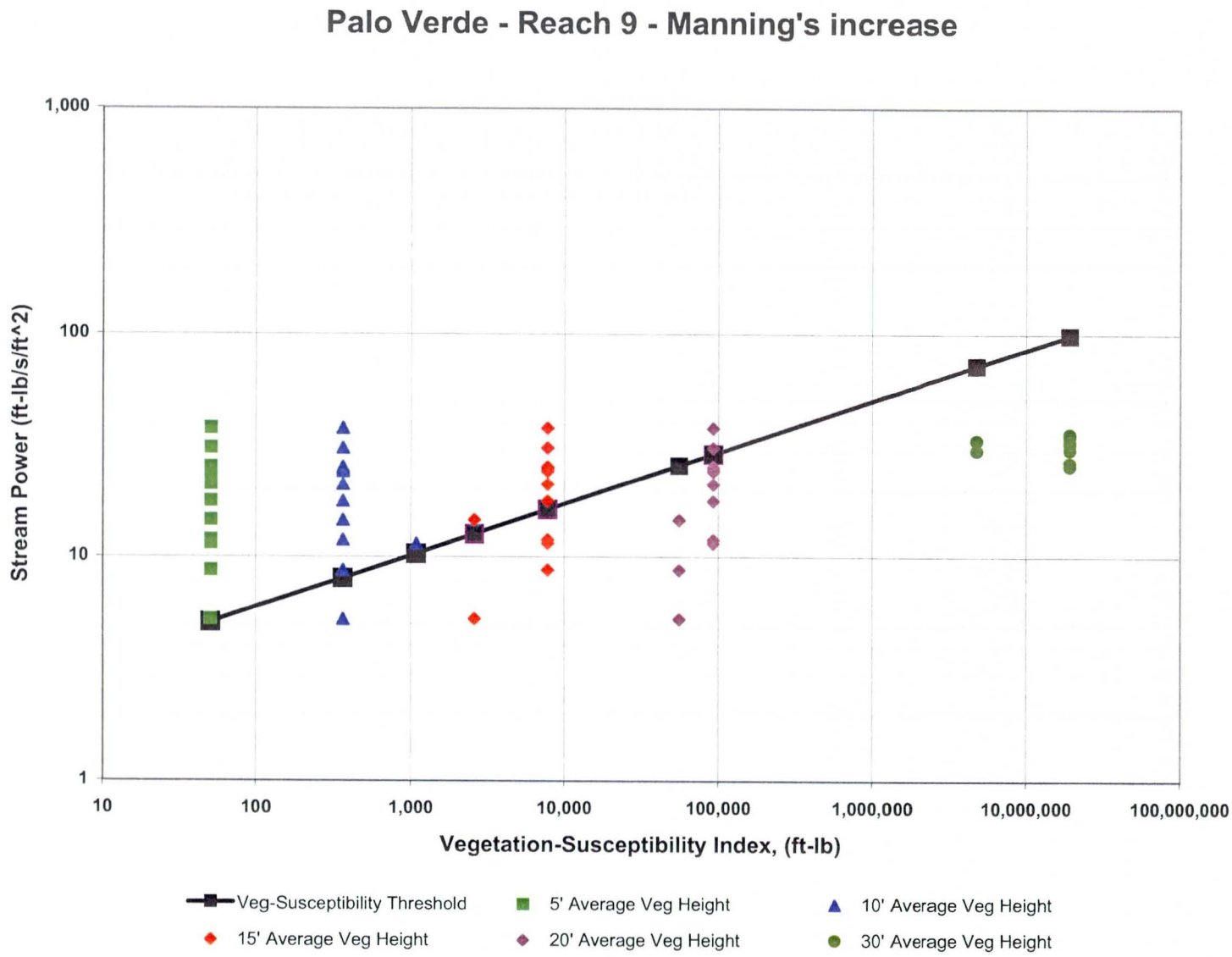

Willow - Reaches 4 and 5 - Manning's increase
100
10
1
Stream Power (ft-lb/s/ft^2)
10
100
1,000
10,000
100,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height

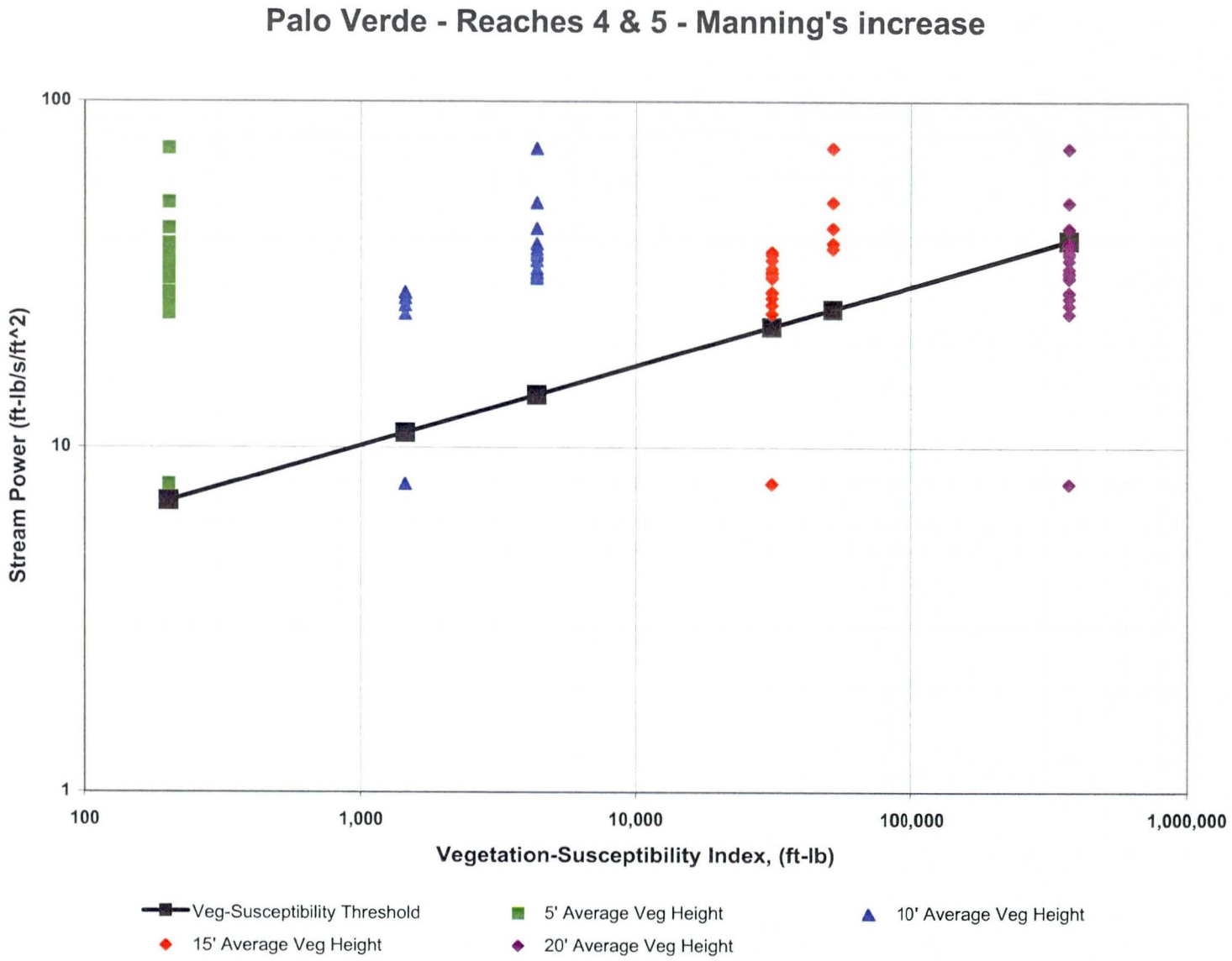

Mesquite - Reach 10 - Manning's increase
Stream Power, (ft-lb/s/ft^2)
1,000
100
10
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000
100,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height


Mesquite - Reach 9 - Manning's increase
Stream Power, (ft-lb/s/ft^2)
100
10
1
10
100
1,000
10,000
100,000
1,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height


Mesquite - Reaches 4 & 5 - Manning's increase
100
10
1
Stream Power, (ft-lb/s/ft^2)
10
100
1,000
10,000
100,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height


Palo Verde - Reach 10 - Manning's increase
Stream Power (ft-lb/s/ft^2)
1,000
100
10
1
100
1,000
10,000
100,000
1,000,000
10,000,000
100,000,000
1,000,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height


Palo Verde - Reach 9 - Manning's increase
Stream Power (ft-lb/s/ft^2)
1,000
100
10
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000
100,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height
30' Average Veg Height


Palo Verde - Reaches 4 & 5 - Manning's increase
Stream Power (ft-lb/s/ft^2)
100
10
1
100
1,000
10,000
100,000
1,000,000
Vegetation-Susceptibility Index, (ft-lb)
Veg-Susceptibility Threshold
5' Average Veg Height
10' Average Veg Height
15' Average Veg Height
20' Average Veg Height

ATTACHMENT 5

Vegetation-Susceptibility Tabular Data
Manning's Roughness Coefficient Increased

Reaches 4 & 5 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Willow	5	15.52	4	1	4.0	1	62	5	73.39	24.4
219.24	22.11	Willow	5	15.52	4	1	4.4	1	62	5	51.11	26.93
219.33	23.32	Willow	5	15.52	4	1	4.7	1	62	5	43.03	27.9
219.42	24.48	Willow	5	15.52	4	1	4.9	1	62	5	38.88	28.8
219.52	25.19	Willow	5	15.52	4	1	5.0	1	62	5	34.88	30.11
219.61	25.77	Willow	5	15.52	4	1	5.2	1	62	5	31.35	30.91
219.7	25.48	Willow	5	15.52	4	1	5.1	1	62	5	36.15	30.45
219.79	25.92	Willow	5	15.52	4	1	5.2	1	62	5	37.64	30.04
219.89	26.4	Willow	5	15.52	4	1	5.3	1	62	5	36.77	30.83
220.05	27.7	Willow	5	15.52	4	1	5.5	1	62	5	33.07	30.89
220.06	28.3	Willow	5	15.52	4	1	5.7	1	62	5	32.03	0
220.063	28.24	Willow	5	15.52	4	1	5.6	1	62	5	32.25	31.37
220.07	28.49	Willow	5	15.52	4	1	5.7	1	62	5	31.06	31.4
220.17	27.21	Willow	5	15.52	4	1	5.4	1	62	5	7.83	0
220.26	28.09	Willow	5	15.52	4	1	5.6	1	62	5	28.28	31.99
220.35	28.17	Willow	5	15.52	4	1	5.6	1	62	5	28.18	32.72
220.45	28.8	Willow	5	15.52	4	1	5.8	1	62	5	27.2	32.71
220.54	29.18	Willow	5	15.52	4	1	5.8	1	62	5	25.95	33.54
220.64	29.74	Willow	5	15.52	4	1	5.9	1	62	5	24.52	34.3

Reaches 4 & 5 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Willow	10	63.24	4	1	2.0	3	759	10	73.39	24.4
219.24	22.11	Willow	10	63.24	4	1	2.2	3	759	10	51.11	26.93
219.33	23.32	Willow	10	63.24	4	1	2.3	3	759	10	43.03	27.9
219.42	24.48	Willow	10	63.24	4	1	2.4	3	759	10	38.88	28.8
219.52	25.19	Willow	10	63.24	4	1	2.5	3	759	10	34.88	30.11
219.61	25.77	Willow	10	63.24	4	1	2.6	3	759	10	31.35	30.91
219.7	25.48	Willow	10	63.24	4	1	2.5	3	759	10	36.15	30.45
219.79	25.92	Willow	10	63.24	4	1	2.6	3	759	10	37.64	30.04
219.89	26.4	Willow	10	63.24	4	1	2.6	3	759	10	36.77	30.83
220.05	27.7	Willow	10	63.24	4	1	2.8	3	759	10	33.07	30.89
220.06	28.3	Willow	10	63.24	4	1	2.8	3	759	10	32.03	0
220.063	28.24	Willow	10	63.24	4	1	2.8	3	759	10	32.25	31.37
220.07	28.49	Willow	10	63.24	4	1	2.8	3	759	10	31.06	31.4
220.17	27.21	Willow	10	63.24	4	1	2.7	1	253	7	7.83	0
220.26	28.09	Willow	10	63.24	4	1	2.8	1	253	7	28.28	31.99
220.35	28.17	Willow	10	63.24	4	1	2.8	1	253	7	28.18	32.72
220.45	28.8	Willow	10	63.24	4	1	2.9	1	253	7	27.2	32.71
220.54	29.18	Willow	10	63.24	4	1	2.9	1	253	7	25.95	33.54
220.64	29.74	Willow	10	63.24	4	1	3.0	1	253	7	24.52	34.3

Reaches 4 & 5 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Willow	15	257.63	4	1	1.3	5	5153	15	73.39	24.4
219.24	22.11	Willow	15	257.63	4	1	1.5	5	5153	15	51.11	26.9
219.33	23.32	Willow	15	257.63	4	1	1.6	5	5153	15	43.03	27.9
219.42	24.48	Willow	15	257.63	4	1	1.6	5	5153	15	38.88	28.8
219.52	25.19	Willow	15	257.63	4	1	1.7	3	3092	13	34.88	30.1
219.61	25.77	Willow	15	257.63	4	1	1.7	3	3092	13	31.35	30.9
219.7	25.48	Willow	15	257.63	4	1	1.7	3	3092	13	36.15	30.5
219.79	25.92	Willow	15	257.63	4	1	1.7	5	5153	15	37.64	30.0
219.89	26.4	Willow	15	257.63	4	1	1.8	3	3092	13	36.77	30.8
220.05	27.7	Willow	15	257.63	4	1	1.8	3	3092	13	33.07	30.9
220.06	28.3	Willow	15	257.63	4	1	1.9	3	3092	13	32.03	0.0
220.063	28.24	Willow	15	257.63	4	1	1.9	3	3092	13	32.25	31.4
220.07	28.49	Willow	15	257.63	4	1	1.9	3	3092	13	31.06	31.4
220.17	27.21	Willow	15	257.63	4	1	1.8	3	3092	13	7.83	0.0
220.26	28.09	Willow	15	257.63	4	1	1.9	3	3092	13	28.28	32.0
220.35	28.17	Willow	15	257.63	4	1	1.9	3	3092	13	28.18	32.7
220.45	28.8	Willow	15	257.63	4	1	1.9	3	3092	13	27.2	32.7
220.54	29.18	Willow	15	257.63	4	1	1.9	3	3092	13	25.95	33.5
220.64	29.74	Willow	15	257.63	4	1	2.0	3	3092	13	24.52	34.3

Reaches 4 & 5 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Willow	20	1049.54	4	1	1.0	5	20991	20	73.39	24.4
219.24	22.11	Willow	20	1049.54	4	1	1.1	5	20991	20	51.11	26.9
219.33	23.32	Willow	20	1049.54	4	1	1.2	5	20991	20	43.03	27.9
219.42	24.48	Willow	20	1049.54	4	1	1.2	5	20991	20	38.88	28.8
219.52	25.19	Willow	20	1049.54	4	1	1.3	5	20991	20	34.88	30.1
219.61	25.77	Willow	20	1049.54	4	1	1.3	5	20991	20	31.35	30.9
219.7	25.48	Willow	20	1049.54	4	1	1.3	5	20991	20	36.15	30.5
219.79	25.92	Willow	20	1049.54	4	1	1.3	5	20991	20	37.64	30.0
219.89	26.4	Willow	20	1049.54	4	1	1.3	5	20991	20	36.77	30.8
220.05	27.7	Willow	20	1049.54	4	1	1.4	5	20991	20	33.07	30.9
220.06	28.3	Willow	20	1049.54	4	1	1.4	5	20991	20	32.03	0.0
220.063	28.24	Willow	20	1049.54	4	1	1.4	5	20991	20	32.25	31.4
220.07	28.49	Willow	20	1049.54	4	1	1.4	5	20991	20	31.06	31.4
220.17	27.21	Willow	20	1049.54	4	1	1.4	5	20991	20	7.83	0.0
220.26	28.09	Willow	20	1049.54	4	1	1.4	5	20991	20	28.28	32.0
220.35	28.17	Willow	20	1049.54	4	1	1.4	5	20991	20	28.18	32.7
220.45	28.8	Willow	20	1049.54	4	1	1.4	5	20991	20	27.2	32.7
220.54	29.18	Willow	20	1049.54	4	1	1.5	5	20991	20	25.95	33.5
220.64	29.74	Willow	20	1049.54	4	1	1.5	5	20991	20	24.52	34.3

Reach 9 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Willow	5	16	1	1	3.3	1	16	4	11.49	25.63
223.2	17.98	Willow	5	16	1	1	3.6	1	16	4	11.92	26.44
223.3	16.9	Willow	5	16	1	1	3.4	1	16	4	21.08	33.02
223.39	16.99	Willow	5	16	1	1	3.4	1	16	4	24.07	35.34
223.49	17.24	Willow	5	16	1	1	3.4	1	16	4	24.63	30.62
223.58	16.4	Willow	5	16	1	1	3.3	1	16	4	37.7	35.6
223.68	17.98	Willow	5	16	1	1	3.6	1	16	4	25.25	34.64
223.77	20.41	Willow	5	16	1	1	4.1	1	16	4	17.74	32.98
223.87	22.02	Willow	5	16	1	1	4.4	1	16	4	8.73	35.37
223.95	28.11	Willow	5	16	1	1	5.6	1	16	4	5.26	33.37
224.03	27.15	Willow	5	16	1	1	5.4	1	16	4	14.61	30.04
224.13	16.89	Willow	5	16	1	1	3.4	1	16	4	30.78	30.36
224.15	18.91	Willow	5	16	1	1	3.8	1	16	4	25.07	32.14
223.1	16.72	Willow	10	63	1	1	1.7	3	190	7	11.49	25.63
223.2	17.98	Willow	10	63	1	1	1.8	1	63	5	11.92	26.44
223.3	16.9	Willow	10	63	1	1	1.7	1	63	5	21.08	33.02
223.39	16.99	Willow	10	63	1	1	1.7	1	63	5	24.07	35.34
223.49	17.24	Willow	10	63	1	1	1.7	1	63	5	24.63	30.62
223.58	16.4	Willow	10	63	1	1	1.6	1	63	5	37.7	35.6
223.68	17.98	Willow	10	63	1	1	1.8	1	63	5	25.25	34.64
223.77	20.41	Willow	10	63	1	1	2.0	1	63	5	17.74	32.98
223.87	22.02	Willow	10	63	1	1	2.2	1	63	5	8.73	35.37
223.95	28.11	Willow	10	63	1	1	2.8	1	63	5	5.26	33.37
224.03	27.15	Willow	10	63	1	1	2.7	1	63	5	14.61	30.04
224.13	16.89	Willow	10	63	1	1	1.7	1	63	5	30.78	30.36
224.15	18.91	Willow	10	63	1	1	1.9	1	63	5	25.07	32.14

Reach 9 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Willow	15	258	1	1	1.1	3	773	10	11.49	25.63
223.2	17.98	Willow	15	258	1	1	1.2	3	773	10	11.92	26.44
223.3	16.9	Willow	15	258	1	1	1.1	3	773	10	21.08	33.02
223.39	16.99	Willow	15	258	1	1	1.1	3	773	10	24.07	35.34
223.49	17.24	Willow	15	258	1	1	1.1	3	773	10	24.63	30.62
223.58	16.4	Willow	15	258	1	1	1.1	3	773	10	37.7	35.60
223.68	17.98	Willow	15	258	1	1	1.2	3	773	10	25.25	34.64
223.77	20.41	Willow	15	258	1	1	1.4	3	773	10	17.74	32.98
223.87	22.02	Willow	15	258	1	1	1.5	3	773	10	8.73	35.37
223.95	28.11	Willow	15	258	1	1	1.9	1	258	7	5.26	33.37
224.03	27.15	Willow	15	258	1	1	1.8	1	258	7	14.61	30.04
224.13	16.89	Willow	15	258	1	1	1.1	3	773	10	30.78	30.36
224.15	18.91	Willow	15	258	1	1	1.3	3	773	10	25.07	32.14
223.1	16.72	Willow	20	1050	1	1	0.8	5	5248	15	11.49	25.63
223.3	17.98	Willow	20	1050	1	1	0.9	5	5248	15	11.92	26.44
223.39	16.9	Willow	20	1050	1	1	0.8	5	5248	15	21.08	33.02
223.49	16.99	Willow	20	1050	1	1	0.8	5	5248	15	24.07	35.34
223.58	17.24	Willow	20	1050	1	1	0.9	5	5248	15	24.63	30.62
223.68	16.4	Willow	20	1050	1	1	0.8	5	5248	15	37.7	35.6
223.77	17.98	Willow	20	1050	1	1	0.9	5	5248	15	25.25	34.64
223.87	20.41	Willow	20	1050	1	1	1.0	5	5248	15	17.74	32.98
223.95	22.02	Willow	20	1050	1	1	1.1	3	3149	13	8.73	35.37
224.03	28.11	Willow	20	1050	1	1	1.4	3	3149	13	5.26	33.37
224.13	27.15	Willow	20	1050	1	1	1.4	3	3149	13	14.61	30.04
224.15	16.89	Willow	20	1050	1	1	0.8	5	5248	15	30.78	30.36
224.17	18.91	Willow	20	1050	1	1	0.9	5	5248	15	25.07	32.14

Reach 9 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Willow	30	17418	1	1	0.6	20	348361	39	11.49	25.63
223.3	17.98	Willow	30	17418	1	1	0.6	20	348361	39	11.92	26.44
223.39	16.9	Willow	30	17418	1	1	0.6	20	348361	39	21.08	33.02
223.49	16.99	Willow	30	17418	1	1	0.6	20	348361	39	24.07	35.34
223.58	17.24	Willow	30	17418	1	1	0.6	20	348361	39	24.63	30.62
223.68	16.4	Willow	30	17418	1	1	0.5	20	348361	39	37.7	35.6
223.77	17.98	Willow	30	17418	1	1	0.6	20	348361	39	25.25	34.64
223.87	20.41	Willow	30	17418	1	1	0.7	20	348361	39	17.74	32.98
223.95	22.02	Willow	30	17418	1	1	0.7	20	348361	39	8.73	35.37
224.03	28.11	Willow	30	17418	1	1	0.9	5	87090	28	5.26	33.37
224.13	27.15	Willow	30	17418	1	1	0.9	5	87090	28	14.61	30.04
224.15	16.89	Willow	30	17418	1	1	0.6	20	348361	39	30.78	30.36
224.17	18.91	Willow	30	17418	1	1	0.6	20	348361	39	25.07	32.14

Reach 10 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Willow	5	16	4	1	3.4	1	62	5	30.78	30.04
224.15	18.91	Willow	5	16	4	1	3.8	1	62	5	25.07	30.36
224.17	26.12	Willow	5	16	4	1	5.2	1	62	5	18.92	32.14
224.21	26.53	Willow	5	16	4	1	5.3	1	62	5	27.52	31.67
224.22	18.69	Willow	5	16	4	1	3.7	1	62	5	34.84	31.65
224.23	19.01	Willow	5	16	4	1	3.8	1	62	5	34.41	32.09
224.33	27.63	Willow	5	16	4	1	5.5	1	62	5	20.87	32.68
224.44	28.62	Willow	5	16	4	1	5.7	1	62	5	16.43	32.96
224.54	29.4	Willow	5	16	4	1	5.9	1	62	5	14.49	33.65
224.64	30.63	Willow	5	16	4	1	6.1	1	62	5	12.17	41.99
224.73	30.29	Willow	5	16	4	1	6.1	1	62	5	12.45	35.13
224.84	29.96	Willow	5	16	4	1	6.0	1	62	5	9.64	35.31
224.93	30.14	Willow	5	16	4	1	6.0	1	62	5	9.4	35.84
225.02	29.4	Willow	5	16	4	1	5.9	1	62	5	9.21	35.58
225.08	29.75	Willow	5	16	4	1	6.0	1	62	5	8.97	35.98
225.13	30.88	Willow	5	16	4	1	6.2	1	62	5	9.64	38.17
225.22	31.4	Willow	5	16	4	1	6.3	1	62	5	10.19	36.6
225.31	31.12	Willow	5	16	4	1	6.2	1	62	5	9	36.8
225.4	31.53	Willow	5	16	4	1	6.3	1	62	5	7.26	38.11
225.47	32.06	Willow	5	16	4	1	6.4	1	62	5	6.65	38.49
225.57	32.91	Willow	5	16	4	1	6.6	1	62	5	6.02	38.14
225.66	33.85	Willow	5	16	4	1	6.8	1	62	5	5.96	39.67
225.76	32.18	Willow	5	16	4	1	6.4	1	62	5	8.58	39.65
225.84	32.64	Willow	5	16	4	1	6.5	1	62	5	6.55	39.82
225.95	34.96	Willow	5	16	4	1	7.0	1	62	5	1.54	40.09
226.06	35.45	Willow	5	16	4	1	7.1	1	62	5	2.39	40.33
226.16	34.43	Willow	5	16	4	1	6.9	1	62	5	6.03	40.54
226.27	34.76	Willow	5	16	4	1	7.0	1	62	5	24.24	41.12
226.33	33.62	Willow	5	16	4	1	6.7	1	62	5	36.75	41.29
226.42	23.93	Willow	5	16	4	1	4.8	1	62	5	64.72	42.73
226.49	23.2	Willow	5	16	4	1	4.6	1	62	5	70.64	44.92
226.59	23.68	Willow	5	16	4	1	4.7	1	62	5	53.73	28.66
226.6	22.93	Willow	5	16	4	1	4.6	1	62	5	69.22	25.27

Reach 10 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Willow	10	63	4	1	1.7	1	253	7	30.78	30.04
224.15	18.91	Willow	10	63	4	1	1.9	1	253	7	25.07	30.36
224.17	26.12	Willow	10	63	4	1	2.6	1	253	7	18.92	32.14
224.21	26.53	Willow	10	63	4	1	2.7	1	253	7	27.52	31.67
224.22	18.69	Willow	10	63	4	1	1.9	1	253	7	34.84	31.65
224.23	19.01	Willow	10	63	4	1	1.9	1	253	7	34.41	32.09
224.33	27.63	Willow	10	63	4	1	2.8	1	253	7	20.87	32.68
224.44	28.62	Willow	10	63	4	1	2.9	1	253	7	16.43	32.96
224.54	29.4	Willow	10	63	4	1	2.9	1	253	7	14.49	33.65
224.64	30.63	Willow	10	63	4	1	3.1	1	253	7	12.17	41.99
224.73	30.29	Willow	10	63	4	1	3.0	1	253	7	12.45	35.13
224.84	29.96	Willow	10	63	4	1	3.0	1	253	7	9.64	35.31
224.93	30.14	Willow	10	63	4	1	3.0	1	253	7	9.4	35.84
225.02	29.4	Willow	10	63	4	1	2.9	1	253	7	9.21	35.58
225.08	29.75	Willow	10	63	4	1	3.0	1	253	7	8.97	35.98
225.13	30.88	Willow	10	63	4	1	3.1	1	253	7	9.64	38.17
225.22	31.4	Willow	10	63	4	1	3.1	1	253	7	10.19	36.6
225.31	31.12	Willow	10	63	4	1	3.1	1	253	7	9	36.8
225.4	31.53	Willow	10	63	4	1	3.2	1	253	7	7.26	38.11
225.47	32.06	Willow	10	63	4	1	3.2	1	253	7	6.65	38.49
225.57	32.91	Willow	10	63	4	1	3.3	1	253	7	6.02	38.14
225.66	33.85	Willow	10	63	4	1	3.4	1	253	7	5.96	39.67
225.76	32.18	Willow	10	63	4	1	3.2	1	253	7	8.58	39.65
225.84	32.64	Willow	10	63	4	1	3.3	1	253	7	6.55	39.82
225.95	34.96	Willow	10	63	4	1	3.5	1	253	7	1.54	40.09
226.06	35.45	Willow	10	63	4	1	3.5	1	253	7	2.39	40.33
226.16	34.43	Willow	10	63	4	1	3.4	1	253	7	6.03	40.54
226.27	34.76	Willow	10	63	4	1	3.5	1	253	7	24.24	41.12
226.33	33.62	Willow	10	63	4	1	3.4	1	253	7	36.75	41.29
226.42	23.93	Willow	10	63	4	1	2.4	1	253	7	64.72	42.73
226.49	23.2	Willow	10	63	4	1	2.3	3	759	10	70.64	44.92
226.59	23.68	Willow	10	63	4	1	2.4	3	759	10	53.73	28.66
226.6	22.93	Willow	10	63	4	1	2.3	3	759	10	69.22	25.27

Reach 10 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Willow	15	258	4	1	1.1	1	1031	10	30.78	30.04
224.15	18.91	Willow	15	258	4	1	1.3	1	1031	10	25.07	30.36
224.17	26.12	Willow	15	258	4	1	1.7	1	1031	10	18.92	32.14
224.21	26.53	Willow	15	258	4	1	1.8	1	1031	10	27.52	31.67
224.22	18.69	Willow	15	258	4	1	1.2	1	1031	10	34.84	31.65
224.23	19.01	Willow	15	258	4	1	1.3	1	1031	10	34.41	32.09
224.33	27.63	Willow	15	258	4	1	1.8	1	1031	10	20.87	32.68
224.44	28.62	Willow	15	258	4	1	1.9	1	1031	10	16.43	32.96
224.54	29.4	Willow	15	258	4	1	2.0	1	1031	10	14.49	33.65
224.64	30.63	Willow	15	258	4	1	2.0	1	1031	10	12.17	41.99
224.73	30.29	Willow	15	258	4	1	2.0	1	1031	10	12.45	35.13
224.84	29.96	Willow	15	258	4	1	2.0	1	1031	10	9.64	35.31
224.93	30.14	Willow	15	258	4	1	2.0	1	1031	10	9.4	35.84
225.02	29.4	Willow	15	258	4	1	2.0	1	1031	10	9.21	35.58
225.08	29.75	Willow	15	258	4	1	2.0	1	1031	10	8.97	35.98
225.13	30.88	Willow	15	258	4	1	2.1	1	1031	10	9.64	38.17
225.22	31.4	Willow	15	258	4	1	2.1	1	1031	10	10.19	36.6
225.31	31.12	Willow	15	258	4	1	2.1	1	1031	10	9	36.8
225.4	31.53	Willow	15	258	4	1	2.1	1	1031	10	7.26	38.11
225.47	32.06	Willow	15	258	4	1	2.1	1	1031	10	6.65	38.49
225.57	32.91	Willow	15	258	4	1	2.2	1	1031	10	6.02	38.14
225.66	33.85	Willow	15	258	4	1	2.3	1	1031	10	5.96	39.67
225.76	32.18	Willow	15	258	4	1	2.1	1	1031	10	8.58	39.65
225.84	32.64	Willow	15	258	4	1	2.2	1	1031	10	6.55	39.82
225.95	34.96	Willow	15	258	4	1	2.3	1	1031	10	1.54	40.09
226.06	35.45	Willow	15	258	4	1	2.4	1	1031	10	2.39	40.33
226.16	34.43	Willow	15	258	4	1	2.3	1	1031	10	6.03	40.54
226.27	34.76	Willow	15	258	4	1	2.3	1	1031	10	24.24	41.12
226.33	33.62	Willow	15	258	4	1	2.2	1	1031	10	36.75	41.29
226.42	23.93	Willow	15	258	4	1	1.6	5	5153	15	64.72	42.73
226.49	23.2	Willow	15	258	4	1	1.5	5	5153	15	70.64	44.92
226.59	23.68	Willow	15	258	4	1	1.6	5	5153	15	53.73	28.66
226.6	22.93	Willow	15	258	4	1	1.5	5	5153	15	69.22	25.27

Reach 10 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Willow	20	1050	4	1	0.8	5	20991	20	30.78	30.04
224.15	18.91	Willow	20	1050	4	1	0.9	5	20991	20	25.07	30.36
224.17	26.12	Willow	20	1050	4	1	1.3	3	12595	18	18.92	32.14
224.21	26.53	Willow	20	1050	4	1	1.3	3	12595	18	27.52	31.67
224.22	18.69	Willow	20	1050	4	1	0.9	5	20991	20	34.84	31.65
224.23	19.01	Willow	20	1050	4	1	1.0	6	25189	21	34.41	32.09
224.33	27.63	Willow	20	1050	4	1	1.4	3	12595	18	20.87	32.68
224.44	28.62	Willow	20	1050	4	1	1.4	3	12595	18	16.43	32.96
224.54	29.4	Willow	20	1050	4	1	1.5	3	12595	18	14.49	33.65
224.64	30.63	Willow	20	1050	4	1	1.5	3	12595	18	12.17	41.99
224.73	30.29	Willow	20	1050	4	1	1.5	3	12595	18	12.45	35.13
224.84	29.96	Willow	20	1050	4	1	1.5	3	12595	18	9.64	35.31
224.93	30.14	Willow	20	1050	4	1	1.5	3	12595	18	9.4	35.84
225.02	29.4	Willow	20	1050	4	1	1.5	3	12595	18	9.21	35.58
225.08	29.75	Willow	20	1050	4	1	1.5	3	12595	18	8.97	35.98
225.13	30.88	Willow	20	1050	4	1	1.5	3	12595	18	9.64	38.17
225.22	31.4	Willow	20	1050	4	1	1.6	3	12595	18	10.19	36.6
225.31	31.12	Willow	20	1050	4	1	1.6	3	12595	18	9	36.8
225.4	31.53	Willow	20	1050	4	1	1.6	3	12595	18	7.26	38.11
225.47	32.06	Willow	20	1050	4	1	1.6	3	12595	18	6.65	38.49
225.57	32.91	Willow	20	1050	4	1	1.6	3	12595	18	6.02	38.14
225.66	33.85	Willow	20	1050	4	1	1.7	3	12595	18	5.96	39.67
225.76	32.18	Willow	20	1050	4	1	1.6	3	12595	18	8.58	39.65
225.84	32.64	Willow	20	1050	4	1	1.6	3	12595	18	6.55	39.82
225.95	34.96	Willow	20	1050	4	1	1.7	3	12595	18	1.54	40.09
226.06	35.45	Willow	20	1050	4	1	1.8	3	12595	18	2.39	40.33
226.16	34.43	Willow	20	1050	4	1	1.7	3	12595	18	6.03	40.54
226.27	34.76	Willow	20	1050	4	1	1.7	3	12595	18	24.24	41.12
226.33	33.62	Willow	20	1050	4	1	1.7	3	12595	18	36.75	41.29
226.42	23.93	Willow	20	1050	4	1	1.2	20	83963	28	64.72	42.73
226.49	23.2	Willow	20	1050	4	1	1.2	20	83963	28	70.64	44.92
226.59	23.68	Willow	20	1050	4	1	1.2	5	20991	20	53.73	28.66
226.6	22.93	Willow	20	1050	4	1	1.1	20	83963	28	69.22	25.27

Reach 10 – Willow Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Willow	30	17418	4	1	0.6	20	1393445	54	30.78	30.04
224.15	18.91	Willow	30	17418	4	1	0.6	20	1393445	54	25.07	30.36
224.17	26.12	Willow	30	17418	4	1	0.9	5	348361	39	18.92	32.14
224.21	26.53	Willow	30	17418	4	1	0.9	5	348361	39	27.52	31.67
224.22	18.69	Willow	30	17418	4	1	0.6	20	1393445	54	34.84	31.65
224.23	19.01	Willow	30	17418	4	1	0.6	20	1393445	54	34.41	32.09
224.33	27.63	Willow	30	17418	4	1	0.9	5	348361	39	20.87	32.68
224.44	28.62	Willow	30	17418	4	1	1.0	5	348361	39	16.43	32.96
224.54	29.4	Willow	30	17418	4	1	1.0	5	348361	39	14.49	33.65
224.64	30.63	Willow	30	17418	4	1	1.0	5	348361	39	12.17	41.99
224.73	30.29	Willow	30	17418	4	1	1.0	5	348361	39	12.45	35.13
224.84	29.96	Willow	30	17418	4	1	1.0	5	348361	39	9.64	35.31
224.93	30.14	Willow	30	17418	4	1	1.0	5	348361	39	9.4	35.84
225.02	29.4	Willow	30	17418	4	1	1.0	5	348361	39	9.21	35.58
225.08	29.75	Willow	30	17418	4	1	1.0	5	348361	39	8.97	35.98
225.13	30.88	Willow	30	17418	4	1	1.0	5	348361	39	9.64	38.17
225.22	31.4	Willow	30	17418	4	1	1.0	5	348361	39	10.19	36.6
225.31	31.12	Willow	30	17418	4	1	1.0	5	348361	39	9	36.8
225.4	31.53	Willow	30	17418	4	1	1.1	5	348361	39	7.26	38.11
225.47	32.06	Willow	30	17418	4	1	1.1	5	348361	39	6.65	38.49
225.57	32.91	Willow	30	17418	4	1	1.1	5	348361	39	6.02	38.14
225.66	33.85	Willow	30	17418	4	1	1.1	5	348361	39	5.96	39.67
225.76	32.18	Willow	30	17418	4	1	1.1	5	348361	39	8.58	39.65
225.84	32.64	Willow	30	17418	4	1	1.1	5	348361	39	6.55	39.82
225.95	34.96	Willow	30	17418	4	1	1.2	5	348361	39	1.54	40.09
226.06	35.45	Willow	30	17418	4	1	1.2	5	348361	39	2.39	40.33
226.16	34.43	Willow	30	17418	4	1	1.1	5	348361	39	6.03	40.54
226.27	34.76	Willow	30	17418	4	1	1.2	5	348361	39	24.24	41.12
226.33	33.62	Willow	30	17418	4	1	1.1	5	348361	39	36.75	41.29
226.42	23.93	Willow	30	17418	4	1	0.8	60	4180336	70	64.72	42.73
226.49	23.2	Willow	30	17418	4	1	0.8	60	4180336	70	70.64	44.92
226.59	23.68	Willow	30	17418	4	1	0.8	60	4180336	70	53.73	28.66
226.6	22.93	Willow	30	17418	4	1	0.8	60	4180336	70	69.22	25.27

Reaches 4 & 5 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Mesquite	5	36	4	1	4.0	1	144	6	73.39	24.4
219.24	22.11	Mesquite	5	36	4	1	4.4	1	144	6	51.11	26.93
219.33	23.32	Mesquite	5	36	4	1	4.7	1	144	6	43.03	27.9
219.42	24.48	Mesquite	5	36	4	1	4.9	1	144	6	38.88	28.8
219.52	25.19	Mesquite	5	36	4	1	5.0	1	144	6	34.88	30.11
219.61	25.77	Mesquite	5	36	4	1	5.2	1	144	6	31.35	30.91
219.7	25.48	Mesquite	5	36	4	1	5.1	1	144	6	36.15	30.45
219.79	25.92	Mesquite	5	36	4	1	5.2	1	144	6	37.64	30.04
219.89	26.4	Mesquite	5	36	4	1	5.3	1	144	6	36.77	30.83
220.05	27.7	Mesquite	5	36	4	1	5.5	1	144	6	33.07	30.89
220.06	28.3	Mesquite	5	36	4	1	5.7	1	144	6	32.03	0
220.063	28.24	Mesquite	5	36	4	1	5.6	1	144	6	32.25	31.37
220.07	28.49	Mesquite	5	36	4	1	5.7	1	144	6	31.06	31.4
220.17	27.21	Mesquite	5	36	4	1	5.4	1	144	6	7.83	0
220.26	28.09	Mesquite	5	36	4	1	5.6	1	144	6	28.28	31.99
220.35	28.17	Mesquite	5	36	4	1	5.6	1	144	6	28.18	32.72
220.45	28.8	Mesquite	5	36	4	1	5.8	1	144	6	27.2	32.71
220.54	29.18	Mesquite	5	36	4	1	5.8	1	144	6	25.95	33.54
220.64	29.74	Mesquite	5	36	4	1	5.9	1	144	6	24.52	34.3

Reaches 4 & 5 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Mesquite	10	150	4	1	2.0	3	1795	12	73.39	24.4
219.24	22.11	Mesquite	10	150	4	1	2.2	3	1795	12	51.11	26.93
219.33	23.32	Mesquite	10	150	4	1	2.3	3	1795	12	43.03	27.9
219.42	24.48	Mesquite	10	150	4	1	2.4	3	1795	12	38.88	28.8
219.52	25.19	Mesquite	10	150	4	1	2.5	3	1795	12	34.88	30.11
219.61	25.77	Mesquite	10	150	4	1	2.6	3	1795	12	31.35	30.91
219.7	25.48	Mesquite	10	150	4	1	2.5	3	1795	12	36.15	30.45
219.79	25.92	Mesquite	10	150	4	1	2.6	3	1795	12	37.64	30.04
219.89	26.4	Mesquite	10	150	4	1	2.6	3	1795	12	36.77	30.83
220.05	27.7	Mesquite	10	150	4	1	2.8	3	1795	12	33.07	30.89
220.06	28.3	Mesquite	10	150	4	1	2.8	3	1795	12	32.03	0
220.063	28.24	Mesquite	10	150	4	1	2.8	3	1795	12	32.25	31.37
220.07	28.49	Mesquite	10	150	4	1	2.8	3	1795	12	31.06	31.4
220.17	27.21	Mesquite	10	150	4	1	2.7	1	598	9	7.83	0
220.26	28.09	Mesquite	10	150	4	1	2.8	1	598	9	28.28	31.99
220.35	28.17	Mesquite	10	150	4	1	2.8	1	598	9	28.18	32.72
220.45	28.8	Mesquite	10	150	4	1	2.9	1	598	9	27.2	32.71
220.54	29.18	Mesquite	10	150	4	1	2.9	1	598	9	25.95	33.54
220.64	29.74	Mesquite	10	150	4	1	3.0	1	598	9	24.52	34.3

Reaches 4 & 5 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Mesquite	15	624	4	1	1.3	5	12475	18	73.39	24.4
219.24	22.11	Mesquite	15	624	4	1	1.5	5	12475	18	51.11	26.9
219.33	23.32	Mesquite	15	624	4	1	1.6	5	12475	18	43.03	27.9
219.42	24.48	Mesquite	15	624	4	1	1.6	5	12475	18	38.88	28.8
219.52	25.19	Mesquite	15	624	4	1	1.7	3	7485	16	34.88	30.1
219.61	25.77	Mesquite	15	624	4	1	1.7	3	7485	16	31.35	30.9
219.7	25.48	Mesquite	15	624	4	1	1.7	3	7485	16	36.15	30.5
219.79	25.92	Mesquite	15	624	4	1	1.7	5	12475	18	37.64	30.0
219.89	26.4	Mesquite	15	624	4	1	1.8	3	7485	16	36.77	30.8
220.05	27.7	Mesquite	15	624	4	1	1.8	3	7485	16	33.07	30.9
220.06	28.3	Mesquite	15	624	4	1	1.9	3	7485	16	32.03	0.0
220.063	28.24	Mesquite	15	624	4	1	1.9	3	7485	16	32.25	31.4
220.07	28.49	Mesquite	15	624	4	1	1.9	3	7485	16	31.06	31.4
220.17	27.21	Mesquite	15	624	4	1	1.8	3	7485	16	7.83	0.0
220.26	28.09	Mesquite	15	624	4	1	1.9	3	7485	16	28.28	32.0
220.35	28.17	Mesquite	15	624	4	1	1.9	3	7485	16	28.18	32.7
220.45	28.8	Mesquite	15	624	4	1	1.9	3	7485	16	27.2	32.7
220.54	29.18	Mesquite	15	624	4	1	1.9	3	7485	16	25.95	33.5
220.64	29.74	Mesquite	15	624	4	1	2.0	3	7485	16	24.52	34.3

Reaches 4 & 5 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Mesquite	20	2600	4	1	1.0	5	52003	25	73.39	24.4
219.24	22.11	Mesquite	20	2600	4	1	1.1	5	52003	25	51.11	26.9
219.33	23.32	Mesquite	20	2600	4	1	1.2	5	52003	25	43.03	27.9
219.42	24.48	Mesquite	20	2600	4	1	1.2	5	52003	25	38.88	28.8
219.52	25.19	Mesquite	20	2600	4	1	1.3	5	52003	25	34.88	30.1
219.61	25.77	Mesquite	20	2600	4	1	1.3	5	52003	25	31.35	30.9
219.7	25.48	Mesquite	20	2600	4	1	1.3	5	52003	25	36.15	30.5
219.79	25.92	Mesquite	20	2600	4	1	1.3	5	52003	25	37.64	30.0
219.89	26.4	Mesquite	20	2600	4	1	1.3	5	52003	25	36.77	30.8
220.05	27.7	Mesquite	20	2600	4	1	1.4	5	52003	25	33.07	30.9
220.06	28.3	Mesquite	20	2600	4	1	1.4	5	52003	25	32.03	0.0
220.063	28.24	Mesquite	20	2600	4	1	1.4	5	52003	25	32.25	31.4
220.07	28.49	Mesquite	20	2600	4	1	1.4	5	52003	25	31.06	31.4
220.17	27.21	Mesquite	20	2600	4	1	1.4	5	52003	25	7.83	0.0
220.26	28.09	Mesquite	20	2600	4	1	1.4	5	52003	25	28.28	32.0
220.35	28.17	Mesquite	20	2600	4	1	1.4	5	52003	25	28.18	32.7
220.45	28.8	Mesquite	20	2600	4	1	1.4	5	52003	25	27.2	32.7
220.54	29.18	Mesquite	20	2600	4	1	1.5	5	52003	25	25.95	33.5
220.64	29.74	Mesquite	20	2600	4	1	1.5	5	52003	25	24.52	34.3

Reach 9 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Mesquite	5	36	1	1	3.3	1	36	5	11.49	25.63
223.2	17.98	Mesquite	5	36	1	1	3.6	1	36	5	11.92	26.44
223.3	16.9	Mesquite	5	36	1	1	3.4	1	36	5	21.08	33.02
223.39	16.99	Mesquite	5	36	1	1	3.4	1	36	5	24.07	35.34
223.49	17.24	Mesquite	5	36	1	1	3.4	1	36	5	24.63	30.62
223.58	16.4	Mesquite	5	36	1	1	3.3	1	36	5	37.7	35.6
223.68	17.98	Mesquite	5	36	1	1	3.6	1	36	5	25.25	34.64
223.77	20.41	Mesquite	5	36	1	1	4.1	1	36	5	17.74	32.98
223.87	22.02	Mesquite	5	36	1	1	4.4	1	36	5	8.73	35.37
223.95	28.11	Mesquite	5	36	1	1	5.6	1	36	5	5.26	33.37
224.03	27.15	Mesquite	5	36	1	1	5.4	1	36	5	14.61	30.04
224.13	16.89	Mesquite	5	36	1	1	3.4	1	36	5	30.78	30.36
224.15	18.91	Mesquite	5	36	1	1	3.8	1	36	5	25.07	32.14
223.1	16.72	Mesquite	10	150	1	1	1.7	3	449	8	11.49	25.63
223.2	17.98	Mesquite	10	150	1	1	1.8	1	150	7	11.92	26.44
223.3	16.9	Mesquite	10	150	1	1	1.7	1	150	7	21.08	33.02
223.39	16.99	Mesquite	10	150	1	1	1.7	1	150	7	24.07	35.34
223.49	17.24	Mesquite	10	150	1	1	1.7	1	150	7	24.63	30.62
223.58	16.4	Mesquite	10	150	1	1	1.6	1	150	7	37.7	35.6
223.68	17.98	Mesquite	10	150	1	1	1.8	1	150	7	25.25	34.64
223.77	20.41	Mesquite	10	150	1	1	2.0	1	150	7	17.74	32.98
223.87	22.02	Mesquite	10	150	1	1	2.2	1	150	7	8.73	35.37
223.95	28.11	Mesquite	10	150	1	1	2.8	1	150	7	5.26	33.37
224.03	27.15	Mesquite	10	150	1	1	2.7	1	150	7	14.61	30.04
224.13	16.89	Mesquite	10	150	1	1	1.7	1	150	7	30.78	30.36
224.15	18.91	Mesquite	10	150	1	1	1.9	1	150	7	25.07	32.14

Reach 9 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Mesquite	15	624	1	1	1.1	3	1871	12	11.49	25.63
223.2	17.98	Mesquite	15	624	1	1	1.2	3	1871	12	11.92	26.44
223.3	16.9	Mesquite	15	624	1	1	1.1	3	1871	12	21.08	33.02
223.39	16.99	Mesquite	15	624	1	1	1.1	3	1871	12	24.07	35.34
223.49	17.24	Mesquite	15	624	1	1	1.1	3	1871	12	24.63	30.62
223.58	16.4	Mesquite	15	624	1	1	1.1	3	1871	12	37.7	35.60
223.68	17.98	Mesquite	15	624	1	1	1.2	3	1871	12	25.25	34.64
223.77	20.41	Mesquite	15	624	1	1	1.4	3	1871	12	17.74	32.98
223.87	22.02	Mesquite	15	624	1	1	1.5	3	1871	12	8.73	35.37
223.95	28.11	Mesquite	15	624	1	1	1.9	1	624	9	5.26	33.37
224.03	27.15	Mesquite	15	624	1	1	1.8	1	624	9	14.61	30.04
224.13	16.89	Mesquite	15	624	1	1	1.1	3	1871	12	30.78	30.36
224.15	18.91	Mesquite	15	624	1	1	1.3	3	1871	12	25.07	32.14
223.1	16.72	Mesquite	20	2600	1	1	0.8	5	13001	18	11.49	25.63
223.3	17.98	Mesquite	20	2600	1	1	0.9	5	13001	18	11.92	26.44
223.39	16.9	Mesquite	20	2600	1	1	0.8	5	13001	18	21.08	33.02
223.49	16.99	Mesquite	20	2600	1	1	0.8	5	13001	18	24.07	35.34
223.58	17.24	Mesquite	20	2600	1	1	0.9	5	13001	18	24.63	30.62
223.68	16.4	Mesquite	20	2600	1	1	0.8	5	13001	18	37.7	35.6
223.77	17.98	Mesquite	20	2600	1	1	0.9	5	13001	18	25.25	34.64
223.87	20.41	Mesquite	20	2600	1	1	1.0	5	13001	18	17.74	32.98
223.95	22.02	Mesquite	20	2600	1	1	1.1	3	7800	16	8.73	35.37
224.03	28.11	Mesquite	20	2600	1	1	1.4	3	7800	16	5.26	33.37
224.13	27.15	Mesquite	20	2600	1	1	1.4	3	7800	16	14.61	30.04
224.15	16.89	Mesquite	20	2600	1	1	0.8	5	13001	18	30.78	30.36
224.17	18.91	Mesquite	20	2600	1	1	0.9	5	13001	18	25.07	32.14

Reach 9 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
223.1	16.72	Mesquite	30	45186	1	1	0.6	20	903712	49	11.49	25.63
223.3	17.98	Mesquite	30	45186	1	1	0.6	20	903712	49	11.92	26.44
223.39	16.9	Mesquite	30	45186	1	1	0.6	20	903712	49	21.08	33.02
223.49	16.99	Mesquite	30	45186	1	1	0.6	20	903712	49	24.07	35.34
223.58	17.24	Mesquite	30	45186	1	1	0.6	20	903712	49	24.63	30.62
223.68	16.4	Mesquite	30	45186	1	1	0.5	20	903712	49	37.7	35.6
223.77	17.98	Mesquite	30	45186	1	1	0.6	20	903712	49	25.25	34.64
223.87	20.41	Mesquite	30	45186	1	1	0.7	20	903712	49	17.74	32.98
223.95	22.02	Mesquite	30	45186	1	1	0.7	20	903712	49	8.73	35.37
224.03	28.11	Mesquite	30	45186	1	1	0.9	5	225928	35	5.26	33.37
224.13	27.15	Mesquite	30	45186	1	1	0.9	5	225928	35	14.61	30.04
224.15	16.89	Mesquite	30	45186	1	1	0.6	20	903712	49	30.78	30.36
224.17	18.91	Mesquite	30	45186	1	1	0.6	20	903712	49	25.07	32.14

Reach 10 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Mesquite	5	36	4	1	3.4	1	144	6	30.78	30.04
224.15	18.91	Mesquite	5	36	4	1	3.8	1	144	6	25.07	30.36
224.17	26.12	Mesquite	5	36	4	1	5.2	1	144	6	18.92	32.14
224.21	26.53	Mesquite	5	36	4	1	5.3	1	144	6	27.52	31.67
224.22	18.69	Mesquite	5	36	4	1	3.7	1	144	6	34.84	31.65
224.23	19.01	Mesquite	5	36	4	1	3.8	1	144	6	34.41	32.09
224.33	27.63	Mesquite	5	36	4	1	5.5	1	144	6	20.87	32.68
224.44	28.62	Mesquite	5	36	4	1	5.7	1	144	6	16.43	32.96
224.54	29.4	Mesquite	5	36	4	1	5.9	1	144	6	14.49	33.65
224.64	30.63	Mesquite	5	36	4	1	6.1	1	144	6	12.17	41.99
224.73	30.29	Mesquite	5	36	4	1	6.1	1	144	6	12.45	35.13
224.84	29.96	Mesquite	5	36	4	1	6.0	1	144	6	9.64	35.31
224.93	30.14	Mesquite	5	36	4	1	6.0	1	144	6	9.4	35.84
225.02	29.4	Mesquite	5	36	4	1	5.9	1	144	6	9.21	35.58
225.08	29.75	Mesquite	5	36	4	1	6.0	1	144	6	8.97	35.98
225.13	30.88	Mesquite	5	36	4	1	6.2	1	144	6	9.64	38.17
225.22	31.4	Mesquite	5	36	4	1	6.3	1	144	6	10.19	36.6
225.31	31.12	Mesquite	5	36	4	1	6.2	1	144	6	9	36.8
225.4	31.53	Mesquite	5	36	4	1	6.3	1	144	6	7.26	38.11
225.47	32.06	Mesquite	5	36	4	1	6.4	1	144	6	6.65	38.49
225.57	32.91	Mesquite	5	36	4	1	6.6	1	144	6	6.02	38.14
225.66	33.85	Mesquite	5	36	4	1	6.8	1	144	6	5.96	39.67
225.76	32.18	Mesquite	5	36	4	1	6.4	1	144	6	8.58	39.65
225.84	32.64	Mesquite	5	36	4	1	6.5	1	144	6	6.55	39.82
225.95	34.96	Mesquite	5	36	4	1	7.0	1	144	6	1.54	40.09
226.06	35.45	Mesquite	5	36	4	1	7.1	1	144	6	2.39	40.33
226.16	34.43	Mesquite	5	36	4	1	6.9	1	144	6	6.03	40.54
226.27	34.76	Mesquite	5	36	4	1	7.0	1	144	6	24.24	41.12
226.33	33.62	Mesquite	5	36	4	1	6.7	1	144	6	36.75	41.29
226.42	23.93	Mesquite	5	36	4	1	4.8	1	144	6	64.72	42.73
226.49	23.2	Mesquite	5	36	4	1	4.6	1	144	6	70.64	44.92
226.59	23.68	Mesquite	5	36	4	1	4.7	1	144	6	53.73	28.66
226.6	22.93	Mesquite	5	36	4	1	4.6	1	144	6	69.22	25.27

Reach 10 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Mesquite	10	150	4	1	1.7	1	598	9	30.78	30.04
224.15	18.91	Mesquite	10	150	4	1	1.9	1	598	9	25.07	30.36
224.17	26.12	Mesquite	10	150	4	1	2.6	1	598	9	18.92	32.14
224.21	26.53	Mesquite	10	150	4	1	2.7	1	598	9	27.52	31.67
224.22	18.69	Mesquite	10	150	4	1	1.9	1	598	9	34.84	31.65
224.23	19.01	Mesquite	10	150	4	1	1.9	1	598	9	34.41	32.09
224.33	27.63	Mesquite	10	150	4	1	2.8	1	598	9	20.87	32.68
224.44	28.62	Mesquite	10	150	4	1	2.9	1	598	9	16.43	32.96
224.54	29.4	Mesquite	10	150	4	1	2.9	1	598	9	14.49	33.65
224.64	30.63	Mesquite	10	150	4	1	3.1	1	598	9	12.17	41.99
224.73	30.29	Mesquite	10	150	4	1	3.0	1	598	9	12.45	35.13
224.84	29.96	Mesquite	10	150	4	1	3.0	1	598	9	9.64	35.31
224.93	30.14	Mesquite	10	150	4	1	3.0	1	598	9	9.4	35.84
225.02	29.4	Mesquite	10	150	4	1	2.9	1	598	9	9.21	35.58
225.08	29.75	Mesquite	10	150	4	1	3.0	1	598	9	8.97	35.98
225.13	30.88	Mesquite	10	150	4	1	3.1	1	598	9	9.64	38.17
225.22	31.4	Mesquite	10	150	4	1	3.1	1	598	9	10.19	36.6
225.31	31.12	Mesquite	10	150	4	1	3.1	1	598	9	9	36.8
225.4	31.53	Mesquite	10	150	4	1	3.2	1	598	9	7.26	38.11
225.47	32.06	Mesquite	10	150	4	1	3.2	1	598	9	6.65	38.49
225.57	32.91	Mesquite	10	150	4	1	3.3	1	598	9	6.02	38.14
225.66	33.85	Mesquite	10	150	4	1	3.4	1	598	9	5.96	39.67
225.76	32.18	Mesquite	10	150	4	1	3.2	1	598	9	8.58	39.65
225.84	32.64	Mesquite	10	150	4	1	3.3	1	598	9	6.55	39.82
225.95	34.96	Mesquite	10	150	4	1	3.5	1	598	9	1.54	40.09
226.06	35.45	Mesquite	10	150	4	1	3.5	1	598	9	2.39	40.33
226.16	34.43	Mesquite	10	150	4	1	3.4	1	598	9	6.03	40.54
226.27	34.76	Mesquite	10	150	4	1	3.5	1	598	9	24.24	41.12
226.33	33.62	Mesquite	10	150	4	1	3.4	1	598	9	36.75	41.29
226.42	23.93	Mesquite	10	150	4	1	2.4	1	598	9	64.72	42.73
226.49	23.2	Mesquite	10	150	4	1	2.3	3	1795	12	70.64	44.92
226.59	23.68	Mesquite	10	150	4	1	2.4	3	1795	12	53.73	28.66
226.6	22.93	Mesquite	10	150	4	1	2.3	3	1795	12	69.22	25.27

Reach 10 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Mesquite	15	624	4	1	1.1	1	2495	13	30.78	30.04
224.15	18.91	Mesquite	15	624	4	1	1.3	1	2495	13	25.07	30.36
224.17	26.12	Mesquite	15	624	4	1	1.7	1	2495	13	18.92	32.14
224.21	26.53	Mesquite	15	624	4	1	1.8	1	2495	13	27.52	31.67
224.22	18.69	Mesquite	15	624	4	1	1.2	1	2495	13	34.84	31.65
224.23	19.01	Mesquite	15	624	4	1	1.3	1	2495	13	34.41	32.09
224.33	27.63	Mesquite	15	624	4	1	1.8	1	2495	13	20.87	32.68
224.44	28.62	Mesquite	15	624	4	1	1.9	1	2495	13	16.43	32.96
224.54	29.4	Mesquite	15	624	4	1	2.0	1	2495	13	14.49	33.65
224.64	30.63	Mesquite	15	624	4	1	2.0	1	2495	13	12.17	41.99
224.73	30.29	Mesquite	15	624	4	1	2.0	1	2495	13	12.45	35.13
224.84	29.96	Mesquite	15	624	4	1	2.0	1	2495	13	9.64	35.31
224.93	30.14	Mesquite	15	624	4	1	2.0	1	2495	13	9.4	35.84
225.02	29.4	Mesquite	15	624	4	1	2.0	1	2495	13	9.21	35.58
225.08	29.75	Mesquite	15	624	4	1	2.0	1	2495	13	8.97	35.98
225.13	30.88	Mesquite	15	624	4	1	2.1	1	2495	13	9.64	38.17
225.22	31.4	Mesquite	15	624	4	1	2.1	1	2495	13	10.19	36.6
225.31	31.12	Mesquite	15	624	4	1	2.1	1	2495	13	9	36.8
225.4	31.53	Mesquite	15	624	4	1	2.1	1	2495	13	7.26	38.11
225.47	32.06	Mesquite	15	624	4	1	2.1	1	2495	13	6.65	38.49
225.57	32.91	Mesquite	15	624	4	1	2.2	1	2495	13	6.02	38.14
225.66	33.85	Mesquite	15	624	4	1	2.3	1	2495	13	5.96	39.67
225.76	32.18	Mesquite	15	624	4	1	2.1	1	2495	13	8.58	39.65
225.84	32.64	Mesquite	15	624	4	1	2.2	1	2495	13	6.55	39.82
225.95	34.96	Mesquite	15	624	4	1	2.3	1	2495	13	1.54	40.09
226.06	35.45	Mesquite	15	624	4	1	2.4	1	2495	13	2.39	40.33
226.16	34.43	Mesquite	15	624	4	1	2.3	1	2495	13	6.03	40.54
226.27	34.76	Mesquite	15	624	4	1	2.3	1	2495	13	24.24	41.12
226.33	33.62	Mesquite	15	624	4	1	2.2	1	2495	13	36.75	41.29
226.42	23.93	Mesquite	15	624	4	1	1.6	5	12475	18	64.72	42.73
226.49	23.2	Mesquite	15	624	4	1	1.5	5	12475	18	70.64	44.92
226.59	23.68	Mesquite	15	624	4	1	1.6	5	12475	18	53.73	28.66
226.6	22.93	Mesquite	15	624	4	1	1.5	5	12475	18	69.22	25.27

Reach 10 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Mesquite	20	2600	4	1	0.8	5	52003	25	30.78	30.04
224.15	18.91	Mesquite	20	2600	4	1	0.9	5	52003	25	25.07	30.36
224.17	26.12	Mesquite	20	2600	4	1	1.3	3	31202	22	18.92	32.14
224.21	26.53	Mesquite	20	2600	4	1	1.3	3	31202	22	27.52	31.67
224.22	18.69	Mesquite	20	2600	4	1	0.9	5	52003	25	34.84	31.65
224.23	19.01	Mesquite	20	2600	4	1	1.0	6	62404	26	34.41	32.09
224.33	27.63	Mesquite	20	2600	4	1	1.4	3	31202	22	20.87	32.68
224.44	28.62	Mesquite	20	2600	4	1	1.4	3	31202	22	16.43	32.96
224.54	29.4	Mesquite	20	2600	4	1	1.5	3	31202	22	14.49	33.65
224.64	30.63	Mesquite	20	2600	4	1	1.5	3	31202	22	12.17	41.99
224.73	30.29	Mesquite	20	2600	4	1	1.5	3	31202	22	12.45	35.13
224.84	29.96	Mesquite	20	2600	4	1	1.5	3	31202	22	9.64	35.31
224.93	30.14	Mesquite	20	2600	4	1	1.5	3	31202	22	9.4	35.84
225.02	29.4	Mesquite	20	2600	4	1	1.5	3	31202	22	9.21	35.58
225.08	29.75	Mesquite	20	2600	4	1	1.5	3	31202	22	8.97	35.98
225.13	30.88	Mesquite	20	2600	4	1	1.5	3	31202	22	9.64	38.17
225.22	31.4	Mesquite	20	2600	4	1	1.6	3	31202	22	10.19	36.6
225.31	31.12	Mesquite	20	2600	4	1	1.6	3	31202	22	9	36.8
225.4	31.53	Mesquite	20	2600	4	1	1.6	3	31202	22	7.26	38.11
225.47	32.06	Mesquite	20	2600	4	1	1.6	3	31202	22	6.65	38.49
225.57	32.91	Mesquite	20	2600	4	1	1.6	3	31202	22	6.02	38.14
225.66	33.85	Mesquite	20	2600	4	1	1.7	3	31202	22	5.96	39.67
225.76	32.18	Mesquite	20	2600	4	1	1.6	3	31202	22	8.58	39.65
225.84	32.64	Mesquite	20	2600	4	1	1.6	3	31202	22	6.55	39.82
225.95	34.96	Mesquite	20	2600	4	1	1.7	3	31202	22	1.54	40.09
226.06	35.45	Mesquite	20	2600	4	1	1.8	3	31202	22	2.39	40.33
226.16	34.43	Mesquite	20	2600	4	1	1.7	3	31202	22	6.03	40.54
226.27	34.76	Mesquite	20	2600	4	1	1.7	3	31202	22	24.24	41.12
226.33	33.62	Mesquite	20	2600	4	1	1.7	3	31202	22	36.75	41.29
226.42	23.93	Mesquite	20	2600	4	1	1.2	20	208013	35	64.72	42.73
226.49	23.2	Mesquite	20	2600	4	1	1.2	20	208013	35	70.64	44.92
226.59	23.68	Mesquite	20	2600	4	1	1.2	5	52003	25	53.73	28.66
226.6	22.93	Mesquite	20	2600	4	1	1.1	20	208013	35	69.22	25.27

Reach 10 – Mesquite Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Mesquite	30	45186	4	1	0.6	20	3614848	67	30.78	30.04
224.15	18.91	Mesquite	30	45186	4	1	0.6	20	3614848	67	25.07	30.36
224.17	26.12	Mesquite	30	45186	4	1	0.9	5	903712	49	18.92	32.14
224.21	26.53	Mesquite	30	45186	4	1	0.9	5	903712	49	27.52	31.67
224.22	18.69	Mesquite	30	45186	4	1	0.6	20	3614848	67	34.84	31.65
224.23	19.01	Mesquite	30	45186	4	1	0.6	20	3614848	67	34.41	32.09
224.33	27.63	Mesquite	30	45186	4	1	0.9	5	903712	49	20.87	32.68
224.44	28.62	Mesquite	30	45186	4	1	1.0	5	903712	49	16.43	32.96
224.54	29.4	Mesquite	30	45186	4	1	1.0	5	903712	49	14.49	33.65
224.64	30.63	Mesquite	30	45186	4	1	1.0	5	903712	49	12.17	41.99
224.73	30.29	Mesquite	30	45186	4	1	1.0	5	903712	49	12.45	35.13
224.84	29.96	Mesquite	30	45186	4	1	1.0	5	903712	49	9.64	35.31
224.93	30.14	Mesquite	30	45186	4	1	1.0	5	903712	49	9.4	35.84
225.02	29.4	Mesquite	30	45186	4	1	1.0	5	903712	49	9.21	35.58
225.08	29.75	Mesquite	30	45186	4	1	1.0	5	903712	49	8.97	35.98
225.13	30.88	Mesquite	30	45186	4	1	1.0	5	903712	49	9.64	38.17
225.22	31.4	Mesquite	30	45186	4	1	1.0	5	903712	49	10.19	36.6
225.31	31.12	Mesquite	30	45186	4	1	1.0	5	903712	49	9	36.8
225.4	31.53	Mesquite	30	45186	4	1	1.1	5	903712	49	7.26	38.11
225.47	32.06	Mesquite	30	45186	4	1	1.1	5	903712	49	6.65	38.49
225.57	32.91	Mesquite	30	45186	4	1	1.1	5	903712	49	6.02	38.14
225.66	33.85	Mesquite	30	45186	4	1	1.1	5	903712	49	5.96	39.67
225.76	32.18	Mesquite	30	45186	4	1	1.1	5	903712	49	8.58	39.65
225.84	32.64	Mesquite	30	45186	4	1	1.1	5	903712	49	6.55	39.82
225.95	34.96	Mesquite	30	45186	4	1	1.2	5	903712	49	1.54	40.09
226.06	35.45	Mesquite	30	45186	4	1	1.2	5	903712	49	2.39	40.33
226.16	34.43	Mesquite	30	45186	4	1	1.1	5	903712	49	6.03	40.54
226.27	34.76	Mesquite	30	45186	4	1	1.2	5	903712	49	24.24	41.12
226.33	33.62	Mesquite	30	45186	4	1	1.1	5	903712	49	36.75	41.29
226.42	23.93	Mesquite	30	45186	4	1	0.8	60	10844543	87	64.72	42.73
226.49	23.2	Mesquite	30	45186	4	1	0.8	60	10844543	87	70.64	44.92
226.59	23.68	Mesquite	30	45186	4	1	0.8	60	10844543	87	53.73	28.66
226.6	22.93	Mesquite	30	45186	4	1	0.8	60	10844543	87	69.22	25.27

Reaches 4 & 5 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
219.15	20.09	Palo Verde	5	50.47	4	1	4.0	1	202	7	73.39	24.4
219.24	22.11	Palo Verde	5	50.47	4	1	4.4	1	202	7	51.11	26.93
219.33	23.32	Palo Verde	5	50.47	4	1	4.7	1	202	7	43.03	27.9
219.42	24.48	Palo Verde	5	50.47	4	1	4.9	1	202	7	38.88	28.8
219.52	25.19	Palo Verde	5	50.47	4	1	5.0	1	202	7	34.88	30.11
219.61	25.77	Palo Verde	5	50.47	4	1	5.2	1	202	7	31.35	30.91
219.7	25.48	Palo Verde	5	50.47	4	1	5.1	1	202	7	36.15	30.45
219.79	25.92	Palo Verde	5	50.47	4	1	5.2	1	202	7	37.64	30.04
219.89	26.4	Palo Verde	5	50.47	4	1	5.3	1	202	7	36.77	30.83
220.05	27.7	Palo Verde	5	50.47	4	1	5.5	1	202	7	33.07	30.89
220.06	28.3	Palo Verde	5	50.47	4	1	5.7	1	202	7	32.03	0
220.063	28.24	Palo Verde	5	50.47	4	1	5.6	1	202	7	32.25	31.37
220.07	28.49	Palo Verde	5	50.47	4	1	5.7	1	202	7	31.06	31.4
220.17	27.21	Palo Verde	5	50.47	4	1	5.4	1	202	7	7.83	0
220.26	28.09	Palo Verde	5	50.47	4	1	5.6	1	202	7	28.28	31.99
220.35	28.17	Palo Verde	5	50.47	4	1	5.6	1	202	7	28.18	32.72
220.45	28.8	Palo Verde	5	50.47	4	1	5.8	1	202	7	27.2	32.71
220.54	29.18	Palo Verde	5	50.47	4	1	5.8	1	202	7	25.95	33.54
220.64	29.74	Palo Verde	5	50.47	4	1	5.9	1	202	7	24.52	34.3

Reaches 4 & 5 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Palo Verde	10	361.41	4	1	2.0	3	4337	14	73.39	24.4
219.24	22.11	Palo Verde	10	361.41	4	1	2.2	3	4337	14	51.11	26.93
219.33	23.32	Palo Verde	10	361.41	4	1	2.3	3	4337	14	43.03	27.9
219.42	24.48	Palo Verde	10	361.41	4	1	2.4	3	4337	14	38.88	28.8
219.52	25.19	Palo Verde	10	361.41	4	1	2.5	3	4337	14	34.88	30.11
219.61	25.77	Palo Verde	10	361.41	4	1	2.6	3	4337	14	31.35	30.91
219.7	25.48	Palo Verde	10	361.41	4	1	2.5	3	4337	14	36.15	30.45
219.79	25.92	Palo Verde	10	361.41	4	1	2.6	3	4337	14	37.64	30.04
219.89	26.4	Palo Verde	10	361.41	4	1	2.6	3	4337	14	36.77	30.83
220.05	27.7	Palo Verde	10	361.41	4	1	2.8	3	4337	14	33.07	30.89
220.06	28.3	Palo Verde	10	361.41	4	1	2.8	3	4337	14	32.03	0
220.063	28.24	Palo Verde	10	361.41	4	1	2.8	3	4337	14	32.25	31.37
220.07	28.49	Palo Verde	10	361.41	4	1	2.8	3	4337	14	31.06	31.4
220.17	27.21	Palo Verde	10	361.41	4	1	2.7	1	1446	11	7.83	0
220.26	28.09	Palo Verde	10	361.41	4	1	2.8	1	1446	11	28.28	31.99
220.35	28.17	Palo Verde	10	361.41	4	1	2.8	1	1446	11	28.18	32.72
220.45	28.8	Palo Verde	10	361.41	4	1	2.9	1	1446	11	27.2	32.71
220.54	29.18	Palo Verde	10	361.41	4	1	2.9	1	1446	11	25.95	33.54
220.64	29.74	Palo Verde	10	361.41	4	1	3.0	1	1446	11	24.52	34.3

Reaches 4 & 5 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Palo Verde	15	2588.21	4	1	1.3	5	51764	25	73.39	24.4
219.24	22.11	Palo Verde	15	2588.21	4	1	1.5	5	51764	25	51.11	26.9
219.33	23.32	Palo Verde	15	2588.21	4	1	1.6	5	51764	25	43.03	27.9
219.42	24.48	Palo Verde	15	2588.21	4	1	1.6	5	51764	25	38.88	28.8
219.52	25.19	Palo Verde	15	2588.21	4	1	1.7	3	31059	22	34.88	30.1
219.61	25.77	Palo Verde	15	2588.21	4	1	1.7	3	31059	22	31.35	30.9
219.7	25.48	Palo Verde	15	2588.21	4	1	1.7	3	31059	22	36.15	30.5
219.79	25.92	Palo Verde	15	2588.21	4	1	1.7	5	51764	25	37.64	30.0
219.89	26.4	Palo Verde	15	2588.21	4	1	1.8	3	31059	22	36.77	30.8
220.05	27.7	Palo Verde	15	2588.21	4	1	1.8	3	31059	22	33.07	30.9
220.06	28.3	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	32.03	0.0
220.063	28.24	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	32.25	31.4
220.07	28.49	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	31.06	31.4
220.17	27.21	Palo Verde	15	2588.21	4	1	1.8	3	31059	22	7.83	0.0
220.26	28.09	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	28.28	32.0
220.35	28.17	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	28.18	32.7
220.45	28.8	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	27.2	32.7
220.54	29.18	Palo Verde	15	2588.21	4	1	1.9	3	31059	22	25.95	33.5
220.64	29.74	Palo Verde	15	2588.21	4	1	2.0	3	31059	22	24.52	34.3

Reaches 4 & 5 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
219.15	20.09	Palo Verde	20	18535.32	4	1	1.0	5	370706	40	73.39	24.4
219.24	22.11	Palo Verde	20	18535.32	4	1	1.1	5	370706	40	51.11	26.9
219.33	23.32	Palo Verde	20	18535.32	4	1	1.2	5	370706	40	43.03	27.9
219.42	24.48	Palo Verde	20	18535.32	4	1	1.2	5	370706	40	38.88	28.8
219.52	25.19	Palo Verde	20	18535.32	4	1	1.3	5	370706	40	34.88	30.1
219.61	25.77	Palo Verde	20	18535.32	4	1	1.3	5	370706	40	31.35	30.9
219.7	25.48	Palo Verde	20	18535.32	4	1	1.3	5	370706	40	36.15	30.5
219.79	25.92	Palo Verde	20	18535.32	4	1	1.3	5	370706	40	37.64	30.0
219.89	26.4	Palo Verde	20	18535.32	4	1	1.3	5	370706	40	36.77	30.8
220.05	27.7	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	33.07	30.9
220.06	28.3	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	32.03	0.0
220.063	28.24	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	32.25	31.4
220.07	28.49	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	31.06	31.4
220.17	27.21	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	7.83	0.0
220.26	28.09	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	28.28	32.0
220.35	28.17	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	28.18	32.7
220.45	28.8	Palo Verde	20	18535.32	4	1	1.4	5	370706	40	27.2	32.7
220.54	29.18	Palo Verde	20	18535.32	4	1	1.5	5	370706	40	25.95	33.5
220.64	29.74	Palo Verde	20	18535.32	4	1	1.5	5	370706	40	24.52	34.3

Reach 9 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	16.72	Palo Verde	5	50.47	1	1	3.3	1	50	5	11.49	25.63
223.2	17.98	Palo Verde	5	50.47	1	1	3.6	1	50	5	11.92	26.44
223.3	16.9	Palo Verde	5	50.47	1	1	3.4	1	50	5	21.08	33.02
223.39	16.99	Palo Verde	5	50.47	1	1	3.4	1	50	5	24.07	35.34
223.49	17.24	Palo Verde	5	50.47	1	1	3.4	1	50	5	24.63	30.62
223.58	16.4	Palo Verde	5	50.47	1	1	3.3	1	50	5	37.7	35.6
223.68	17.98	Palo Verde	5	50.47	1	1	3.6	1	50	5	25.25	34.64
223.77	20.41	Palo Verde	5	50.47	1	1	4.1	1	50	5	17.74	32.98
223.87	22.02	Palo Verde	5	50.47	1	1	4.4	1	50	5	8.73	35.37
223.95	28.11	Palo Verde	5	50.47	1	1	5.6	1	50	5	5.26	33.37
224.03	27.15	Palo Verde	5	50.47	1	1	5.4	1	50	5	14.61	30.04
224.13	16.89	Palo Verde	5	50.47	1	1	3.4	1	50	5	30.78	30.36
224.15	18.91	Palo Verde	5	50.47	1	1	3.8	1	50	5	25.07	32.14
223.1	16.72	Palo Verde	10	361.41	1	1	1.7	3	1084	10	11.49	25.63
223.2	17.98	Palo Verde	10	361.41	1	1	1.8	1	361	8	11.92	26.44
223.3	16.9	Palo Verde	10	361.41	1	1	1.7	1	361	8	21.08	33.02
223.39	16.99	Palo Verde	10	361.41	1	1	1.7	1	361	8	24.07	35.34
223.49	17.24	Palo Verde	10	361.41	1	1	1.7	1	361	8	24.63	30.62
223.58	16.4	Palo Verde	10	361.41	1	1	1.6	1	361	8	37.7	35.6
223.68	17.98	Palo Verde	10	361.41	1	1	1.8	1	361	8	25.25	34.64
223.77	20.41	Palo Verde	10	361.41	1	1	2.0	1	361	8	17.74	32.98
223.87	22.02	Palo Verde	10	361.41	1	1	2.2	1	361	8	8.73	35.37
223.95	28.11	Palo Verde	10	361.41	1	1	2.8	1	361	8	5.26	33.37
224.03	27.15	Palo Verde	10	361.41	1	1	2.7	1	361	8	14.61	30.04
224.13	16.89	Palo Verde	10	361.41	1	1	1.7	1	361	8	30.78	30.36
224.15	18.91	Palo Verde	10	361.41	1	1	1.9	1	361	8	25.07	32.14

Reach 9 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	16.72	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	11.49	25.63
223.2	17.98	Palo Verde	15	2588.21	1	1	1.2	3	7765	16	11.92	26.44
223.3	16.9	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	21.08	33.02
223.39	16.99	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	24.07	35.34
223.49	17.24	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	24.63	30.62
223.58	16.4	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	37.7	35.60
223.68	17.98	Palo Verde	15	2588.21	1	1	1.2	3	7765	16	25.25	34.64
223.77	20.41	Palo Verde	15	2588.21	1	1	1.4	3	7765	16	17.74	32.98
223.87	22.02	Palo Verde	15	2588.21	1	1	1.5	3	7765	16	8.73	35.37
223.95	28.11	Palo Verde	15	2588.21	1	1	1.9	1	2588	13	5.26	33.37
224.03	27.15	Palo Verde	15	2588.21	1	1	1.8	1	2588	13	14.61	30.04
224.13	16.89	Palo Verde	15	2588.21	1	1	1.1	3	7765	16	30.78	30.36
224.15	18.91	Palo Verde	15	2588.21	1	1	1.3	3	7765	16	25.07	32.14
223.1	16.72	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	11.49	25.63
223.3	17.98	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	11.92	26.44
223.39	16.9	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	21.08	33.02
223.49	16.99	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	24.07	35.34
223.58	17.24	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	24.63	30.62
223.68	16.4	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	37.7	35.6
223.77	17.98	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	25.25	34.64
223.87	20.41	Palo Verde	20	18535.32	1	1	1.0	5	92677	29	17.74	32.98
223.95	22.02	Palo Verde	20	18535.32	1	1	1.1	3	55606	26	8.73	35.37
224.03	28.11	Palo Verde	20	18535.32	1	1	1.4	3	55606	26	5.26	33.37
224.13	27.15	Palo Verde	20	18535.32	1	1	1.4	3	55606	26	14.61	30.04
224.15	16.89	Palo Verde	20	18535.32	1	1	0.8	5	92677	29	30.78	30.36
224.17	18.91	Palo Verde	20	18535.32	1	1	0.9	5	92677	29	25.07	32.14

Reach 9 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
223.1	16.72	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	11.49	25.63
223.3	17.98	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	11.92	26.44
223.39	16.9	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	21.08	33.02
223.49	16.99	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	24.07	35.34
223.58	17.24	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	24.63	30.62
223.68	16.4	Palo Verde	30	950604.79	1	1	0.5	20	19012096	99	37.7	35.6
223.77	17.98	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	25.25	34.64
223.87	20.41	Palo Verde	30	950604.79	1	1	0.7	20	19012096	99	17.74	32.98
223.95	22.02	Palo Verde	30	950604.79	1	1	0.7	20	19012096	99	8.73	35.37
224.03	28.11	Palo Verde	30	950604.79	1	1	0.9	5	4753024	72	5.26	33.37
224.13	27.15	Palo Verde	30	950604.79	1	1	0.9	5	4753024	72	14.61	30.04
224.15	16.89	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	30.78	30.36
224.17	18.91	Palo Verde	30	950604.79	1	1	0.6	20	19012096	99	25.07	32.14

Reach 10 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Palo Verde	5	50.47	4	1	3.4	1	202	7	30.78	30.04
224.15	18.91	Palo Verde	5	50.47	4	1	3.8	1	202	7	25.07	30.36
224.17	26.12	Palo Verde	5	50.47	4	1	5.2	1	202	7	18.92	32.14
224.21	26.53	Palo Verde	5	50.47	4	1	5.3	1	202	7	27.52	31.67
224.22	18.69	Palo Verde	5	50.47	4	1	3.7	1	202	7	34.84	31.65
224.23	19.01	Palo Verde	5	50.47	4	1	3.8	1	202	7	34.41	32.09
224.33	27.63	Palo Verde	5	50.47	4	1	5.5	1	202	7	20.87	32.68
224.44	28.62	Palo Verde	5	50.47	4	1	5.7	1	202	7	16.43	32.96
224.54	29.4	Palo Verde	5	50.47	4	1	5.9	1	202	7	14.49	33.65
224.64	30.63	Palo Verde	5	50.47	4	1	6.1	1	202	7	12.17	41.99
224.73	30.29	Palo Verde	5	50.47	4	1	6.1	1	202	7	12.45	35.13
224.84	29.96	Palo Verde	5	50.47	4	1	6.0	1	202	7	9.64	35.31
224.93	30.14	Palo Verde	5	50.47	4	1	6.0	1	202	7	9.4	35.84
225.02	29.4	Palo Verde	5	50.47	4	1	5.9	1	202	7	9.21	35.58
225.08	29.75	Palo Verde	5	50.47	4	1	6.0	1	202	7	8.97	35.98
225.13	30.88	Palo Verde	5	50.47	4	1	6.2	1	202	7	9.64	38.17
225.22	31.4	Palo Verde	5	50.47	4	1	6.3	1	202	7	10.19	36.6
225.31	31.12	Palo Verde	5	50.47	4	1	6.2	1	202	7	9	36.8
225.4	31.53	Palo Verde	5	50.47	4	1	6.3	1	202	7	7.26	38.11
225.47	32.06	Palo Verde	5	50.47	4	1	6.4	1	202	7	6.65	38.49
225.57	32.91	Palo Verde	5	50.47	4	1	6.6	1	202	7	6.02	38.14
225.66	33.85	Palo Verde	5	50.47	4	1	6.8	1	202	7	5.96	39.67
225.76	32.18	Palo Verde	5	50.47	4	1	6.4	1	202	7	8.58	39.65
225.84	32.64	Palo Verde	5	50.47	4	1	6.5	1	202	7	6.55	39.82
225.95	34.96	Palo Verde	5	50.47	4	1	7.0	1	202	7	1.54	40.09
226.06	35.45	Palo Verde	5	50.47	4	1	7.1	1	202	7	2.39	40.33
226.16	34.43	Palo Verde	5	50.47	4	1	6.9	1	202	7	6.03	40.54
226.27	34.76	Palo Verde	5	50.47	4	1	7.0	1	202	7	24.24	41.12
226.33	33.62	Palo Verde	5	50.47	4	1	6.7	1	202	7	36.75	41.29
226.42	23.93	Palo Verde	5	50.47	4	1	4.8	1	202	7	64.72	42.73
226.49	23.2	Palo Verde	5	50.47	4	1	4.6	1	202	7	70.64	44.92
226.59	23.68	Palo Verde	5	50.47	4	1	4.7	1	202	7	53.73	28.66
226.6	22.93	Palo Verde	5	50.47	4	1	4.6	1	202	7	69.22	25.27

Reach 10 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.89	Palo Verde	10	361.41	4	1	1.7	1	1446	11	30.78	30.04
224.15	18.91	Palo Verde	10	361.41	4	1	1.9	1	1446	11	25.07	30.36
224.17	26.12	Palo Verde	10	361.41	4	1	2.6	1	1446	11	18.92	32.14
224.21	26.53	Palo Verde	10	361.41	4	1	2.7	1	1446	11	27.52	31.67
224.22	18.69	Palo Verde	10	361.41	4	1	1.9	1	1446	11	34.84	31.65
224.23	19.01	Palo Verde	10	361.41	4	1	1.9	1	1446	11	34.41	32.09
224.33	27.63	Palo Verde	10	361.41	4	1	2.8	1	1446	11	20.87	32.68
224.44	28.62	Palo Verde	10	361.41	4	1	2.9	1	1446	11	16.43	32.96
224.54	29.4	Palo Verde	10	361.41	4	1	2.9	1	1446	11	14.49	33.65
224.64	30.63	Palo Verde	10	361.41	4	1	3.1	1	1446	11	12.17	41.99
224.73	30.29	Palo Verde	10	361.41	4	1	3.0	1	1446	11	12.45	35.13
224.84	29.96	Palo Verde	10	361.41	4	1	3.0	1	1446	11	9.64	35.31
224.93	30.14	Palo Verde	10	361.41	4	1	3.0	1	1446	11	9.4	35.84
225.02	29.4	Palo Verde	10	361.41	4	1	2.9	1	1446	11	9.21	35.58
225.08	29.75	Palo Verde	10	361.41	4	1	3.0	1	1446	11	8.97	35.98
225.13	30.88	Palo Verde	10	361.41	4	1	3.1	1	1446	11	9.64	38.17
225.22	31.4	Palo Verde	10	361.41	4	1	3.1	1	1446	11	10.19	36.6
225.31	31.12	Palo Verde	10	361.41	4	1	3.1	1	1446	11	9	36.8
225.4	31.53	Palo Verde	10	361.41	4	1	3.2	1	1446	11	7.26	38.11
225.47	32.06	Palo Verde	10	361.41	4	1	3.2	1	1446	11	6.65	38.49
225.57	32.91	Palo Verde	10	361.41	4	1	3.3	1	1446	11	6.02	38.14
225.66	33.85	Palo Verde	10	361.41	4	1	3.4	1	1446	11	5.96	39.67
225.76	32.18	Palo Verde	10	361.41	4	1	3.2	1	1446	11	8.58	39.65
225.84	32.64	Palo Verde	10	361.41	4	1	3.3	1	1446	11	6.55	39.82
225.95	34.96	Palo Verde	10	361.41	4	1	3.5	1	1446	11	1.54	40.09
226.06	35.45	Palo Verde	10	361.41	4	1	3.5	1	1446	11	2.39	40.33
226.16	34.43	Palo Verde	10	361.41	4	1	3.4	1	1446	11	6.03	40.54
226.27	34.76	Palo Verde	10	361.41	4	1	3.5	1	1446	11	24.24	41.12
226.33	33.62	Palo Verde	10	361.41	4	1	3.4	1	1446	11	36.75	41.29
226.42	23.93	Palo Verde	10	361.41	4	1	2.4	1	1446	11	64.72	42.73
226.49	23.2	Palo Verde	10	361.41	4	1	2.3	3	4337	14	70.64	44.92
226.59	23.68	Palo Verde	10	361.41	4	1	2.4	3	4337	14	53.73	28.66
226.6	22.93	Palo Verde	10	361.41	4	1	2.3	3	4337	14	69.22	25.27

Reach 10 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Palo Verde	15	2588.21	4	1	1.1	1	10353	17	30.78	30.04
224.15	18.91	Palo Verde	15	2588.21	4	1	1.3	1	10353	17	25.07	30.36
224.17	26.12	Palo Verde	15	2588.21	4	1	1.7	1	10353	17	18.92	32.14
224.21	26.53	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	27.52	31.67
224.22	18.69	Palo Verde	15	2588.21	4	1	1.2	1	10353	17	34.84	31.65
224.23	19.01	Palo Verde	15	2588.21	4	1	1.3	1	10353	17	34.41	32.09
224.33	27.63	Palo Verde	15	2588.21	4	1	1.8	1	10353	17	20.87	32.68
224.44	28.62	Palo Verde	15	2588.21	4	1	1.9	1	10353	17	16.43	32.96
224.54	29.4	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	14.49	33.65
224.64	30.63	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	12.17	41.99
224.73	30.29	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	12.45	35.13
224.84	29.96	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	9.64	35.31
224.93	30.14	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	9.4	35.84
225.02	29.4	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	9.21	35.58
225.08	29.75	Palo Verde	15	2588.21	4	1	2.0	1	10353	17	8.97	35.98
225.13	30.88	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	9.64	38.17
225.22	31.4	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	10.19	36.6
225.31	31.12	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	9	36.8
225.4	31.53	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	7.26	38.11
225.47	32.06	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	6.65	38.49
225.57	32.91	Palo Verde	15	2588.21	4	1	2.2	1	10353	17	6.02	38.14
225.66	33.85	Palo Verde	15	2588.21	4	1	2.3	1	10353	17	5.96	39.67
225.76	32.18	Palo Verde	15	2588.21	4	1	2.1	1	10353	17	8.58	39.65
225.84	32.64	Palo Verde	15	2588.21	4	1	2.2	1	10353	17	6.55	39.82
225.95	34.96	Palo Verde	15	2588.21	4	1	2.3	1	10353	17	1.54	40.09
226.06	35.45	Palo Verde	15	2588.21	4	1	2.4	1	10353	17	2.39	40.33
226.16	34.43	Palo Verde	15	2588.21	4	1	2.3	1	10353	17	6.03	40.54
226.27	34.76	Palo Verde	15	2588.21	4	1	2.3	1	10353	17	24.24	41.12
226.33	33.62	Palo Verde	15	2588.21	4	1	2.2	1	10353	17	36.75	41.29
226.42	23.93	Palo Verde	15	2588.21	4	1	1.6	5	51764	25	64.72	42.73
226.49	23.2	Palo Verde	15	2588.21	4	1	1.5	5	51764	25	70.64	44.92
226.59	23.68	Palo Verde	15	2588.21	4	1	1.6	5	51764	25	53.73	28.66
226.6	22.93	Palo Verde	15	2588.21	4	1	1.5	5	51764	25	69.22	25.27

Reach 10 – Palo Verde Susceptibility Index – Manning's Increase

$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID (--) 1	Hydraulic Radius (ft) 2	Vegetation Type (--) 3	Average Vegetation Height (ft) 4	V_{flex} (ft-lb) 5	$C_{blocking}$ (--) 6	C_{dist} (--) 7	Ratio of hydraulic radius to veg height (--) 8	C_{depth} (--) 9	K_v (ft-lb) 10	SP Threshold (ft-lb) 11	Stream Power (ft-lb/s/ft^2) 12	Max Depth (ft) 13
224.13	16.89	Palo Verde	20	18535.32	4	1	0.8	5	370706	40	30.78	30.04
224.15	18.91	Palo Verde	20	18535.32	4	1	0.9	5	370706	40	25.07	30.36
224.17	26.12	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	18.92	32.14
224.21	26.53	Palo Verde	20	18535.32	4	1	1.3	3	222424	35	27.52	31.67
224.22	18.69	Palo Verde	20	18535.32	4	1	0.9	5	370706	40	34.84	31.65
224.23	19.01	Palo Verde	20	18535.32	4	1	1.0	6	444848	41	34.41	32.09
224.33	27.63	Palo Verde	20	18535.32	4	1	1.4	3	222424	35	20.87	32.68
224.44	28.62	Palo Verde	20	18535.32	4	1	1.4	3	222424	35	16.43	32.96
224.54	29.4	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	14.49	33.65
224.64	30.63	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	12.17	41.99
224.73	30.29	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	12.45	35.13
224.84	29.96	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	9.64	35.31
224.93	30.14	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	9.4	35.84
225.02	29.4	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	9.21	35.58
225.08	29.75	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	8.97	35.98
225.13	30.88	Palo Verde	20	18535.32	4	1	1.5	3	222424	35	9.64	38.17
225.22	31.4	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	10.19	36.6
225.31	31.12	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	9	36.8
225.4	31.53	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	7.26	38.11
225.47	32.06	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	6.65	38.49
225.57	32.91	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	6.02	38.14
225.66	33.85	Palo Verde	20	18535.32	4	1	1.7	3	222424	35	5.96	39.67
225.76	32.18	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	8.58	39.65
225.84	32.64	Palo Verde	20	18535.32	4	1	1.6	3	222424	35	6.55	39.82
225.95	34.96	Palo Verde	20	18535.32	4	1	1.7	3	222424	35	1.54	40.09
226.06	35.45	Palo Verde	20	18535.32	4	1	1.8	3	222424	35	2.39	40.33
226.16	34.43	Palo Verde	20	18535.32	4	1	1.7	3	222424	35	6.03	40.54
226.27	34.76	Palo Verde	20	18535.32	4	1	1.7	3	222424	35	24.24	41.12
226.33	33.62	Palo Verde	20	18535.32	4	1	1.7	3	222424	35	36.75	41.29
226.42	23.93	Palo Verde	20	18535.32	4	1	1.2	20	1482825	55	64.72	42.73
226.49	23.2	Palo Verde	20	18535.32	4	1	1.2	20	1482825	55	70.64	44.92
226.59	23.68	Palo Verde	20	18535.32	4	1	1.2	5	370706	40	53.73	28.66
226.6	22.93	Palo Verde	20	18535.32	4	1	1.1	20	1482825	55	69.22	25.27

Reach 10 – Palo Verde Susceptibility Index – Manning's Increase

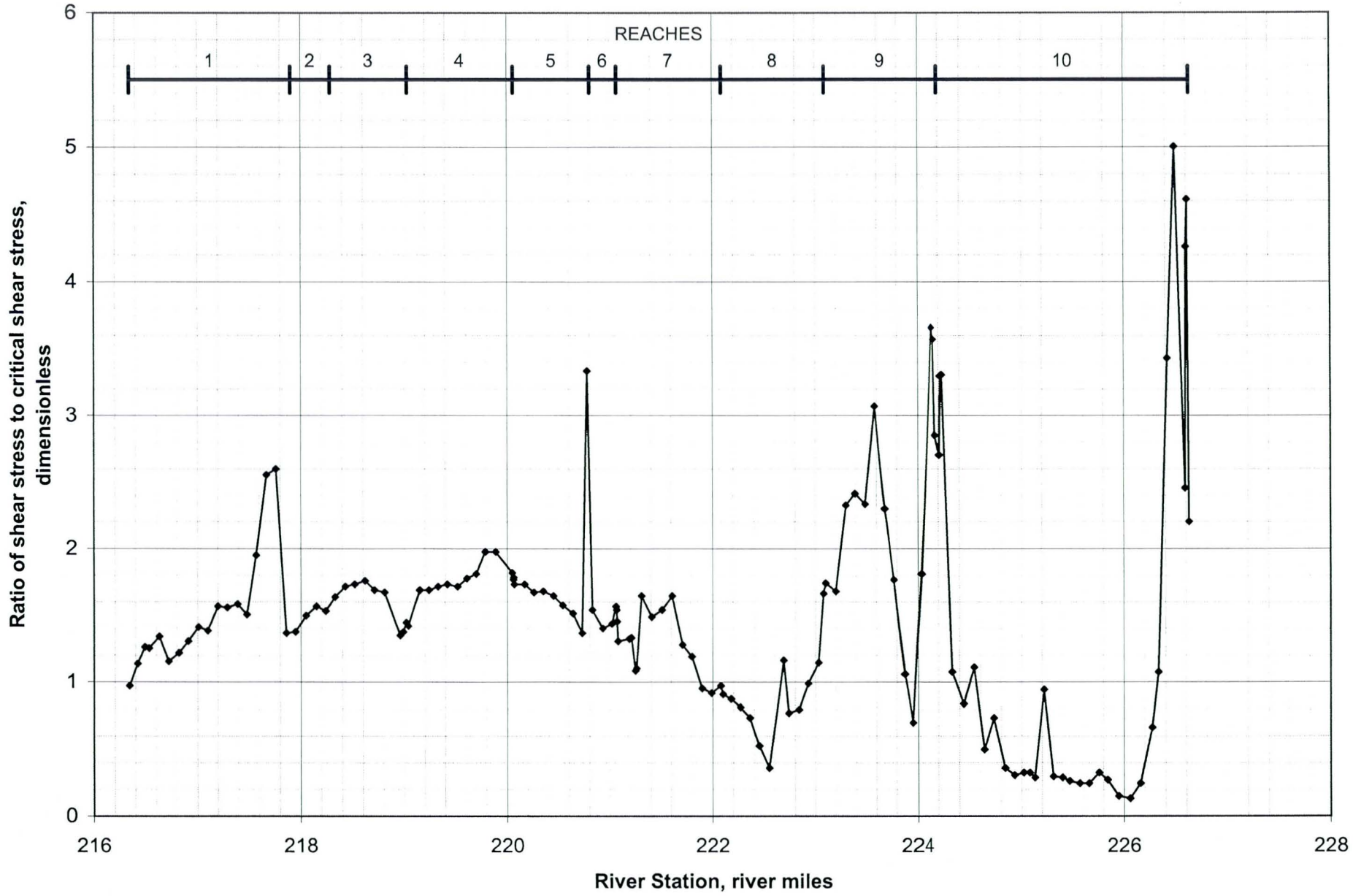
$K_v = V_{flex}\ C_{blocking}\ C_{dist}\ C_{depth}$

Cross Section ID	Hydraulic Radius	Vegetation Type	Average Vegetation Height	V_{flex}	$C_{blocking}$	C_{dist}	Ratio of hydraulic radius to veg height	C_{depth}	K_v	SP Threshold	Stream Power	Max Depth
(--)	(ft)	(--)	(ft)	(ft-lb)	(--)	(--)	(--)	(--)	(ft-lb)	(ft-lb)	(ft-lb/s/ft^2)	(ft)
1	2	3	4	5	6	7	8	9	10	11	12	13
224.13	16.89	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	30.78	30.04
224.15	18.91	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	25.07	30.36
224.17	26.12	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	18.92	32.14
224.21	26.53	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	27.52	31.67
224.22	18.69	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	34.84	31.65
224.23	19.01	Palo Verde	30	950604.79	4	1	0.6	20	76048383	136	34.41	32.09
224.33	27.63	Palo Verde	30	950604.79	4	1	0.9	5	19012096	99	20.87	32.68
224.44	28.62	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	16.43	32.96
224.54	29.4	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	14.49	33.65
224.64	30.63	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	12.17	41.99
224.73	30.29	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	12.45	35.13
224.84	29.96	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	9.64	35.31
224.93	30.14	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	9.4	35.84
225.02	29.4	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	9.21	35.58
225.08	29.75	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	8.97	35.98
225.13	30.88	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	9.64	38.17
225.22	31.4	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	10.19	36.6
225.31	31.12	Palo Verde	30	950604.79	4	1	1.0	5	19012096	99	9	36.8
225.4	31.53	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	7.26	38.11
225.47	32.06	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	6.65	38.49
225.57	32.91	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	6.02	38.14
225.66	33.85	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	5.96	39.67
225.76	32.18	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	8.58	39.65
225.84	32.64	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	6.55	39.82
225.95	34.96	Palo Verde	30	950604.79	4	1	1.2	5	19012096	99	1.54	40.09
226.06	35.45	Palo Verde	30	950604.79	4	1	1.2	5	19012096	99	2.39	40.33
226.16	34.43	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	6.03	40.54
226.27	34.76	Palo Verde	30	950604.79	4	1	1.2	5	19012096	99	24.24	41.12
226.33	33.62	Palo Verde	30	950604.79	4	1	1.1	5	19012096	99	36.75	41.29
226.42	23.93	Palo Verde	30	950604.79	4	1	0.8	60	228145150	175	64.72	42.73
226.49	23.2	Palo Verde	30	950604.79	4	1	0.8	60	228145150	175	70.64	44.92
226.59	23.68	Palo Verde	30	950604.79	4	1	0.8	60	228145150	175	53.73	28.66
226.6	22.93	Palo Verde	30	950604.79	4	1	0.8	60	228145150	175	69.22	25.27

ATTACHMENT 6

Shear Stress Plots
Existing Condition

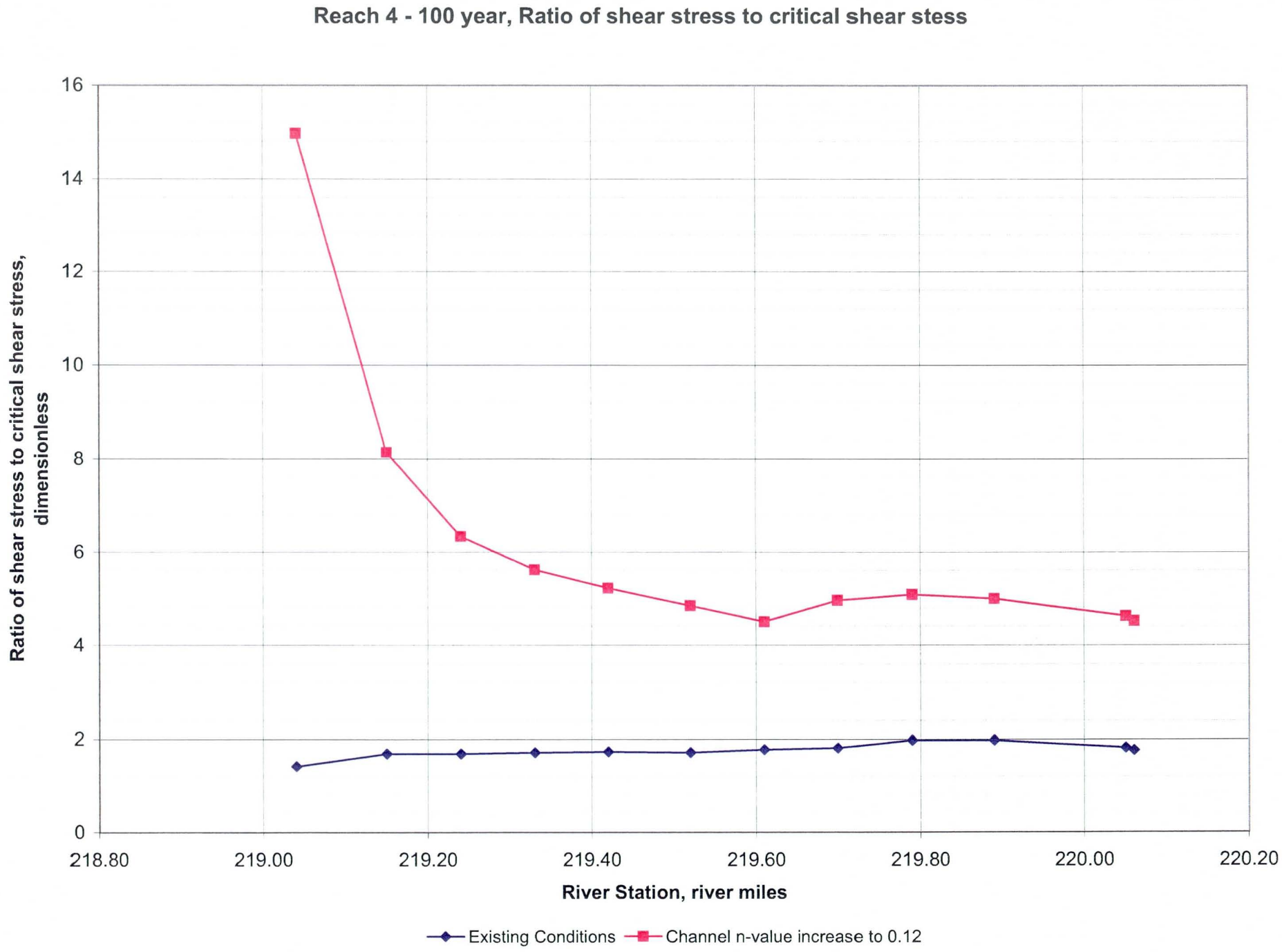
100 year - Existing Conditions - Ratio of shear stress to critical shear stess

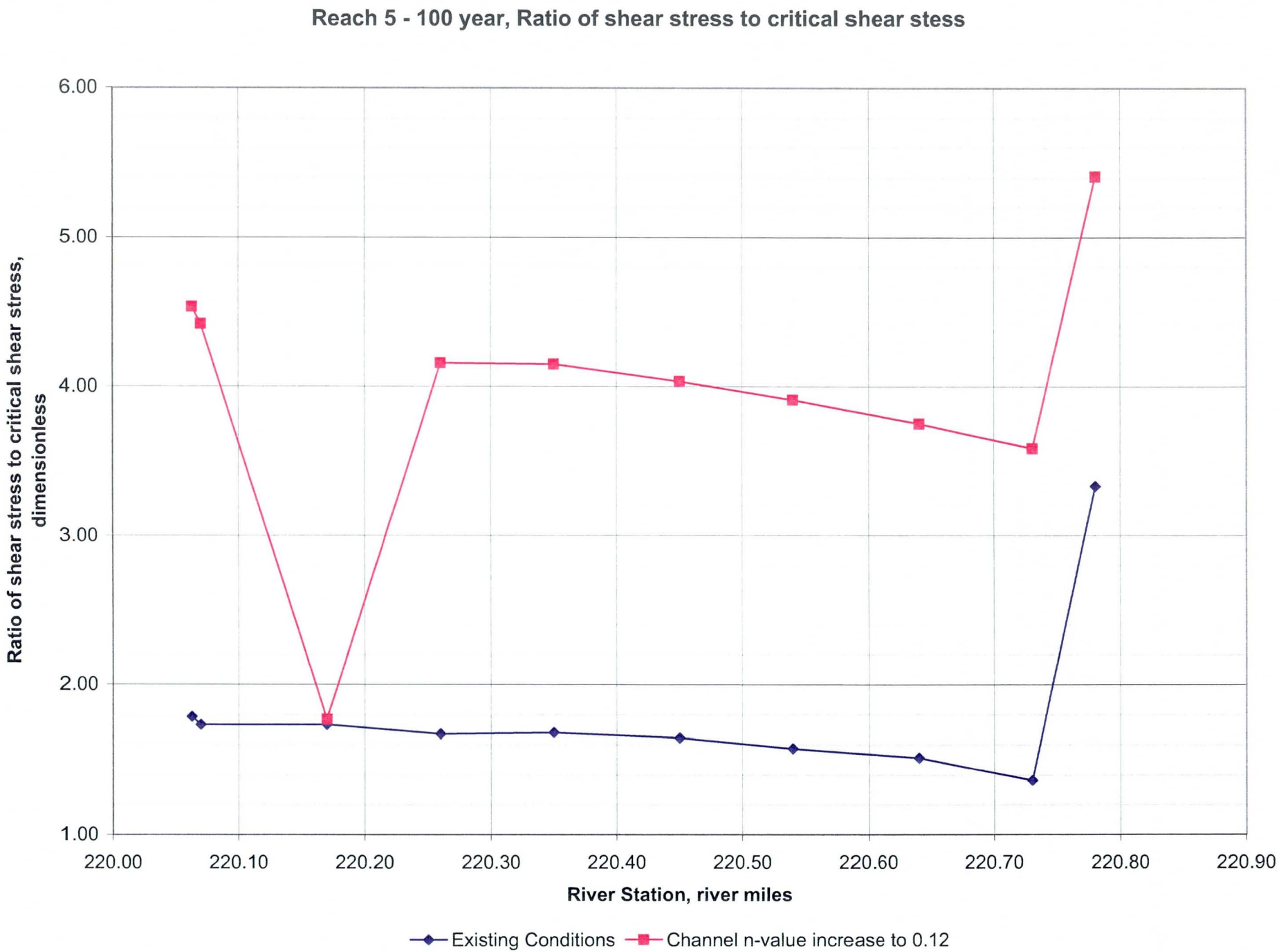


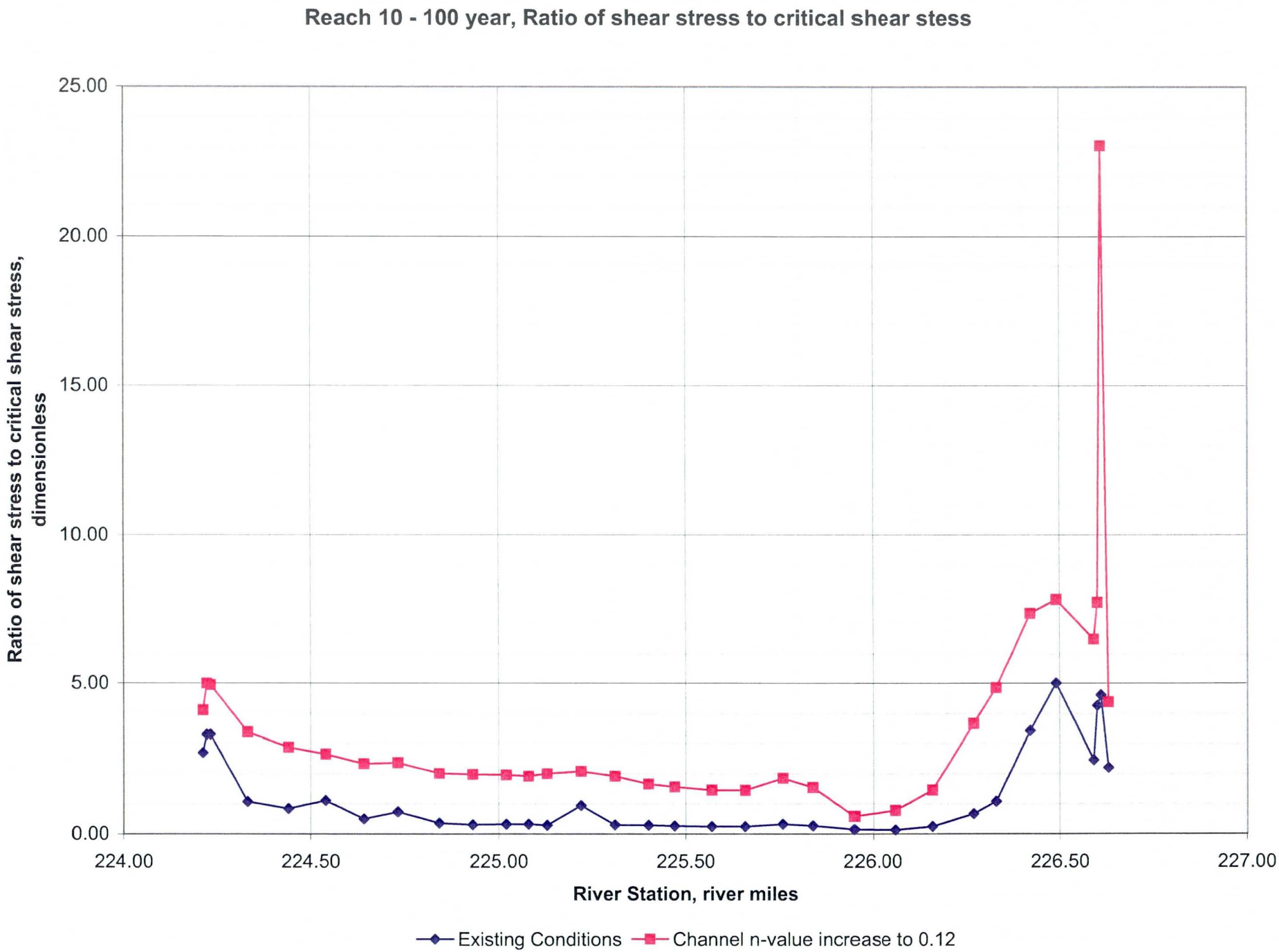
ATTACHMENT 7

Shear Stress Plots

Manning's Roughness Coefficient Increased

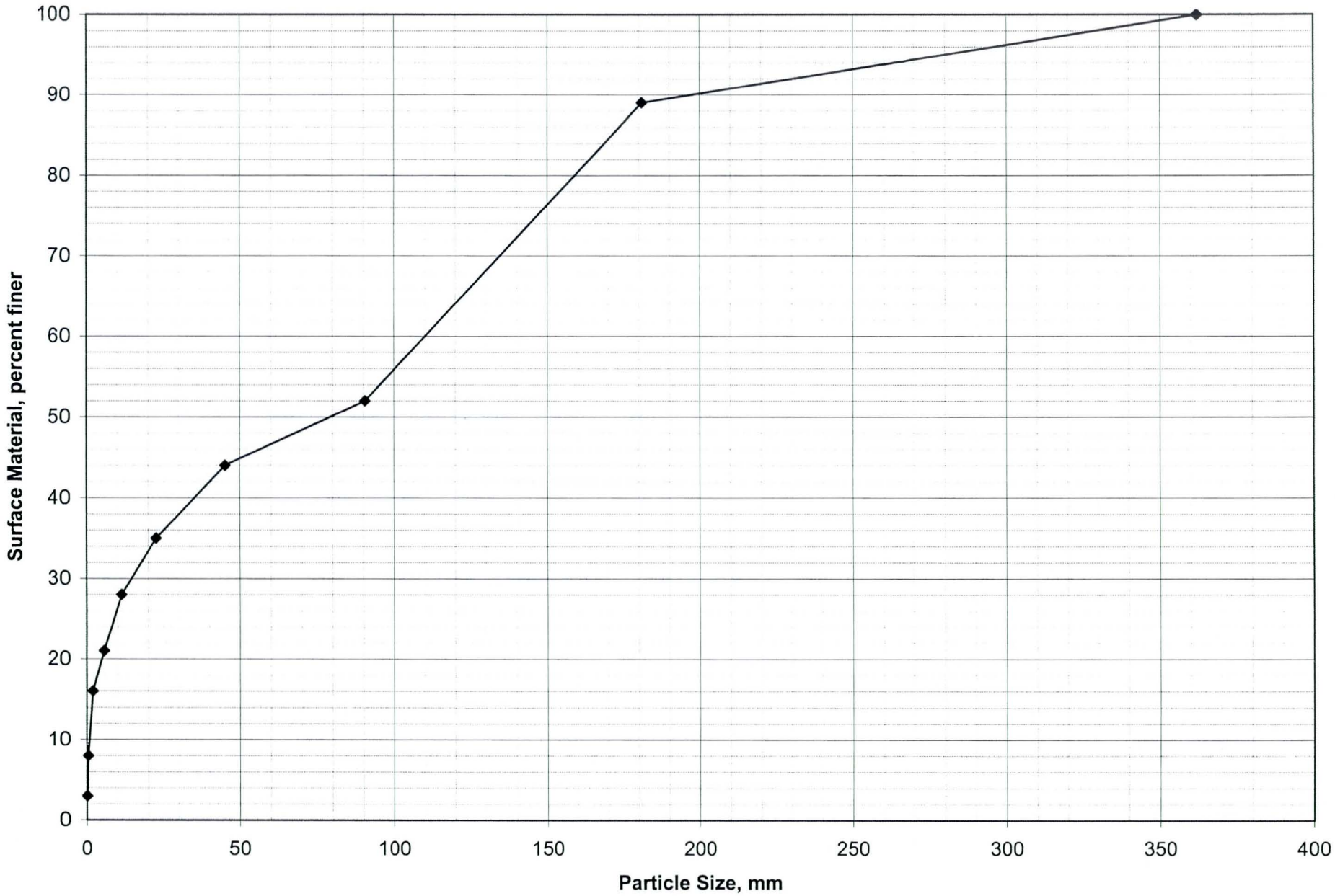

Reach 4 - 100 year, Ratio of shear stress to critical shear stess
Ratio of shear stress to critical shear stress, dimensionless
16
14
12
10
8
6
4
2
0
218.80
219.00
219.20
219.40
219.60
219.80
220.00
220.20
River Station, river miles
Existing Conditions
Channel n-value increase to 0.12


Reach 5 - 100 year, Ratio of shear stress to critical shear stess
Ratio of shear stress to critical shear stress, dimensionless
6.00
5.00
4.00
3.00
2.00
1.00
220.00
220.10
220.20
220.30
220.40
220.50
220.60
220.70
220.80
220.90
River Station, river miles
Existing Conditions
Channel n-value increase to 0.12


Reach 10 - 100 year, Ratio of shear stress to critical shear stess
Ratio of shear stress to critical shear stress, dimensionless
25.00
20.00
15.00
10.00
5.00
0.00
224.00
224.50
225.00
225.50
226.00
226.50
227.00
River Station, river miles
Existing Conditions
Channel n-value increase to 0.12

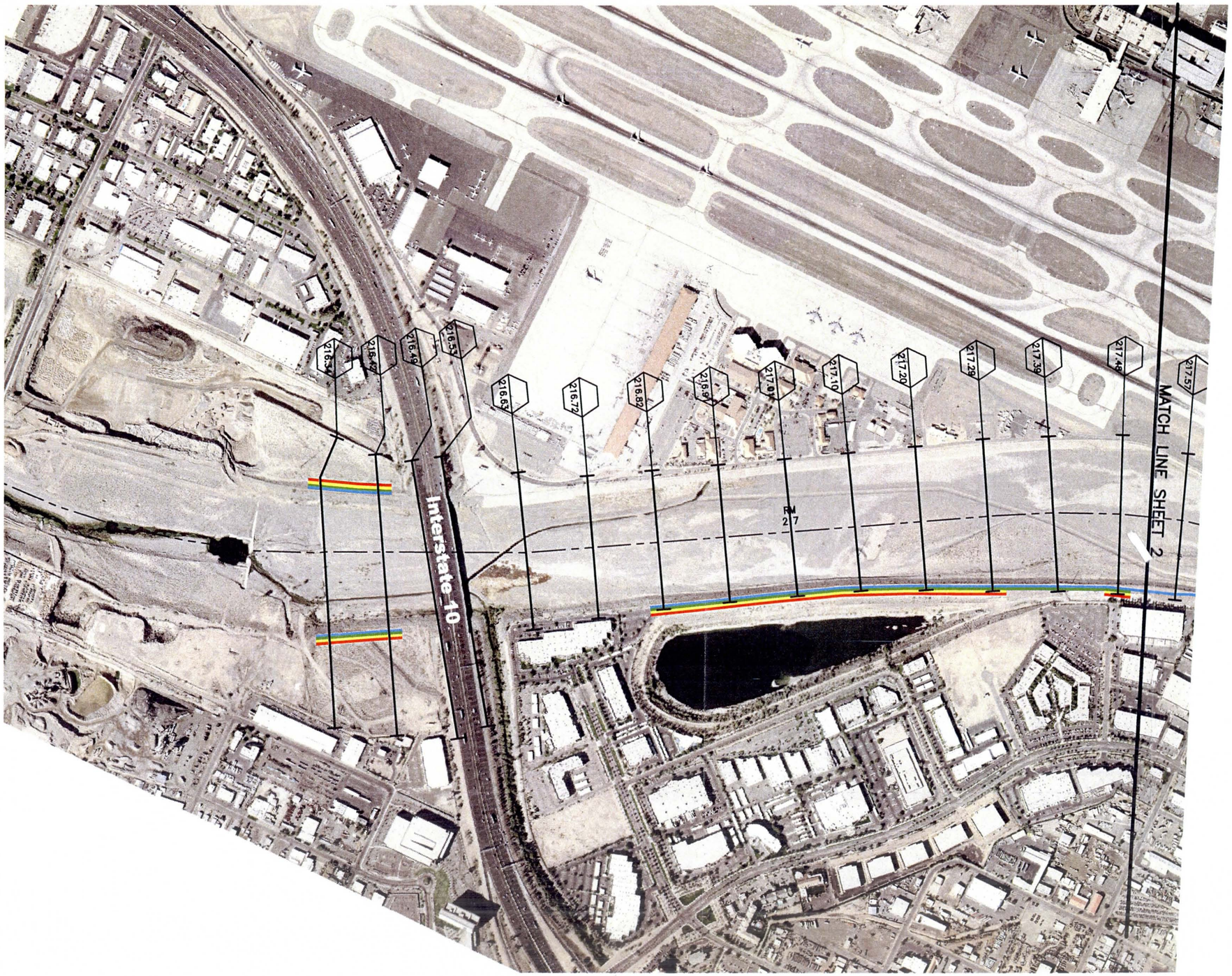
ATTACHMENT 8
Sediment Gradation Curves

Sediment Gradation Curve



ATTACHMENT 9

Levee Condition Location Map



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

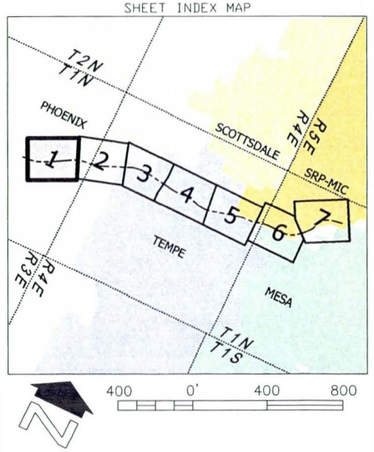
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan

Levee Condition Location Maps

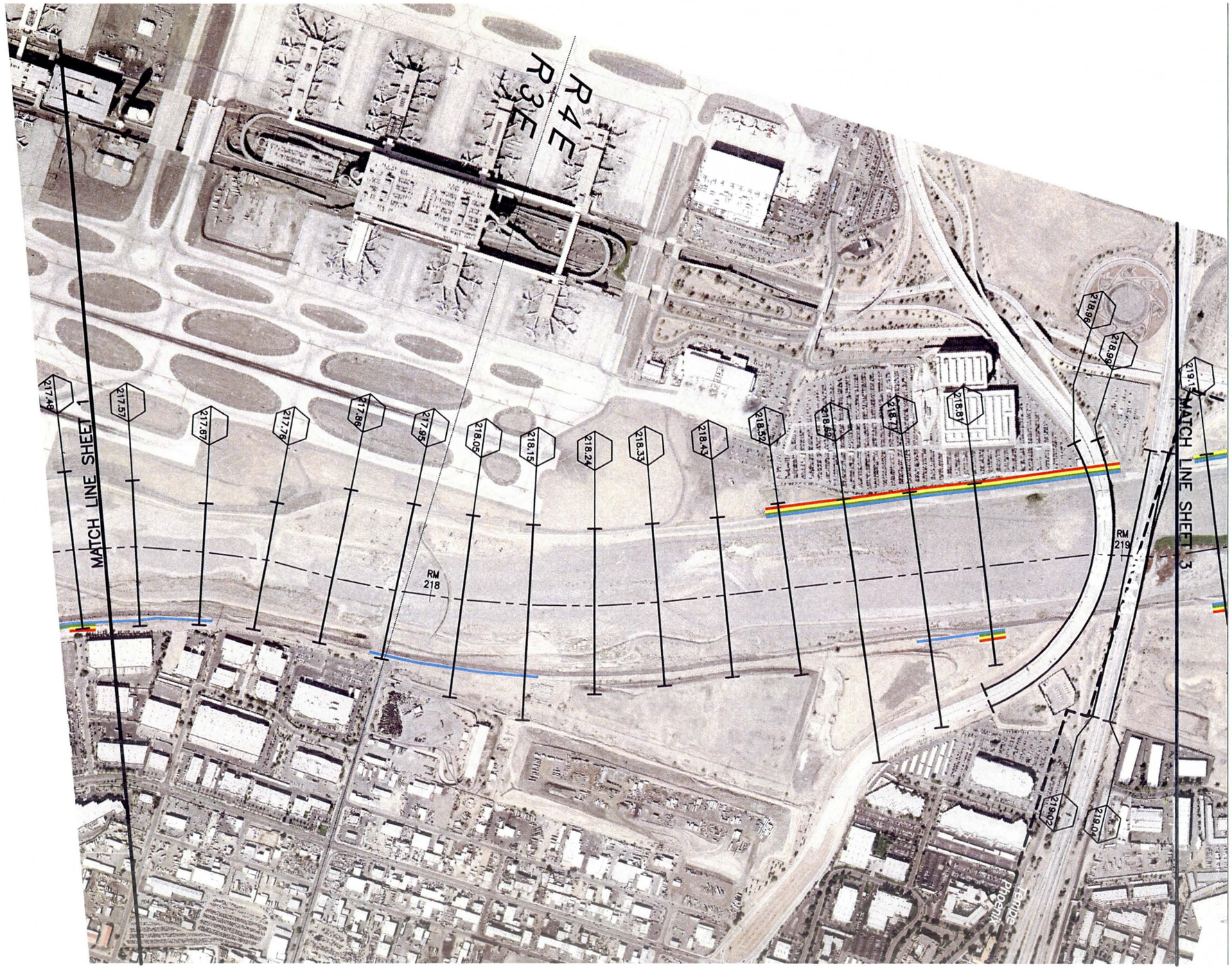
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 1 OF 7



LEGEND

CROSS SECTION — 0.10

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

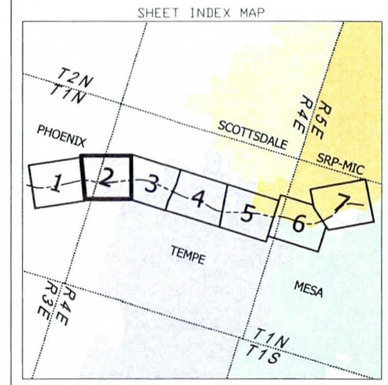
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



400 0' 400 800

NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Levee Condition Location Maps

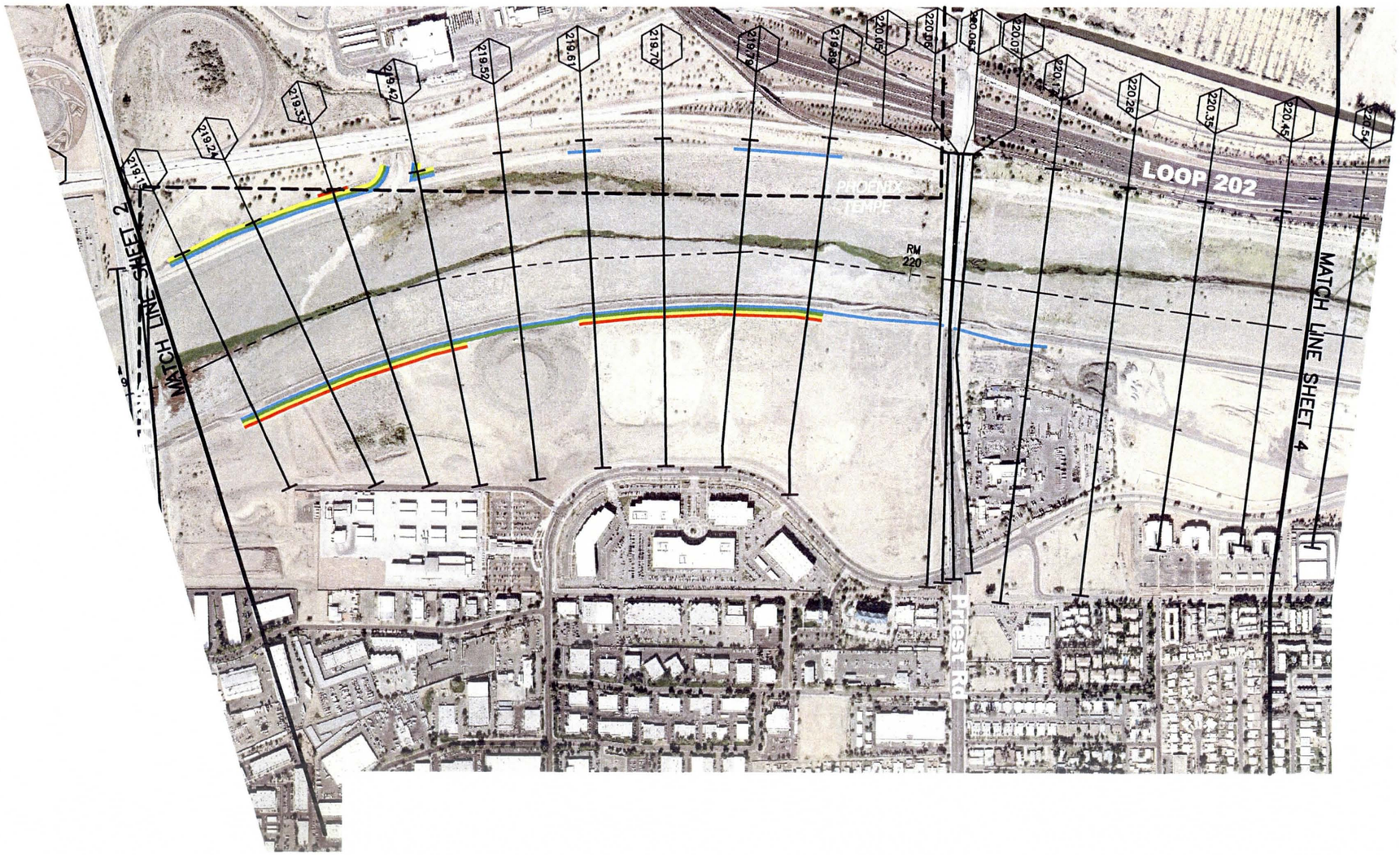
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 2 OF 7



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

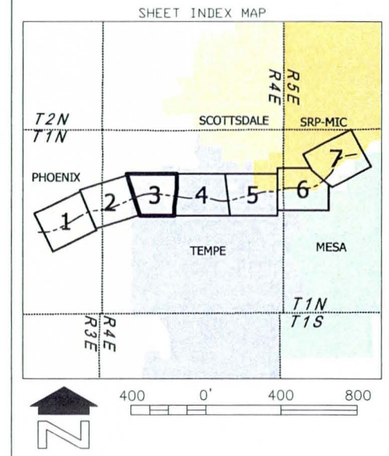
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Levee Condition Location Maps

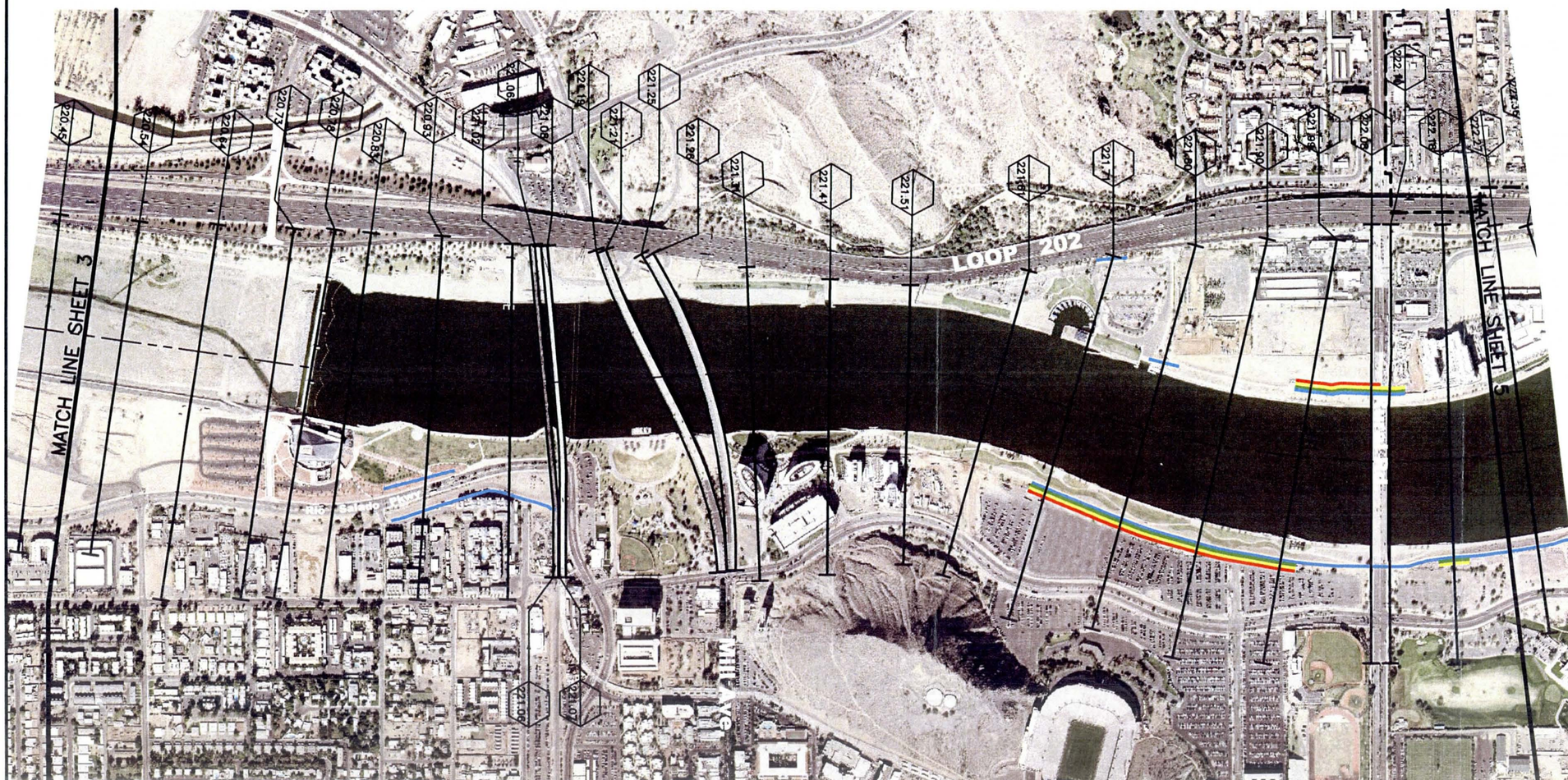
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	—	—
DESIGN CHK.	—	—
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 3 OF 7



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

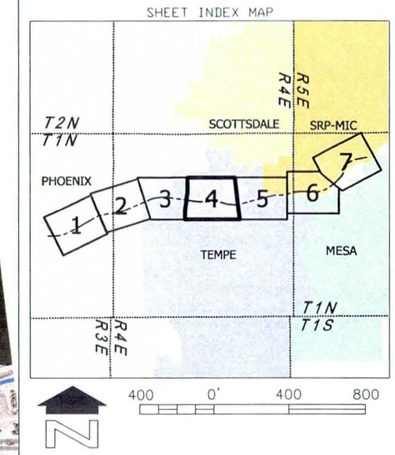
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Levee Condition Location Maps

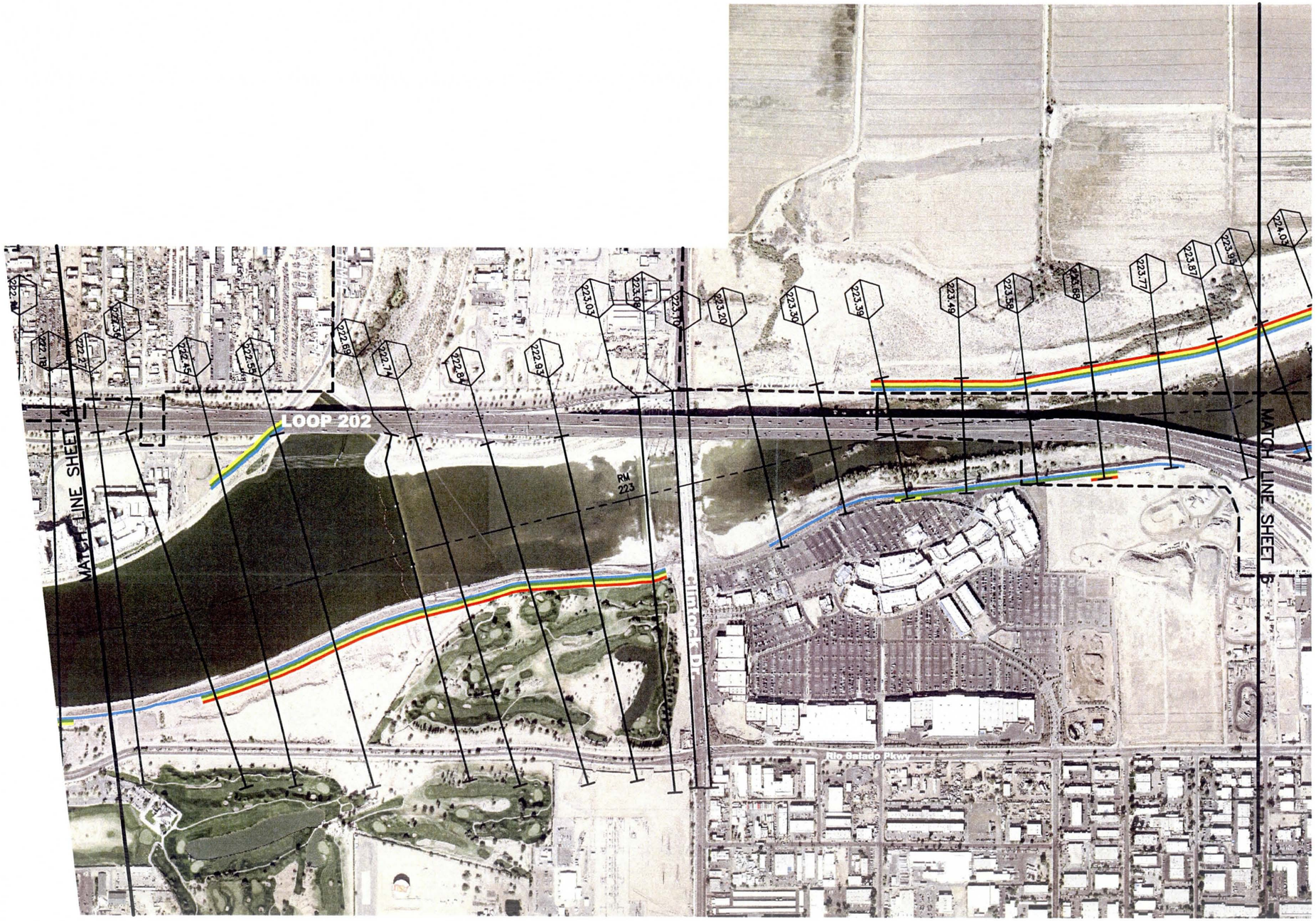
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 4 OF 7



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

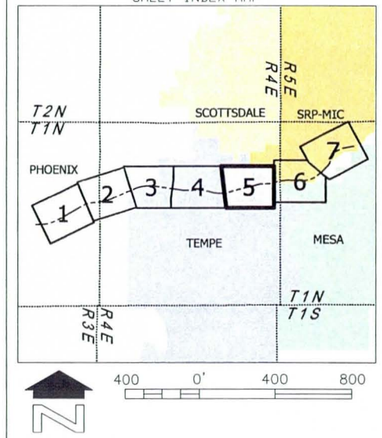
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan

Levee Condition Location Maps

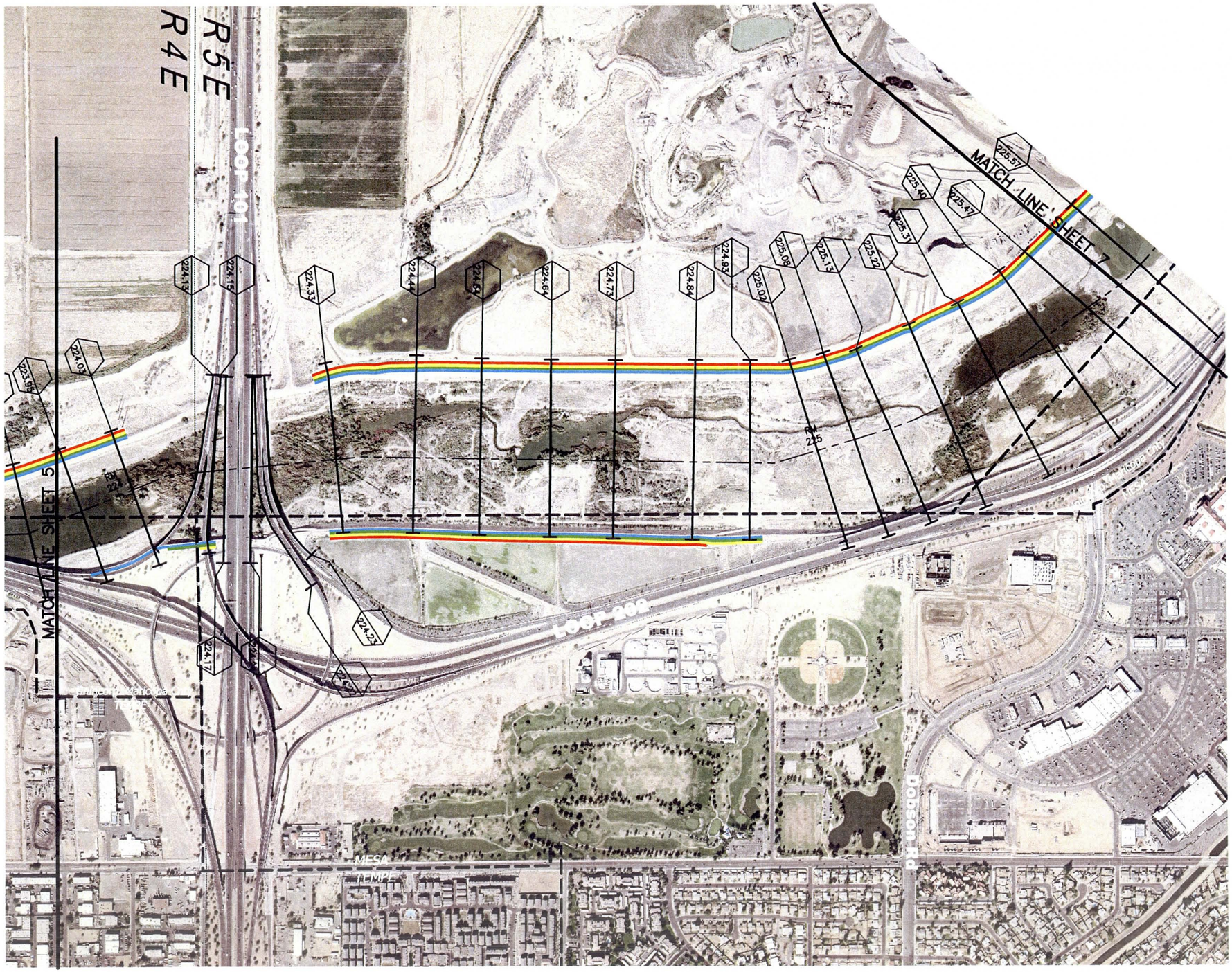
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 5 OF 7



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

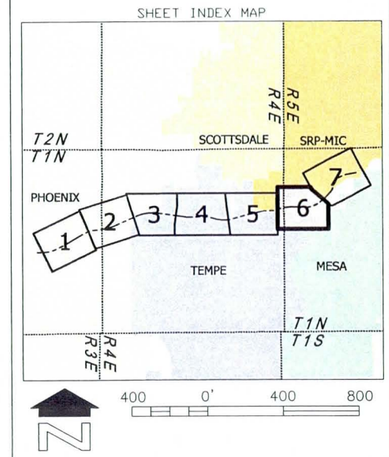
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Levee Condition Location Maps

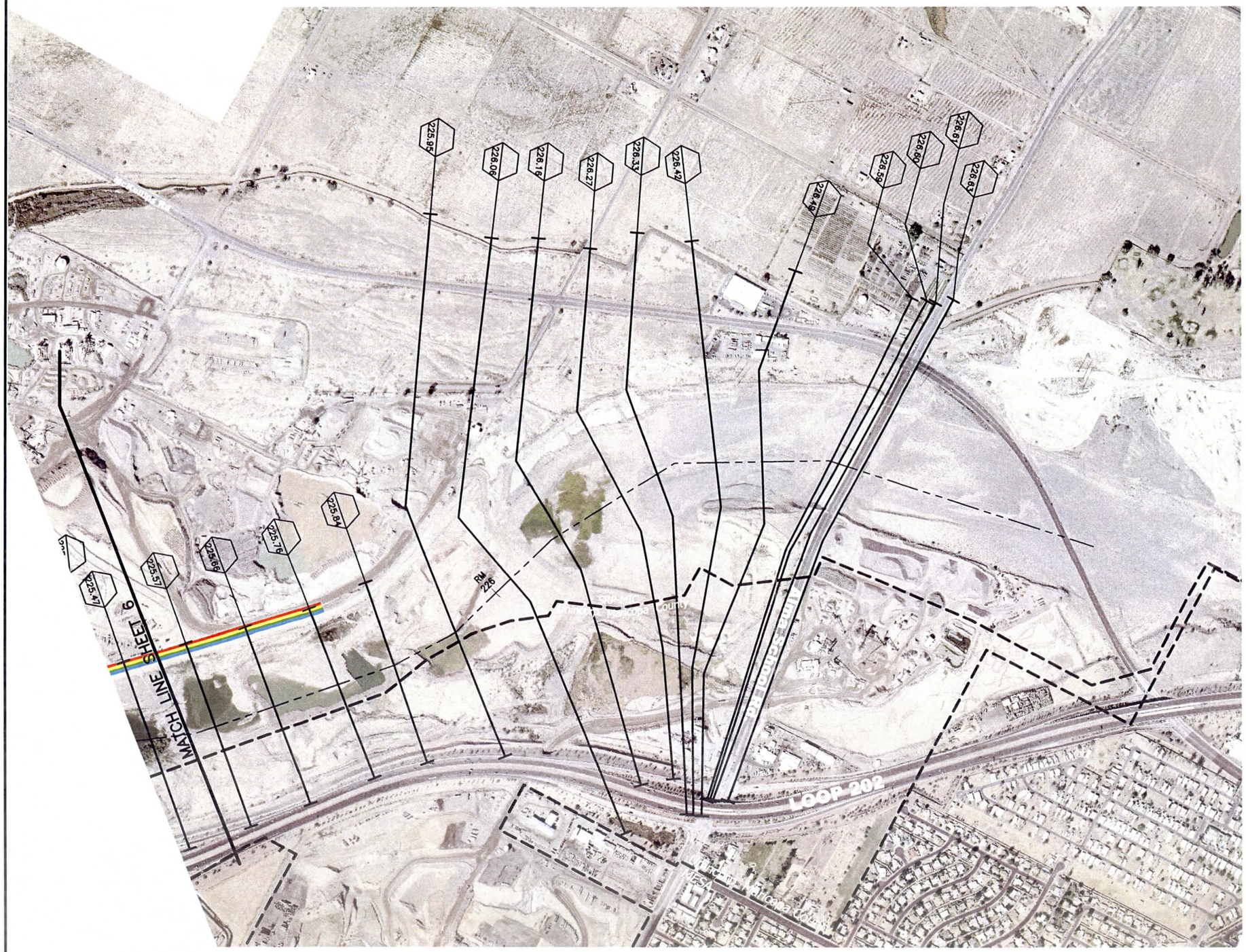
FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 6 OF 7



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

100-Year, Levee Condition

SPF, Levee Condition

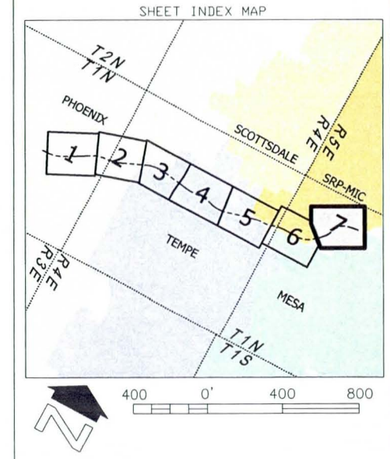
200-Year, Levee Condition

500-Year, Levee Condition

NOTES

1. Events listed above are the Post-Roosevelt Dam Modifications Condition
2. Levee Condition linework does not depict the actual extent of the levee condition, only which cross sections are in the levee condition

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan

Levee Condition Location Maps

FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300087

STANTEC CONSULTING, Inc.

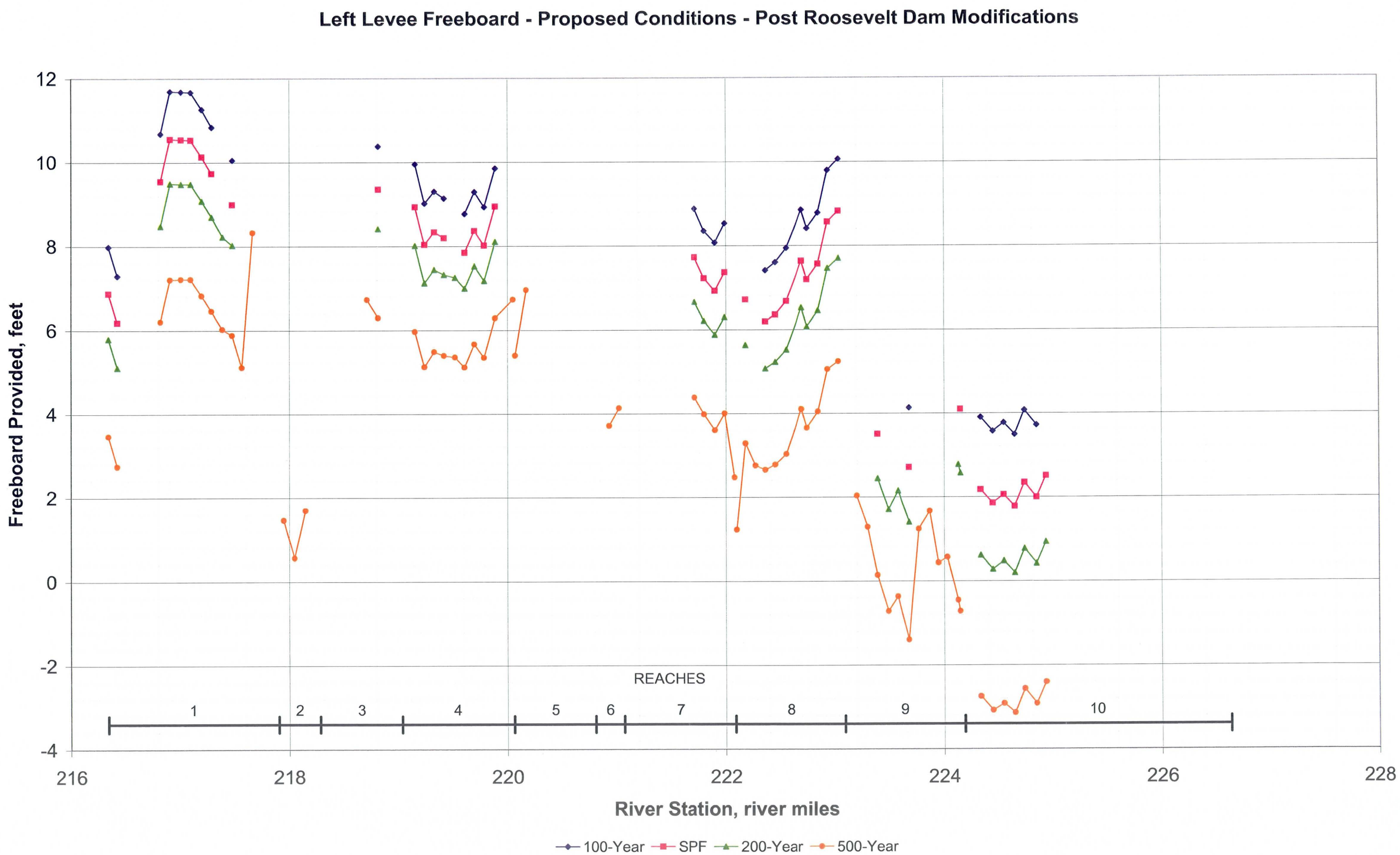
	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	11/2009
PLANS CHK.	PJE	11/2009

SHEET 7 OF 7

ATTACHMENT 10

Freeboard Plots
Left Bank

Left Levee Freeboard - Existing Conditions - Post Roosevelt Dam Modifications
Freeboard Provided, feet
12
10
8
6
4
2
0
-2
-4
REACHES
1
2
3
4
5
6
7
8
9
10
216
218
220
222
224
226
228
River Station, river miles
100-Year
SPF
200-Year
500-Year


Left Levee Freeboard - Proposed Conditions - Post Roosevelt Dam Modifications
Freeboard Provided, feet
12
10
8
6
4
2
0
-2
-4
REACHES
1
2
3
4
5
6
7
8
9
10
216
218
220
222
224
226
228
River Station, river miles
100-Year
SPF
200-Year
500-Year

Attachment 10, Table 1
Existing Conditions, Freeboard, Reach 1 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
216.34	1	7.98	6.86	5.79	3.44
216.42	1	7.29	6.17	5.1	2.73
216.49	1	NA	NA	NA	NA
216.505	1	NA	NA	NA	NA
216.53	1	NA	NA	NA	NA
216.63	1	NA	NA	NA	NA
216.72	1	NA	NA	NA	NA
216.82	1	10.68	9.54	8.48	6.2
216.91	1	11.69	10.55	9.49	7.2
217.01	1	11.68	10.54	9.48	7.2
217.1	1	11.67	10.53	9.48	7.2
217.2	1	11.26	10.13	9.08	6.81
217.29	1	10.84	9.73	8.7	6.45
217.39	1	NA	NA	8.22	6.02
217.48	1	10.05	8.99	8.02	5.87
217.57	1	NA	NA	NA	5.1
217.67	1	NA	NA	NA	8.07
217.76	1	NA	NA	NA	NA
217.86	1	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 2 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
217.95	2	NA	NA	NA	2.85
218.05	2	NA	NA	NA	2.65
218.15	2	NA	NA	NA	2.19
218.24	2	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 3 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
218.33	3	NA	NA	NA	NA
218.43	3	NA	NA	NA	NA
218.52	3	NA	NA	NA	NA
218.62	3	NA	NA	NA	NA
218.71	3	NA	NA	NA	7.36
218.81	3	10.48	9.53	8.67	6.8
218.96	3	NA	NA	NA	NA
218.965	3	NA	NA	NA	NA
218.99	3	NA	NA	NA	NA
219.02	3	NA	NA	NA	NA
219.03	3	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 4 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
219.04	4	NA	NA	NA	NA
219.15	4	10.02	9.03	8.14	6.21
219.24	4	9.07	8.1	7.22	5.31
219.33	4	9.34	8.38	7.52	5.63
219.42	4	9.16	8.23	7.37	5.51
219.52	4	NA	NA	7.29	5.44
219.61	4	8.78	7.86	7.02	5.19
219.70	4	9.3	8.38	7.54	5.72
219.79	4	8.94	8.02	7.19	5.38
219.89	4	9.86	8.94	8.11	6.31
220.05	4	NA	NA	NA	6.74
220.055	4	NA	NA	NA	NA
220.06	4	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 5 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
220.063	5	NA	NA	NA	NA
220.066	5	NA	NA	NA	NA
220.07	5	NA	NA	NA	5.4
220.17	5	NA	NA	NA	6.96
220.26	5	NA	NA	NA	NA
220.35	5	NA	NA	NA	NA
220.45	5	NA	NA	NA	NA
220.54	5	NA	NA	NA	NA
220.64	5	NA	NA	NA	NA
220.73	5	NA	NA	NA	NA
220.78	5	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 6 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
220.83	6	NA	NA	NA	NA
220.93	6	NA	NA	NA	3.27
221.02	6	NA	NA	NA	3.51
221.06	6	NA	NA	NA	NA
221.063	6	NA	NA	NA	NA
221.065	6	NA	NA	NA	NA
221.07	6	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 7 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
221.075	7	NA	NA	NA	NA
221.08	7	NA	NA	NA	NA
221.19	7	NA	NA	NA	NA
221.20	7	NA	NA	NA	NA
221.21	7	NA	NA	NA	NA
221.25	7	NA	NA	NA	NA
221.255	7	NA	NA	NA	NA
221.26	7	NA	NA	NA	NA
221.31	7	NA	NA	NA	NA
221.41	7	NA	NA	NA	NA
221.51	7	NA	NA	NA	NA
221.61	7	NA	NA	NA	NA
221.71	7	8.82	7.65	6.59	4.37
221.80	7	8.3	7.16	6.14	3.97
221.90	7	8.03	6.87	5.82	3.59
221.99	7	8.49	7.31	6.25	3.99
222.08	7	NA	NA	NA	2.46
222.09	7	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 8 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
222.10	8	NA	NA	NA	1.22
222.18	8	NA	6.67	5.58	3.27
222.27	8	NA	NA	NA	2.74
222.36	8	7.39	6.15	5.03	2.65
222.45	8	7.57	6.32	5.19	2.77
222.55	8	7.91	6.64	5.49	3.02
222.69	8	8.83	7.6	6.49	4.1
222.74	8	8.39	7.16	6.04	3.65
222.84	8	8.76	7.53	6.42	4.04
222.93	8	9.77	8.54	7.43	5.04
223.03	8	10.04	8.8	7.67	5.23
223.08	8	NA	NA	NA	NA
223.09	8	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 9 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
223.10	9	NA	NA	NA	NA
223.20	9	NA	NA	NA	2.04
223.30	9	NA	NA	NA	1.48
223.39	9	NA	3.93	2.89	0.65
223.49	9	NA	NA	2.5	NA
223.58	9	NA	NA	3.33	1.02
223.68	9	5.28	3.94	2.72	NA
223.77	9	NA	NA	NA	2.91
223.87	9	NA	NA	NA	NA
223.95	9	NA	NA	NA	2.09
224.03	9	NA	NA	NA	2.17
224.13	9	NA	NA	3.96	1.08
224.15	9	NA	5.13	3.67	0.7
224.17	9	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
224.19	10	NA	NA	NA	NA
224.21	10	NA	NA	NA	NA
224.22	10	NA	NA	NA	NA
224.23	10	NA	NA	NA	NA
224.33	10	4.65	2.99	1.49	NA
224.44	10	4.28	2.63	1.12	NA
224.54	10	4.45	2.79	1.29	NA
224.64	10	4.15	2.49	0.98	NA
224.73	10	4.71	3.05	1.54	NA
224.84	10	4.35	2.69	1.18	NA
224.93	10	NA	3.19	1.68	NA
225.02	10	NA	NA	NA	NA
225.08	10	NA	NA	NA	NA
225.13	10	NA	NA	NA	NA
225.22	10	NA	NA	NA	NA
225.31	10	NA	NA	NA	NA
225.4	10	NA	NA	NA	NA
225.47	10	NA	NA	NA	NA
225.57	10	NA	NA	NA	NA
225.66	10	NA	NA	NA	NA
225.76	10	NA	NA	NA	NA
225.84	10	NA	NA	NA	NA
225.95	10	NA	NA	NA	NA
226.06	10	NA	NA	NA	NA
226.16	10	NA	NA	NA	NA
226.27	10	NA	NA	NA	NA

Attachment 10, Table 1, continued
Existing Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
226.33	10	NA	NA	NA	NA
226.42	10	NA	NA	NA	NA
226.49	10	NA	NA	NA	NA
226.59	10	NA	NA	NA	NA
226.6	10	NA	NA	NA	NA
226.61	10	NA	NA	NA	NA
226.62	10	NA	NA	NA	NA
226.63	10	NA	NA	NA	NA

Attachment 10, Table 2
Proposed Conditions, Freeboard, Reach 1 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
216.34	1	7.98	6.87	5.79	3.46
216.42	1	7.29	6.18	5.1	2.74
216.49	1	NA	NA	NA	NA
216.505	1	NA	NA	NA	NA
216.53	1	NA	NA	NA	NA
216.63	1	NA	NA	NA	NA
216.72	1	NA	NA	NA	NA
216.82	1	10.68	9.54	8.48	6.2
216.91	1	11.69	10.55	9.49	7.2
217.01	1	11.68	10.54	9.48	7.21
217.10	1	11.67	10.53	9.48	7.21
217.2	1	11.26	10.13	9.08	6.82
217.29	1	10.84	9.73	8.7	6.45
217.39	1	NA	NA	8.22	6.02
217.48	1	10.05	8.99	8.02	5.88
217.57	1	NA	NA	NA	5.11
217.67	1	NA	NA	NA	8.32
217.76	1	NA	NA	NA	NA
217.86	1	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 2 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
217.95	2	NA	NA	NA	1.46
218.05	2	NA	NA	NA	0.56
218.15	2	NA	NA	NA	1.69
218.24	2	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 3 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
218.33	3	NA	NA	NA	NA
218.43	3	NA	NA	NA	NA
218.52	3	NA	NA	NA	NA
218.62	3	NA	NA	NA	NA
218.71	3	NA	NA	NA	6.72
218.81	3	10.38	9.35	8.41	6.29
218.96	3	NA	NA	NA	NA
218.965	3	NA	NA	NA	NA
218.99	3	NA	NA	NA	NA
219.01	3	NA	NA	NA	NA
219.03	3	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 4 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
219.04	4	NA	NA	NA	NA
219.15	4	9.95	8.93	8.01	5.96
219.24	4	9.02	8.03	7.12	5.12
219.33	4	9.3	8.33	7.44	5.48
219.42	4	9.14	8.19	7.32	5.39
219.52	4	NA	NA	7.25	5.35
219.61	4	8.77	7.84	6.99	5.11
219.7	4	9.29	8.36	7.52	5.66
219.79	4	8.93	8.01	7.17	5.34
219.89	4	9.85	8.94	8.1	6.28
220.05	4	NA	NA	NA	6.72
220.055	4	NA	NA	NA	NA
220.06	4	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 5 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
220.063	5	NA	NA	NA	NA
220.066	5	NA	NA	NA	NA
220.07	5	NA	NA	NA	5.39
220.17	5	NA	NA	NA	6.95
220.26	5	NA	NA	NA	NA
220.35	5	NA	NA	NA	NA
220.45	5	NA	NA	NA	NA
220.54	5	NA	NA	NA	NA
220.64	5	NA	NA	NA	NA
220.73	5	NA	NA	NA	NA
220.77	5	NA	NA	NA	NA
220.78	5	NA	NA	NA	NA
220.79	5	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 6 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
220.83	6	NA	NA	NA	NA
220.93	6	NA	NA	NA	3.71
221.02	6	NA	NA	NA	4.13
221.06	6	NA	NA	NA	NA
221.063	6	NA	NA	NA	NA
221.065	6	NA	NA	NA	NA
221.07	6	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 7 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
221.075	7	NA	NA	NA	NA
221.08	7	NA	NA	NA	NA
221.19	7	NA	NA	NA	NA
221.20	7	NA	NA	NA	NA
221.21	7	NA	NA	NA	NA
221.25	7	NA	NA	NA	NA
221.255	7	NA	NA	NA	NA
221.26	7	NA	NA	NA	NA
221.31	7	NA	NA	NA	NA
221.41	7	NA	NA	NA	NA
221.51	7	NA	NA	NA	NA
221.61	7	NA	NA	NA	NA
221.71	7	8.88	7.72	6.66	4.38
221.80	7	8.35	7.22	6.21	3.98
221.90	7	8.07	6.92	5.88	3.6
221.99	7	8.53	7.36	6.3	4
222.08	7	NA	NA	NA	2.47
222.09	7	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 8 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
222.10	8	NA	NA	NA	1.22
222.18	8	NA	6.71	5.63	3.28
222.27	8	NA	NA	NA	2.75
222.36	8	7.41	6.19	5.07	2.65
222.45	8	7.6	6.35	5.23	2.77
222.55	8	7.94	6.67	5.52	3.02
222.69	8	8.85	7.63	6.52	4.1
222.74	8	8.41	7.19	6.07	3.65
222.84	8	8.78	7.56	6.45	4.04
222.93	8	9.79	8.56	7.46	5.05
223.03	8	10.06	8.82	7.7	5.24
223.08	8	NA	NA	NA	NA
223.09	8	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 9 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
223.10	9	NA	NA	NA	NA
223.20	9	NA	NA	NA	2.03
223.30	9	NA	NA	NA	1.28
223.39	9	NA	3.5	2.44	0.14
223.49	9	NA	NA	1.7	NA
223.58	9	NA	NA	2.15	NA
223.68	9	4.13	2.7	1.4	NA
223.77	9	NA	NA	NA	1.23
223.87	9	NA	NA	NA	1.66
223.95	9	NA	NA	NA	0.43
224.03	9	NA	NA	NA	0.56
224.13	9	NA	NA	2.77	NA
224.15	9	NA	4.09	2.57	NA
224.17	9	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
224.19	10	NA	NA	NA	NA
224.21	10	NA	NA	NA	NA
224.22	10	NA	NA	NA	NA
224.23	10	NA	NA	NA	NA
224.33	10	3.9	2.17	0.61	NA
224.44	10	3.57	1.85	0.28	NA
224.54	10	3.77	2.05	0.48	NA
224.64	10	3.49	1.77	0.2	NA
224.73	10	4.07	2.34	0.77	NA
224.84	10	3.72	1.99	0.42	NA
224.93	10	NA	2.5	0.93	NA
225.02	10	NA	NA	NA	NA
225.08	10	NA	NA	NA	NA
225.13	10	NA	NA	NA	NA
225.22	10	NA	NA	NA	NA
225.31	10	NA	NA	NA	NA
225.37	10	NA	NA	NA	NA
225.40	10	NA	NA	NA	NA
225.42	10	NA	NA	NA	NA
225.47	10	NA	NA	NA	NA
225.57	10	NA	NA	NA	NA
225.66	10	NA	NA	NA	NA
225.76	10	NA	NA	NA	NA
225.84	10	NA	NA	NA	NA
225.95	10	NA	NA	NA	NA
226.06	10	NA	NA	NA	NA

Attachment 10, Table 2, continued
Proposed Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Left Levee Freeboard (feet)	SPF Left Levee Freeboard (feet)	200-Year Left Levee Freeboard (feet)	500-Year Left Levee Freeboard (feet)
226.16	10	NA	NA	NA	NA
226.27	10	NA	NA	NA	NA
226.33	10	NA	NA	NA	NA
226.42	10	NA	NA	NA	NA
226.49	10	NA	NA	NA	NA
226.59	10	NA	NA	NA	NA
226.60	10	NA	NA	NA	NA
226.61	10	NA	NA	NA	NA
226.62	10	NA	NA	NA	NA
226.63	10	NA	NA	NA	NA

ATTACHMENT 11

Freeboard Plots
Right Bank

Right Levee Freeboard - Existing Conditions - Post Roosevelt Dam Modifications
Freeboard Provided, feet
12
10
8
6
4
2
0
-2
-4
REACHES
1
2
3
4
5
6
7
8
9
10
216
218
220
222
224
226
228
River Station, river miles
100-Year
SPF
200-Year
500-Year

Right Levee Freeboard - Proposed Conditions - Post Roosevelt Dam Modifications
Freeboard Provided, feet
12
10
8
6
4
2
0
-2
-4
REACHES
1
2
3
4
5
6
7
8
9
10
216
218
220
222
224
226
228
River Station, river miles
100-Year
SPF
200-Year
500-Year

Attachment 11, Table 1
Existing Conditions, Freeboard, Reach 1 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
216.34	1	8.2	7.08	6.01	3.66
216.42	1	8.79	7.67	6.6	4.23
216.49	1	NA	NA	NA	NA
216.505	1	NA	NA	NA	NA
216.53	1	NA	NA	NA	NA
216.63	1	NA	NA	NA	NA
216.72	1	NA	NA	NA	NA
216.82	1	NA	NA	NA	NA
216.91	1	NA	NA	NA	NA
217.01	1	NA	NA	NA	NA
217.1	1	NA	NA	NA	NA
217.2	1	NA	NA	NA	NA
217.29	1	NA	NA	NA	NA
217.39	1	NA	NA	NA	NA
217.48	1	NA	NA	NA	NA
217.57	1	NA	NA	NA	NA
217.67	1	NA	NA	NA	NA
217.76	1	NA	NA	NA	NA
217.86	1	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 2 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
217.95	2	NA	NA	NA	NA
218.05	2	NA	NA	NA	NA
218.15	2	NA	NA	NA	NA
218.24	2	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 3 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
218.33	3	NA	NA	NA	NA
218.43	3	NA	NA	NA	NA
218.52	3	9.4	8.46	7.59	5.67
218.62	3	10.47	9.53	8.67	6.77
218.71	3	9.45	8.5	7.65	5.77
218.81	3	10.32	9.37	8.51	6.64
218.96	3	10.49	9.5	8.61	6.67
218.965	3	NA	NA	NA	NA
218.99	3	10.39	9.38	8.48	6.53
219.02	3	NA	NA	NA	NA
219.03	3	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 4 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
219.04	4	NA	NA	NA	NA
219.15	4	NA	8.76	7.87	5.94
219.24	4	NA	9.49	8.61	6.7
219.33	4	11.04	10.08	9.22	7.33
219.42	4	NA	8.63	7.77	5.91
219.52	4	NA	NA	NA	NA
219.61	4	NA	NA	NA	6.96
219.70	4	NA	NA	NA	NA
219.79	4	NA	NA	9.07	7.26
219.89	4	NA	NA	NA	6.17
220.05	4	NA	NA	NA	NA
220.055	4	NA	NA	NA	NA
220.06	4	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 5 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
220.063	5	NA	NA	NA	NA
220.066	5	NA	NA	NA	NA
220.07	5	NA	NA	NA	NA
220.17	5	NA	NA	NA	NA
220.26	5	NA	NA	NA	NA
220.35	5	NA	NA	NA	NA
220.45	5	NA	NA	NA	NA
220.54	5	NA	NA	NA	NA
220.64	5	NA	NA	NA	NA
220.73	5	NA	NA	NA	NA
220.78	5	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 6 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
220.83	6	NA	NA	NA	NA
220.93	6	NA	NA	NA	NA
221.02	6	NA	NA	NA	NA
221.06	6	NA	NA	NA	NA
221.063	6	NA	NA	NA	NA
221.065	6	NA	NA	NA	NA
221.07	6	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 7 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
221.075	7	NA	NA	NA	NA
221.08	7	NA	NA	NA	NA
221.19	7	NA	NA	NA	NA
221.20	7	NA	NA	NA	NA
221.21	7	NA	NA	NA	NA
221.25	7	NA	NA	NA	NA
221.255	7	NA	NA	NA	NA
221.26	7	NA	NA	NA	NA
221.31	7	NA	NA	NA	NA
221.41	7	NA	NA	NA	NA
221.51	7	NA	NA	NA	NA
221.61	7	NA	NA	NA	NA
221.71	7	NA	NA	NA	NA
221.80	7	NA	NA	NA	0.67
221.90	7	NA	NA	NA	NA
221.99	7	7.53	6.35	5.29	3.03
222.08	7	6.92	5.74	4.68	2.41
222.09	7	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 8 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
222.10	8	NA	4.92	3.84	1.55
222.18	8	NA	NA	NA	NA
222.27	8	NA	NA	NA	NA
222.36	8	NA	NA	NA	NA
222.45	8	6.81	5.56	4.43	2.01
222.55	8	6.99	5.72	4.57	2.1
222.69	8	NA	NA	NA	NA
222.74	8	NA	NA	NA	NA
222.84	8	NA	NA	NA	NA
222.93	8	NA	NA	NA	NA
223.03	8	NA	NA	NA	NA
223.08	8	NA	NA	NA	NA
223.09	8	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 9 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
223.10	9	NA	NA	NA	NA
223.20	9	NA	NA	NA	NA
223.30	9	NA	NA	NA	NA
223.39	9	4.8	3.67	2.63	0.39
223.49	9	4.63	3.45	2.38	NA
223.58	9	5.04	3.83	2.74	0.43
223.68	9	5.04	3.7	2.48	NA
223.77	9	5.19	3.76	2.46	NA
223.87	9	5.71	4.19	2.82	0.03
223.95	9	5.67	4.14	2.75	NA
224.03	9	4.79	3.25	1.86	NA
224.13	9	NA	NA	NA	NA
224.15	9	NA	NA	NA	NA
224.17	9	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
224.19	10	NA	NA	NA	NA
224.21	10	NA	NA	NA	NA
224.22	10	NA	NA	NA	NA
224.23	10	NA	NA	NA	NA
224.33	10	5.02	3.36	1.86	NA
224.44	10	5.2	3.55	2.04	NA
224.54	10	5.14	3.48	1.98	NA
224.64	10	5.1	3.44	1.93	NA
224.73	10	4.54	2.88	1.37	NA
224.84	10	4.11	2.45	0.94	NA
224.93	10	4.87	3.21	1.7	NA
225.02	10	4.54	2.88	1.37	NA
225.08	10	4.48	2.82	1.31	NA
225.13	10	4.27	2.61	1.1	NA
225.22	10	4.73	3.07	1.56	NA
225.31	10	4.96	3.3	1.79	NA
225.4	10	4.69	3.03	1.52	NA
225.47	10	5.07	3.4	1.89	NA
225.57	10	5.06	3.4	1.89	NA
225.66	10	5.3	3.64	2.12	NA
225.76	10	5.67	4.02	2.51	NA
225.84	10	NA	NA	NA	NA
225.95	10	NA	NA	NA	NA
226.06	10	NA	NA	NA	NA
226.16	10	NA	NA	NA	NA
226.27	10	NA	NA	NA	NA

Attachment 11, Table 1, continued
Existing Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
226.33	10	NA	NA	NA	NA
226.42	10	NA	NA	NA	NA
226.49	10	NA	NA	NA	NA
226.59	10	NA	NA	NA	NA
226.6	10	NA	NA	NA	NA
226.61	10	NA	NA	NA	NA
226.62	10	NA	NA	NA	NA
226.63	10	NA	NA	NA	NA

Attachment 11, Table 2
Proposed Conditions, Freeboard, Reach 1 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
216.34	1	8.2	7.09	6.01	3.68
216.42	1	8.79	7.68	6.6	4.24
216.49	1	NA	NA	NA	NA
216.505	1	NA	NA	NA	NA
216.53	1	NA	NA	NA	NA
216.63	1	NA	NA	NA	NA
216.72	1	NA	NA	NA	NA
216.82	1	NA	NA	NA	NA
216.91	1	NA	NA	NA	NA
217.01	1	NA	NA	NA	NA
217.10	1	NA	NA	NA	NA
217.2	1	NA	NA	NA	NA
217.29	1	NA	NA	NA	NA
217.39	1	NA	NA	NA	NA
217.48	1	NA	NA	NA	NA
217.57	1	NA	NA	NA	NA
217.67	1	NA	NA	NA	NA
217.76	1	NA	NA	NA	NA
217.86	1	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 2 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
217.95	2	NA	NA	NA	NA
218.05	2	NA	NA	NA	NA
218.15	2	NA	NA	NA	NA
218.24	2	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 3 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
218.33	3	NA	NA	NA	NA
218.43	3	NA	NA	NA	NA
218.52	3	9.12	7.99	6.94	4.61
218.62	3	10.26	9.18	8.17	5.92
218.71	3	9.3	8.25	7.29	5.13
218.81	3	10.22	9.19	8.25	6.13
218.96	3	10.43	9.39	8.45	6.35
218.965	3	NA	NA	NA	NA
218.99	3	10.33	9.28	8.34	6.24
219.01	3	NA	NA	NA	NA
219.03	3	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 4 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
219.04	4	NA	NA	NA	NA
219.15	4	NA	8.66	7.74	5.69
219.24	4	NA	9.42	8.51	6.51
219.33	4	11	10.03	9.14	7.18
219.42	4	NA	8.59	7.72	5.79
219.52	4	NA	NA	NA	NA
219.61	4	NA	NA	NA	6.88
219.7	4	NA	NA	NA	NA
219.79	4	NA	NA	9.05	7.22
219.89	4	NA	NA	NA	6.14
220.05	4	NA	NA	NA	NA
220.055	4	NA	NA	NA	NA
220.06	4	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 5 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
220.063	5	NA	NA	NA	NA
220.066	5	NA	NA	NA	NA
220.07	5	NA	NA	NA	NA
220.17	5	NA	NA	NA	NA
220.26	5	NA	NA	NA	NA
220.35	5	NA	NA	NA	NA
220.45	5	NA	NA	NA	NA
220.54	5	NA	NA	NA	NA
220.64	5	NA	NA	NA	NA
220.73	5	NA	NA	NA	NA
220.77	5	NA	NA	NA	NA
220.78	5	NA	NA	NA	NA
220.79	5	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 6 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
220.83	6	NA	NA	NA	NA
220.93	6	NA	NA	NA	NA
221.02	6	NA	NA	NA	NA
221.06	6	NA	NA	NA	NA
221.063	6	NA	NA	NA	NA
221.065	6	NA	NA	NA	NA
221.07	6	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 7 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
221.075	7	NA	NA	NA	NA
221.08	7	NA	NA	NA	NA
221.19	7	NA	NA	NA	NA
221.20	7	NA	NA	NA	NA
221.21	7	NA	NA	NA	NA
221.25	7	NA	NA	NA	NA
221.255	7	NA	NA	NA	NA
221.26	7	NA	NA	NA	NA
221.31	7	NA	NA	NA	NA
221.41	7	NA	NA	NA	NA
221.51	7	NA	NA	NA	NA
221.61	7	NA	NA	NA	NA
221.71	7	NA	NA	NA	NA
221.80	7	NA	NA	NA	0.68
221.90	7	NA	NA	NA	NA
221.99	7	7.57	6.4	5.34	3.04
222.08	7	6.96	5.79	4.73	2.42
222.09	7	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 8 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
222.10	8	NA	4.96	3.89	1.55
222.18	8	NA	NA	NA	NA
222.27	8	NA	NA	NA	NA
222.36	8	NA	NA	NA	NA
222.45	8	6.84	5.59	4.47	2.01
222.55	8	7.02	5.75	4.6	2.1
222.69	8	NA	NA	NA	NA
222.74	8	NA	NA	NA	NA
222.84	8	NA	NA	NA	NA
222.93	8	NA	NA	NA	NA
223.03	8	NA	NA	NA	NA
223.08	8	NA	NA	NA	NA
223.09	8	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 9 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
223.10	9	NA	NA	NA	NA
223.20	9	NA	NA	NA	NA
223.30	9	NA	NA	NA	NA
223.39	9	4.4	3.24	2.18	NA
223.49	9	3.92	2.69	1.58	NA
223.58	9	4.02	2.73	1.56	NA
223.68	9	3.89	2.46	1.16	NA
223.77	9	3.96	2.44	1.06	NA
223.87	9	4.49	2.88	1.43	NA
223.95	9	4.49	2.86	1.39	NA
224.03	9	3.63	2.01	0.53	NA
224.13	9	NA	NA	NA	NA
224.15	9	NA	NA	NA	NA
224.17	9	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
224.19	10	NA	NA	NA	NA
224.21	10	NA	NA	NA	NA
224.22	10	NA	NA	NA	NA
224.23	10	NA	NA	NA	NA
224.33	10	4.27	2.54	0.98	NA
224.44	10	4.49	2.77	1.2	NA
224.54	10	4.46	2.74	1.17	NA
224.64	10	4.44	2.72	1.15	NA
224.73	10	3.9	2.17	0.6	NA
224.84	10	3.48	1.75	0.18	NA
224.93	10	4.25	2.52	0.95	NA
225.02	10	3.93	2.2	0.63	NA
225.08	10	3.87	2.15	0.58	NA
225.13	10	3.67	1.95	0.38	NA
225.22	10	4.14	2.42	0.86	NA
225.31	10	4.38	2.66	1.09	NA
225.37	10	3.89	2.16	0.6	NA
225.40	10	NA	NA	NA	NA
225.42	10	4.33	2.6	0.94	NA
225.47	10	4.45	2.72	1.06	NA
225.57	10	4.46	2.73	1.07	NA
225.66	10	4.69	2.97	1.31	NA
225.76	10	5.07	3.35	1.7	NA
225.84	10	NA	NA	NA	NA
225.95	10	NA	NA	NA	NA
226.06	10	NA	NA	NA	NA

Attachment 11, Table 2, continued
Proposed Conditions, Freeboard, Reach 10 – Salt River

River Station	Reach	100-Year Right Levee Freeboard (feet)	SPF Right Levee Freeboard (feet)	200-Year Right Levee Freeboard (feet)	500-Year Right Levee Freeboard (feet)
226.16	10	NA	NA	NA	NA
226.27	10	NA	NA	NA	NA
226.33	10	NA	NA	NA	NA
226.42	10	NA	NA	NA	NA
226.49	10	NA	NA	NA	NA
226.59	10	NA	NA	NA	NA
226.60	10	NA	NA	NA	NA
226.61	10	NA	NA	NA	NA
226.62	10	NA	NA	NA	NA
226.63	10	NA	NA	NA	NA

Salt River Hydraulic Master Plan

Field Reconnaissance Memo

Prepared For:
Flood Control District
Of Maricopa County

PREPARED BY:

STANTEC CONSULTING INC.
8211 South 48th Street
Phoenix, Arizona 85044
(602) 438-2200
January 2009
Revised: March 2009

Stantec Consulting Inc.
Project No. 181300035

Table of Contents

1.0 Introduction 1

1.1 Purpose 1
1.2 Location 1

2.0 Physical Characteristics 2

2.1 Manning's N-Value 2
2.1.1 Methodology 2

3.0 Observation Notes 5

4.0 References 6

List of Figures

Figure 1 Location Map 1

Figure 2 Channel Obstructions 4

List of Tables

Table 1 Summary Of Manning's "N" Values 5

List of Attachments

Attachment A Manning's Roughness Coefficients Map .....

Attachment B Manning's Roughness Coefficients Calculation Sheet .....

Attachment C Field Photographs .....

Registered Professional Engineer (Civil)
CERTIFICATE NO.
31680
PATRICK J.
ELLISON
Date Signed 3-2-2009
ARIZONA U.S.A.

Expires 9-30-2009

1.0 INTRODUCTION

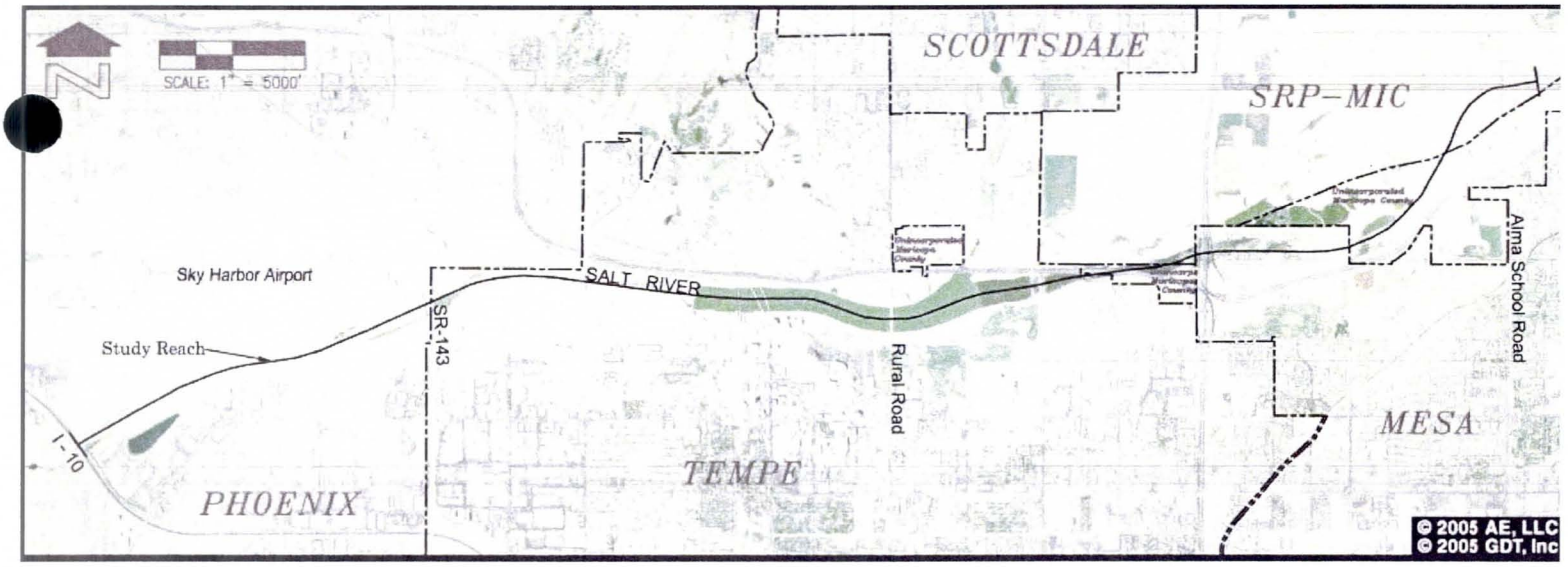
1.1 Purpose

The primary focus of this memo is to present field reconnaissance observations and results of the determination of channel and overbank Manning's roughness coefficients ("n" values) that will be used in the preparation of the HEC-RAS hydraulic model. The hydraulic model will be used to determine the flow capacity of the Salt River. Field reconnaissance was conducted to identify size of bed material, vegetation density and distribution, obstructions to flow and physical characteristics of channel banks.

1.2 Location

The study reach is located along the Salt River from the Interstate 10 Bridge to Alma School Road Bridge. It is within the jurisdictions of the cities of Mesa, Tempe, Phoenix, the Salt River Pima-Maricopa Indian Community (SRP-MIC), and unincorporated Maricopa County. Figure 1 depicts the study reach location.

Figure 1
Location Map



2.0 PHYSICAL CHARACTERISTICS

The subject reach of the Salt River is characterized by an engineered trapezoidal shape channel with varying channel bottom, and steep channel banks which are engineered levees. Segments of the study reach have little or no vegetation within the channel while other segments contain dense vegetation (near the Loops 101 and 202 interchange). Channel bottom width dimensions range from 600 to 1200 feet. Channel side slopes are steep (2:1 horizontal to vertical) and are lined with sparse vegetation in some areas and barren or very little vegetation in others. The channel side slopes (banks) are armored with a gabion mattress and/or soil cement types of bank protection. Vegetation typically occurs on the side slopes that are protected with a gabion mattress. Grass, brush and weeds are the typical vegetation types occurring on gabion mattresses. Vegetation type throughout the study reach consists of grass, shrubs, weeds, cattails, willows, cottonwood, mesquite and other riparian and wetland types of vegetation. In areas of dense vegetation the predominate vegetation types are cattails, willow, and cottonwoods. The average channel bed material size ranges from gravel to cobbles.

Over bank areas, the areas behind the levee are urbanized. Land use in the urbanized area consists of moderate to high density residential, commercial, parks, golf course and parking lots.

2.1 Manning's N-value

2.1.1 Methodology

In order to estimate Manning's *n*-values for the study watercourse, physical characteristics for the watercourse were identified through field observations and examination of ground and aerial photographs as well as examination of topographic mapping. The discerning characteristics recorded are channel size and shape, bed material, vegetation density, the presence of meanders or channel bends and the presence or absence of channel obstructions. Physical characteristics of the study reach were viewed on foot during field reconnaissance and the reach was photographed at representative locations.

Manning's *n*-values were estimated using the methods set forth in the US Geological Survey (USGS) publication Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidelines for Vegetated Channels in Central Arizona.(USGS, 2007). The method cited in the USGS publication and the method used for this study involved the selection of an initial Manning's *n*-value based upon the channel bed material and then the adjustment of that value for channel irregularities, effects of obstructions, vegetation and channel cross sectional variations. If the channel has sufficient meander to increase roughness, then the sum of the base *n*-value plus subsequent adjustments is multiplied by a meander value, *m*.

2.1.1.1 Manning's *n*-Value Determination

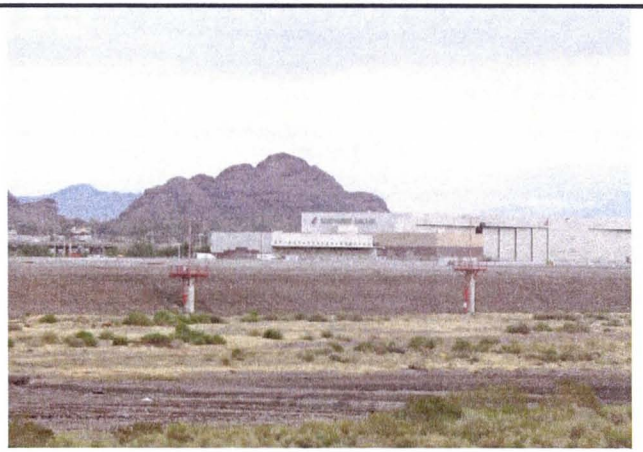
The base *n*-value for the bed material roughness was estimated from field investigations. A 1-foot square grid (grid on 1-inch centers) was utilized for the estimation of the average size of bed material. Adjustment of the base *n*-value was then made based on vegetation present in the channel, field assessment of the channel bank conditions and the impact of any obstructions as well as a review of the topographic mapping for variations in channel geometry.

Base *n*-values for the study reach were estimated from the average size of the channel bed and overbank bed material. Adjustments to the channel base *n*-value were then made to account for channel irregularity, effects of obstruction and vegetation, variations in channel cross section, and degree of meandering. The greatest adjustment to the base *n*-value is from the effect of vegetation and/or obstructions. The degree of channel irregularity (physical characteristics of the side slopes) is smooth therefore no adjustments are made. Variations in channel cross section are typically minor; therefore, no adjustment was made. No significant meanders occur in the study reach of Salt River, therefore no adjustments for river meandering were made. In the effect of obstructions category, adjusting the base *n*-value for the presence of boulders or man-made features in the channel was necessary due to a number of obstructions. Obstructions within the channel include bridge piers, dam abutments, Sky Harbor Airport runway guide lights, and both west and east Tempe Town Lake Dams. Figure 2 illustrates the type of obstructions found within the channel of the Salt River.

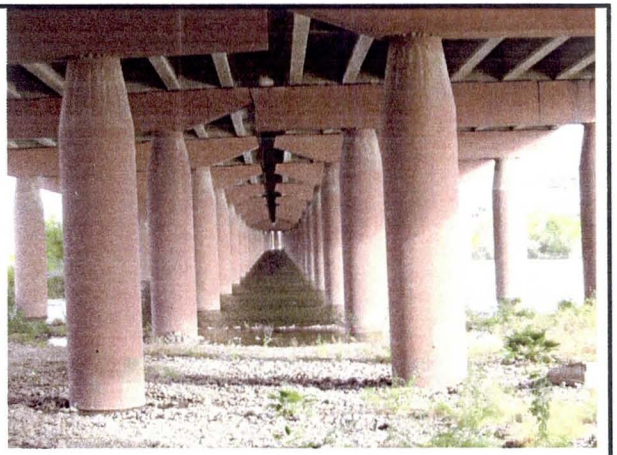
For the purpose of estimating "n" values zones of similar physical characteristics were delineated and an n value estimated for each zone. A summary of the results of the Manning *n*-value estimation is listed in Table 1. Calculation sheets listing the estimated base *n*-values and adjustments to that value for each zone is provided as Attachment B. Field photographs depicting channel physical characteristics are provided as Attachment C and a map depicting the location of the field photographs and the distribution of *n*-values is provided as Attachment A.

Figure 2
Channel Obstructions

Old Piers

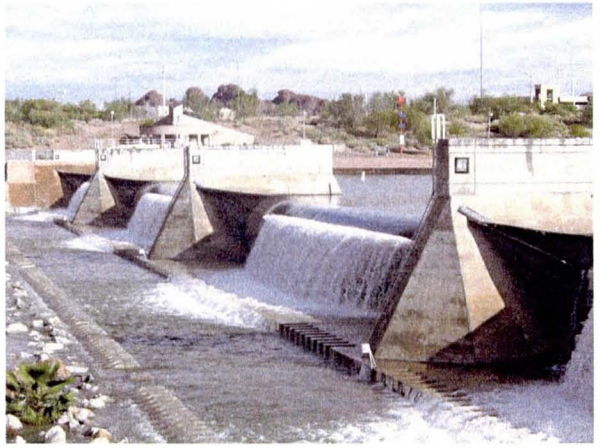


Airport Runway Guide Lights



Bridge Piers

Bridge Piers



Tempe Town Lake West Dam

Tempe Town Lake East Dam

Table 1
Summary of Manning's "n" Values

"n" value Zone	"n" value	Comments
1	0.035	channel value
2	0.030	Zone includes area from inside channel toe of levee to the area behind the levee provided that the land use is vacant lot or roadway.
3	0.080	Urban area behind levee where the obstruction to flow is greater than 50%.
4	0.050	Area behind levee where land uses is parking lots and there is an assumed 15% to 50 % obstruction to flow.
5	0.040	Zone includes area from inside channel toe of levee to the area behind the levee provided that the land uses are parks.
6	0.070	Golf course with obstructions and alternating flow path geometry.
7	0.050	Portion of channel under Loop 202 bridge. 5% to 15% of the flow area is obstructed by piers.
8	0.080	Portion of the channel upstream of the Loop 101/Loop 202 interchange where dense vegetation occurs.
9	0.095	Portion of the channel under the Loop 101/Loop 202 interchange where dense vegetation occurs and there are pier obstructions.
10	0.045	Area between McClintock Drive and the Loop 101/Loop 202 interchange where there is medium density vegetation

3.0 OBSERVATION NOTES

The following observations made during the field visit ate noted:

- Bank protection along the south bank upstream of the Interstate 10 Bridge (Photographic Way Point 3) has failed.
- The area upstream of Va Shly' Ay appears to have been mined since the development of the topographic mapping.
- Plans of the dams for Tempe Town Lake will need to be obtained before n values are estimated in the vicinity of the dams.

4.0 REFERENCES

Reports/Documents

Michael Baker, Jr., Inc (Baker), Salt-Gila River Floodplain Delineation Restudy (Baker 1999, FEMA Case No. 99-09-706P),

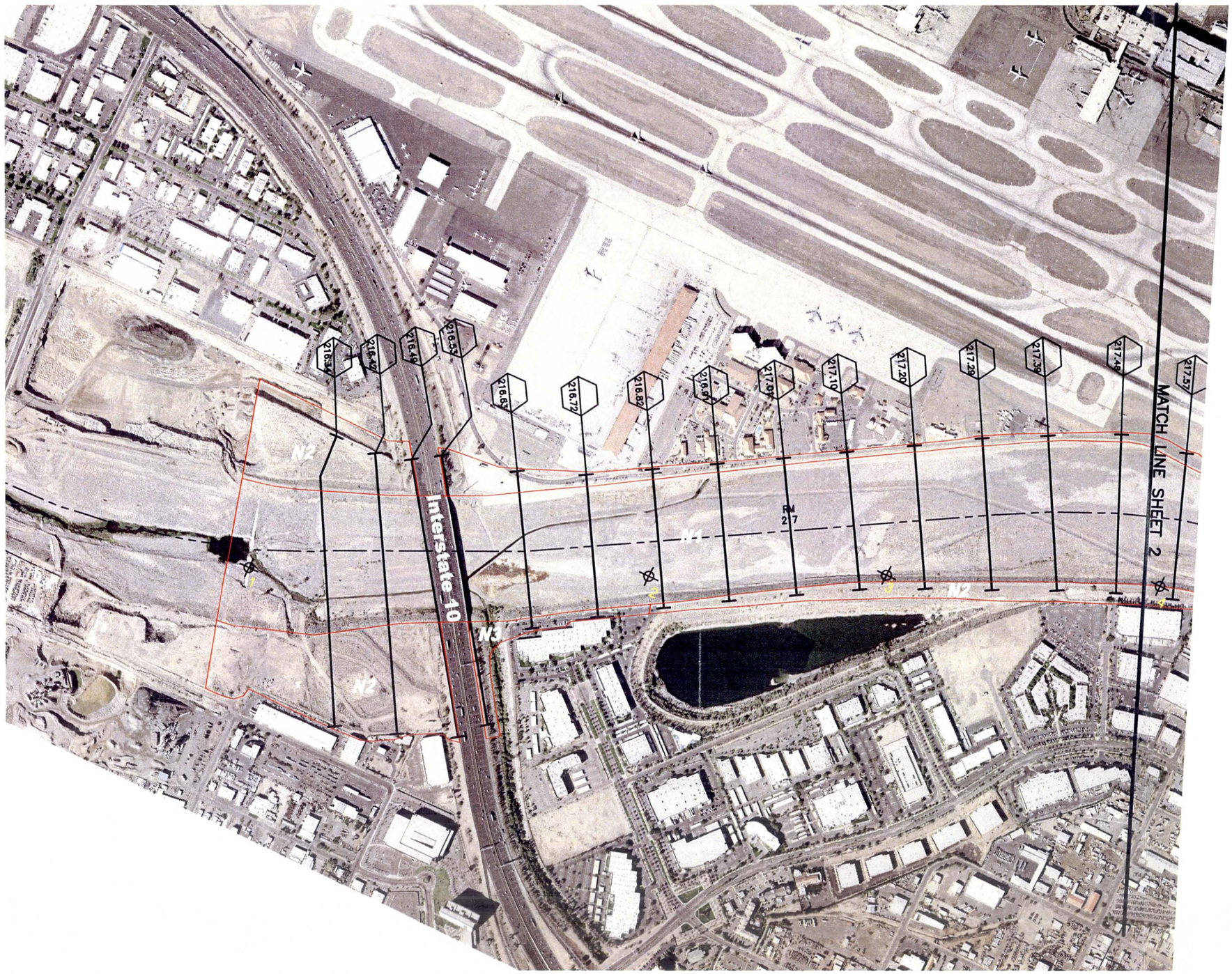
Manuals/Guidelines

Flood Control District of Maricopa County (FCDMC), January 1995 revised 2003. Drainage Design Manual for Maricopa County, Arizona, Volume 2, Hydraulics.

Phillips, Jeff V. and Tadayon Saeid, 2007. Selection of Manning's Roughness Coefficient for Natural and Constructed Vegetated and Non-Vegetated Channels, and Vegetation Maintenance Plan Guidlelines for Vegetated Channels in Central Arizona.. Prepared by the US Geological Survey Water Resources Division for the Flood Control District of Maricopa County.

US Army Corps of Engineers (COE). January 2001. HEC-RAS River Analysis System User's Manual.

Attachment A
Manning's Roughness Coefficients Map



LEGEND

CROSS SECTION 0.10

HYDRAULIC BASE LINE RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID #

MANNING'S N-VALUE BOUNDARY

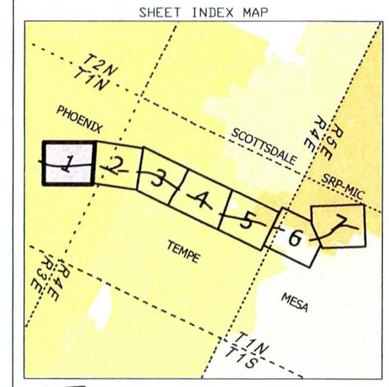
N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM

HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



400 0' 400 800

NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

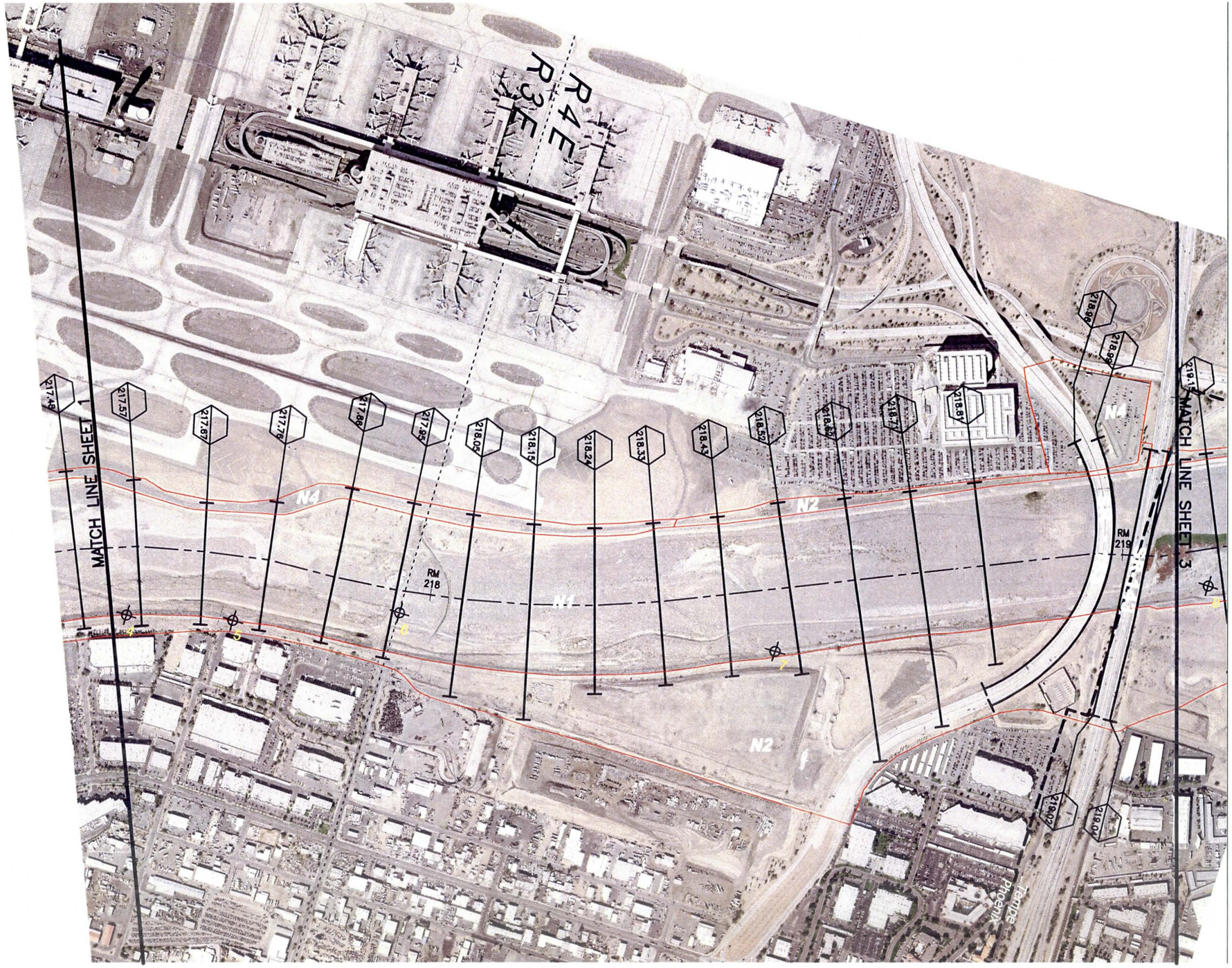
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 1 OF 7



LEGEND

CROSS SECTION — 0.10

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID — #

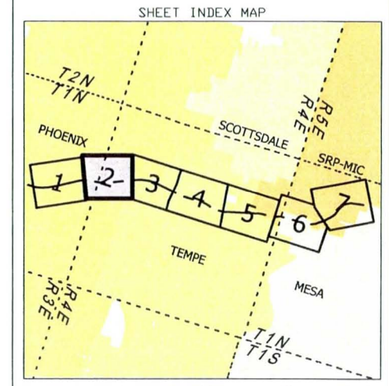
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



400 0' 400 800

NO	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

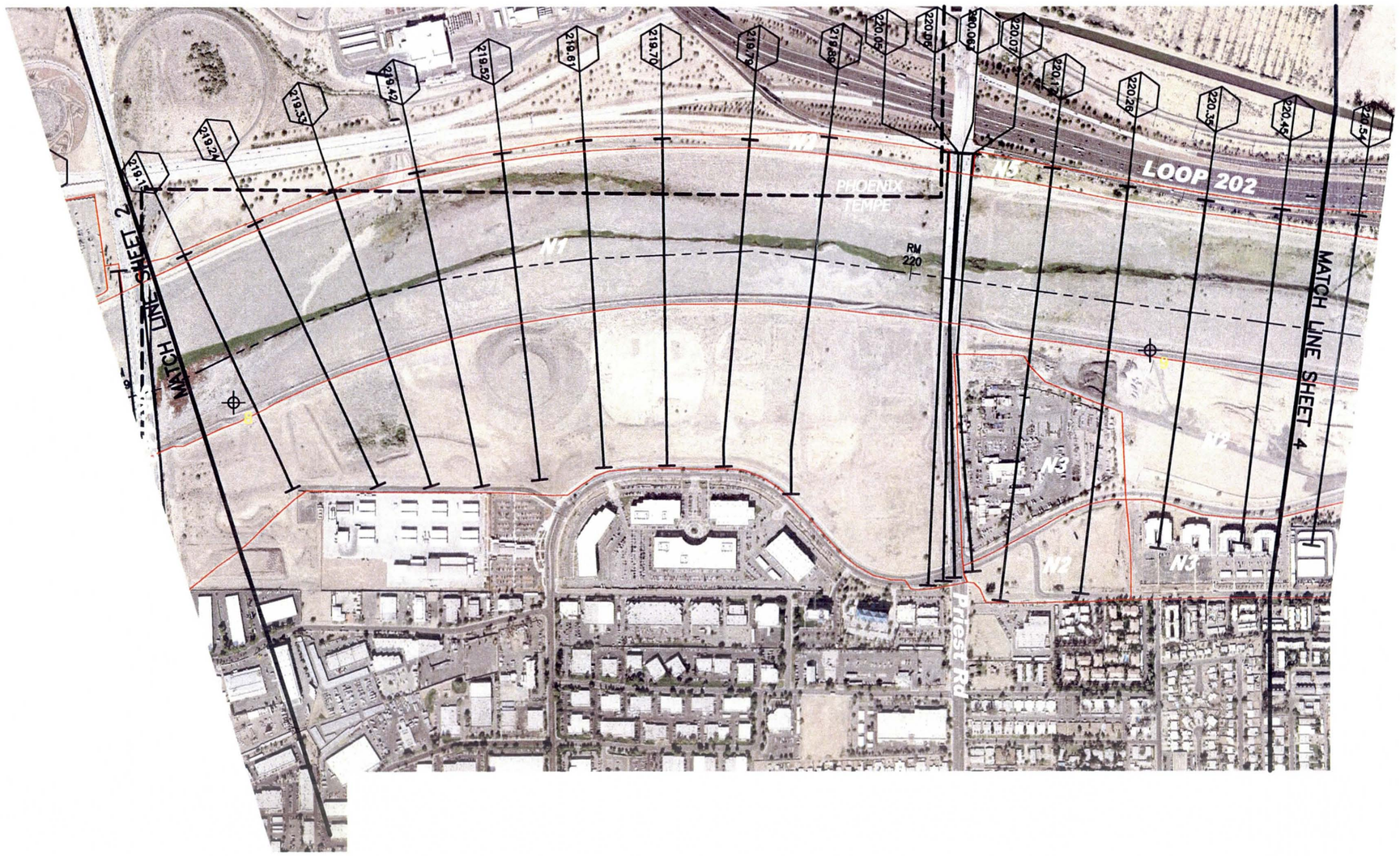
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	--	--
DESIGN CHK.	--	--
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 2 OF 7



LEGEND

CROSS SECTION — 0.10

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID — #

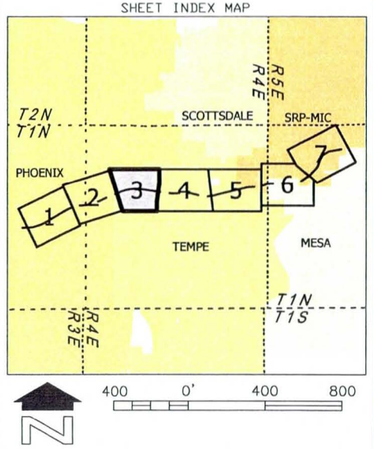
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

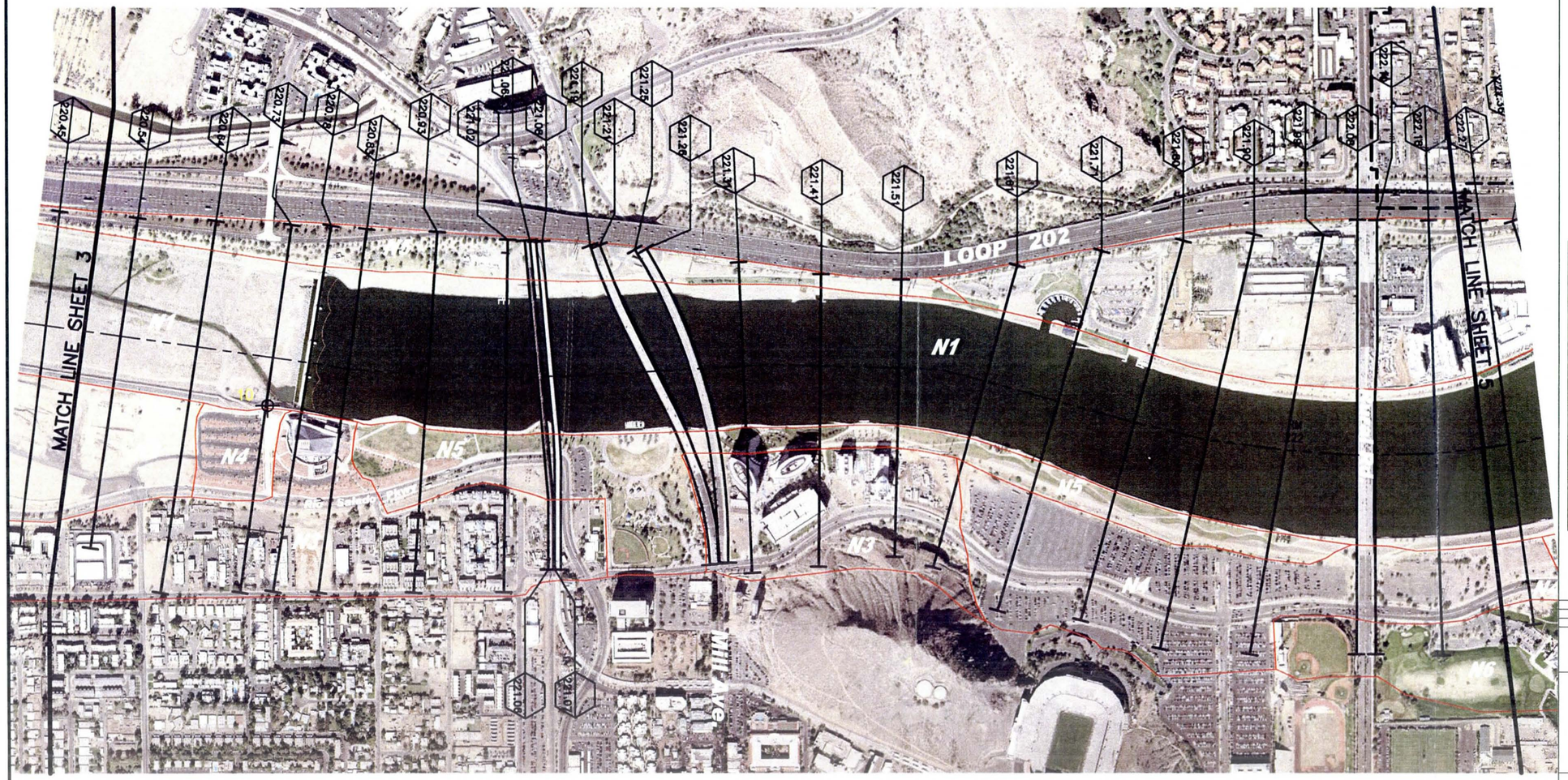
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 3 OF 7



LEGEND

CROSS SECTION (0.10)

HYDRAULIC BASE LINE (RM 219)

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID #

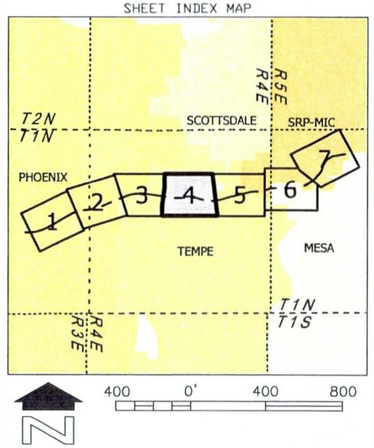
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

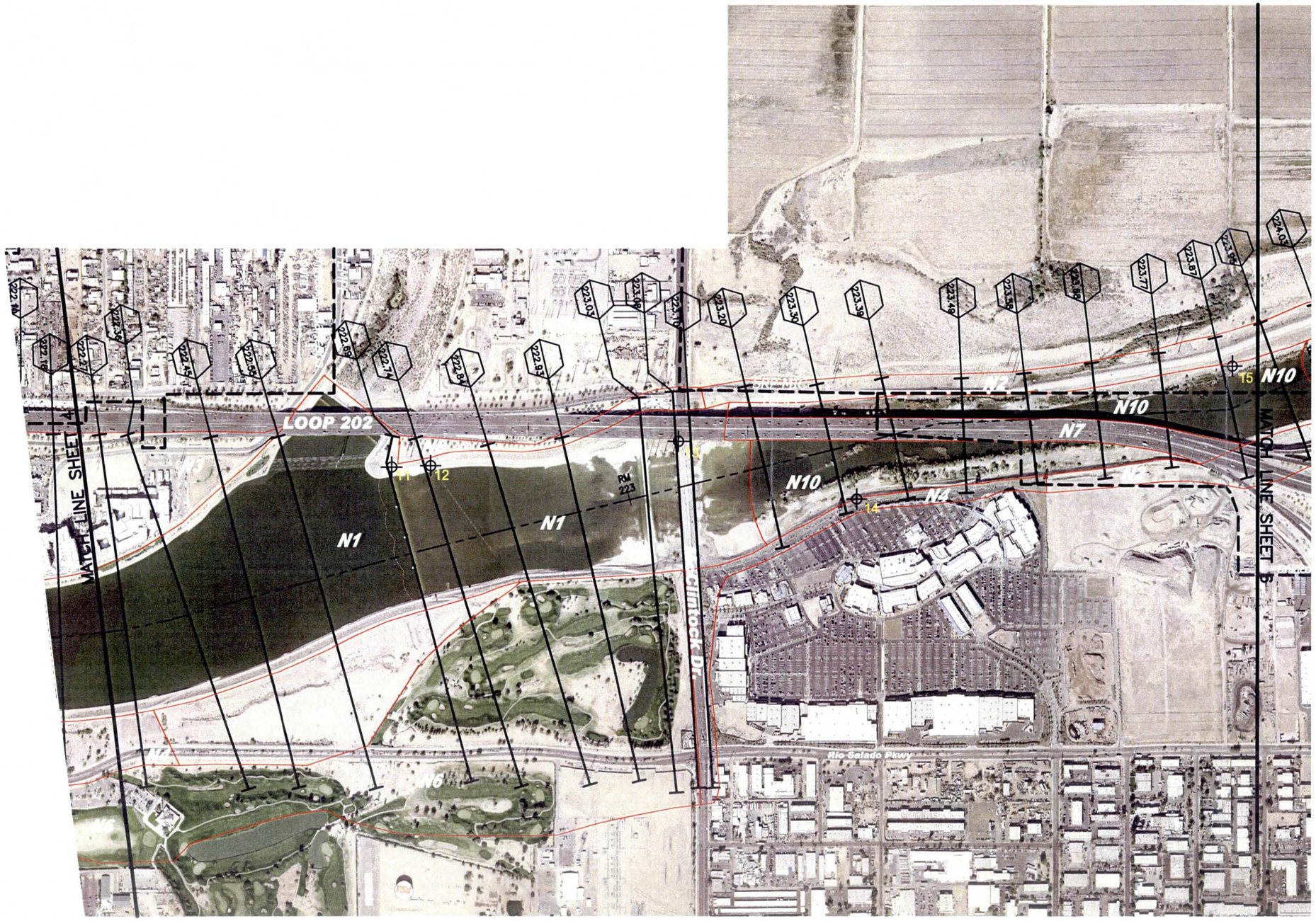
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 4 OF 7



LEGEND

CROSS SECTION — 0.10 — CROSS SECTION INDEX NUMBER; RIVER SYSTEM DESIGNATION

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID — #

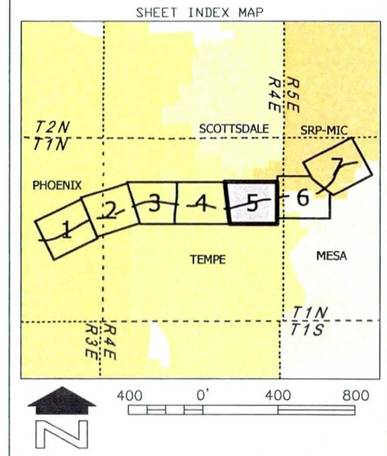
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



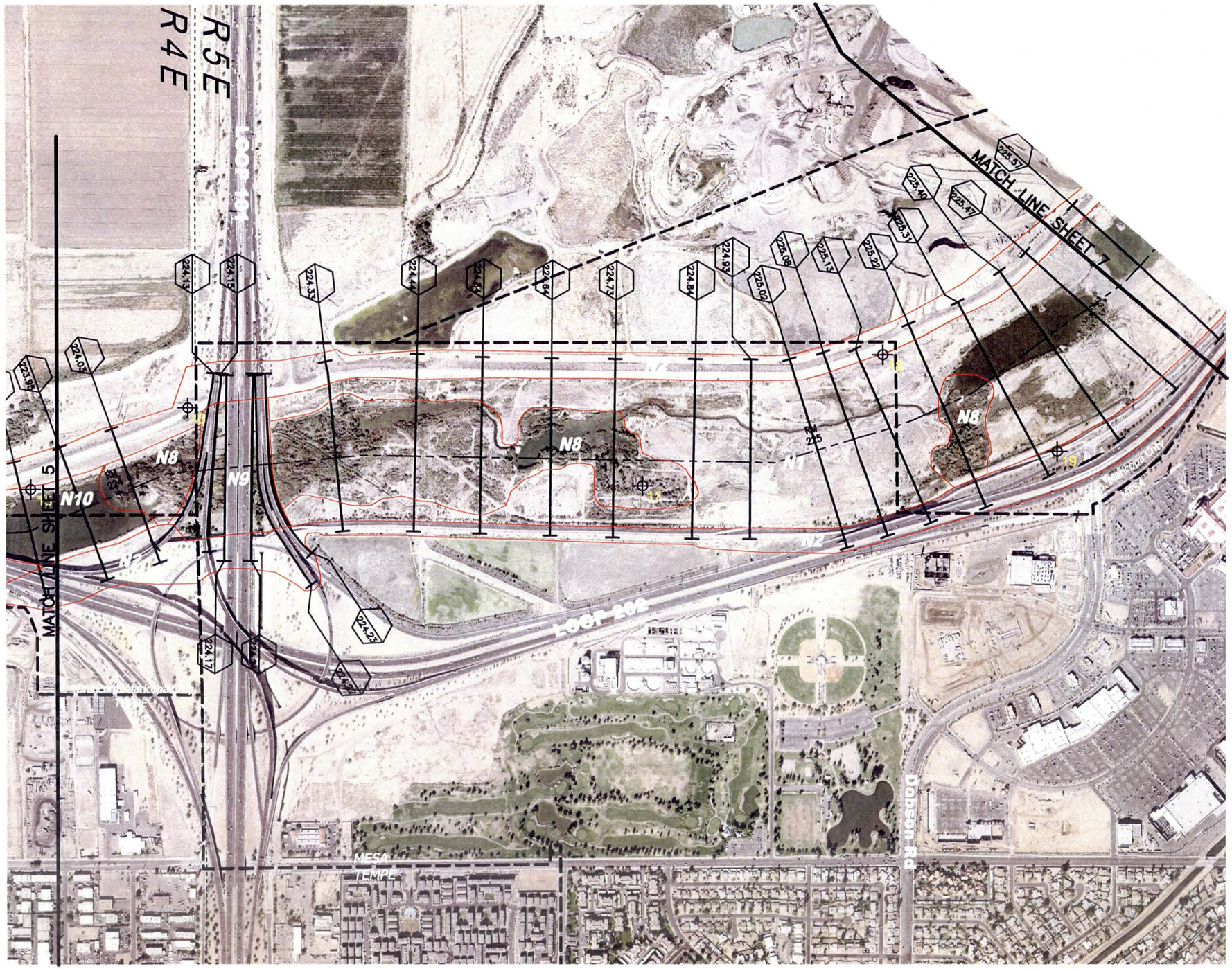
NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannnings N-value Maps
FCD Contract 2007C017 / PCN 126.06.20
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	—	—
DESIGN CHK.	—	—
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A



LEGEND

CROSS SECTION — 0.10

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID — #

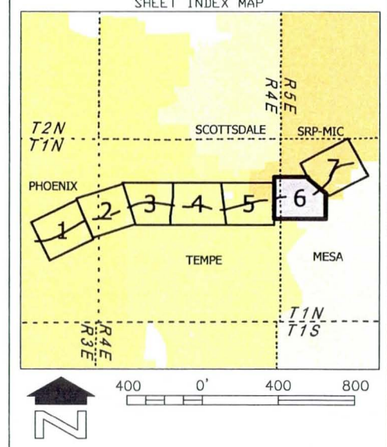
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

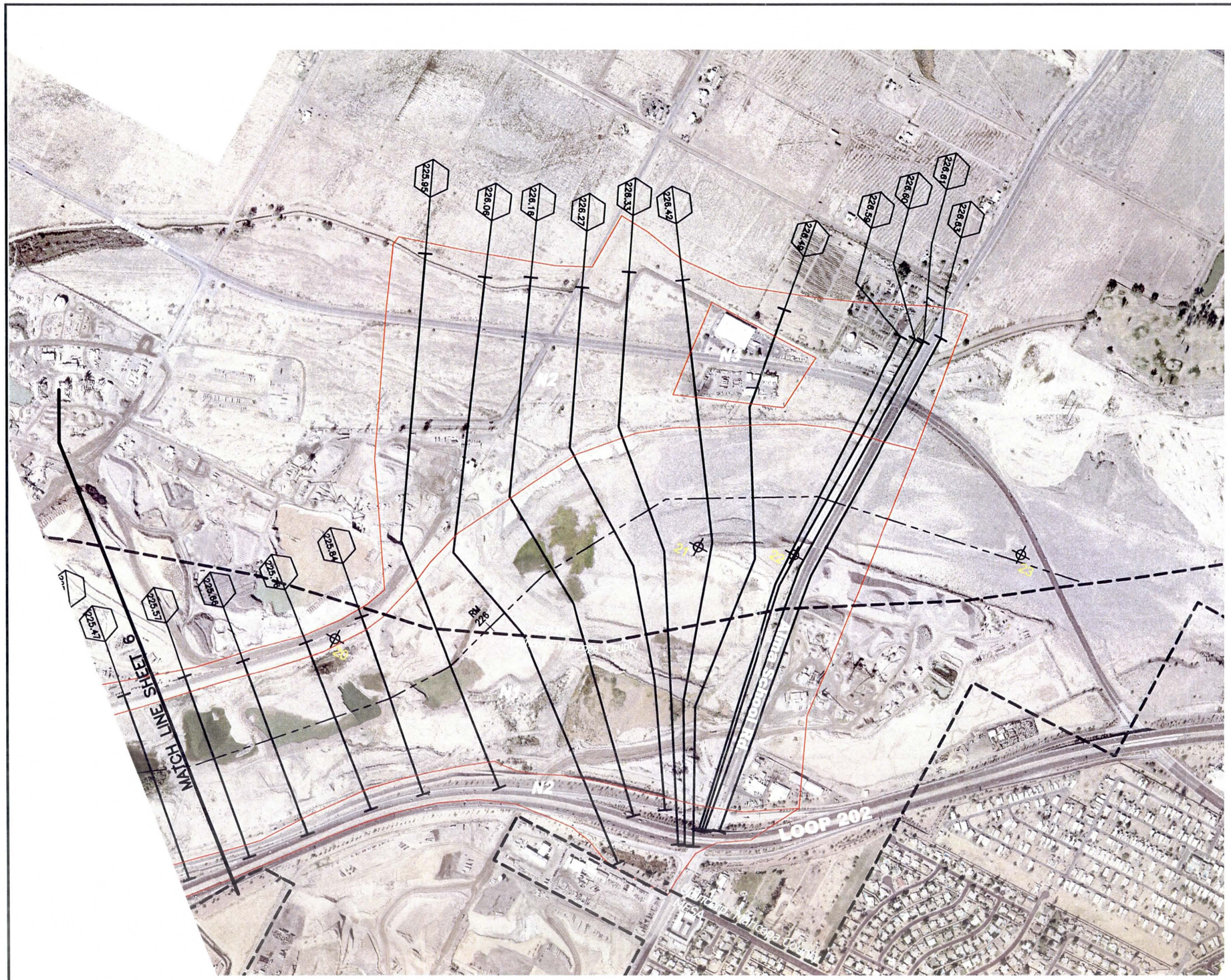
Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 6 OF 7



LEGEND

CROSS SECTION — 0.10

HYDRAULIC BASE LINE — RM 219

CORPORATE LIMITS

PHOTO WAYPOINT LOCATION & ID — #

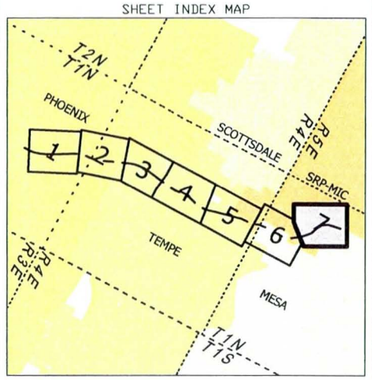
MANNING'S N-VALUE BOUNDARY

N1 = 0.035
N2 = 0.030
N3 = 0.080
N4 = 0.050
N5 = 0.040
N6 = 0.070
N7 = 0.050
N8 = 0.080
N9 = 0.095
N10 = 0.045

NOTES

DATUM
HORIZONTAL: North American Datum of 1983
VERTICAL: National Geodetic Vetical Datum of 1929

SHEET INDEX MAP



400 0' 400 800

NO.	REVISION	BY	DATE
2			
1			

Salt River Hydraulic Master Plan
Mannings N-value Maps

FCD Contract 2007C017 / PCN 126.06.20

Stantec Proj. 181300035

STANTEC CONSULTING, Inc.

	BY	DATE
DESIGN	–	–
DESIGN CHK.	–	–
PLANS	AML	2/2009
PLANS CHK.	PJE	2/2009

ATTACHMENT A

SHEET 7 OF 7

Attachment B
Manning's Roughness Coefficients Calculation Sheet

Determination of Manning's n-value by the FCDMC method

Project: Salt River Hydraulic Master Plan
Stream: Salt River
Reach: Salt River between I-10 and Alma School Rd By: PJE & AML Date: 12/17/2008

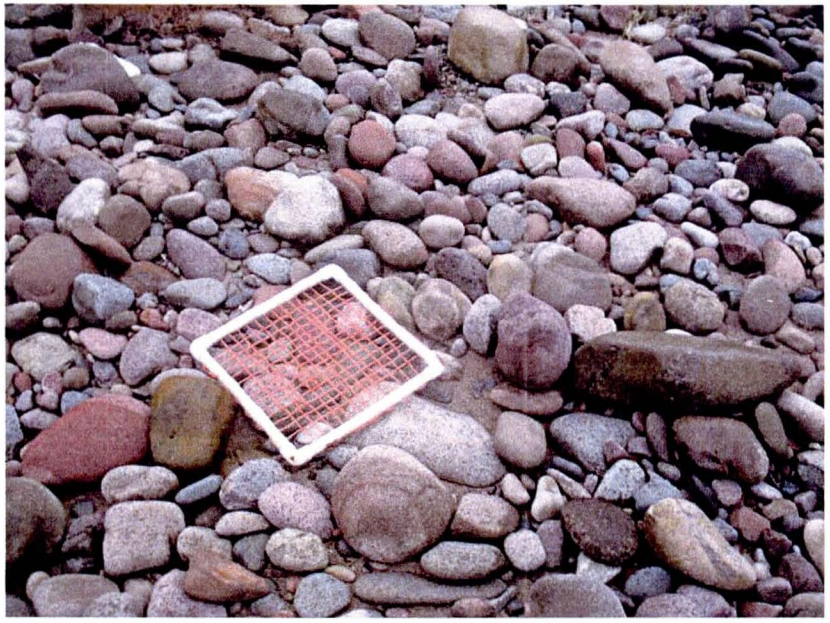
Channel Conditions		Manning's n Adjustment		n1	n2	n3	n4	n5	n6	n7	n8	n9	n10
Channel Bed Material	Concrete / Asphalt	n_0	0.012 - 0.018			0.018	0.018						
	Rock Cut		0.025										
	Firm Soil		0.025 - 0.032		0.030			0.030	0.030				
	Fine Sand		0.023 - 0.026										
	Coarse Sand		0.026 - 0.035										
	Gravel		0.028 - 0.035										
	Cobble		0.030 - 0.050	0.030						0.030	0.030	0.030	0.030
	Boulder		0.040 - 0.070										
Degree of Irregularity	Smooth	n_1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Minor		0.001 - 0.005										
	Moderate		0.006 - 0.010						0.010				
	Severe		0.011 - 0.020										
Effects of Obstructions	Negligible	n_2	0.000 - 0.004	0.003	0.000						0.000		0.000
	Minor		0.005 - 0.015							0.015		0.015	
	Appreciable		0.020 - 0.030				0.030		0.020				
	Severe		0.040 - 0.060			0.060							
Vegetation	Negligible	n_3	0.000-0.002	0.002	0.000	0.000							
	Small		0.002 - 0.010				0.005	0.010	0.010	0.005			
	Medium		0.010 - 0.025										0.015
	Large		0.025 - 0.050										
	Very Large		0.050 - 0.100								0.050	0.050	
	Extremely Large		0.100 - 0.200										
Variations in Channel Cross Section	Gradual	n_4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Alternating (occasionally)		0.001 - 0.005										
	Alternating (frequently)		0.010 - 0.015										
Degree of Meandering	Minor	m	1.00	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Appreciable		1.15										
	Severe		1.30										
$n = (n_0 + n_1 + n_2 + n_3 + n_4)m$				0.035	0.030	0.078	0.053	0.040	0.070	0.050	0.080	0.095	0.045
Round values to the nearest 0.005:				**0.035**	**0.030**	**0.080**	**0.050**	**0.040**	**0.070**	**0.050**	**0.080**	**0.095**	**0.045**
Photograph Waypoint Number.:				1,2,4,5,6 7,8,9,10, 11,12,15 17,18,19 20,21,22	3,7,9,	see aerial Attact. A	see aerial Attact. A	see aerial Attact. A	see aerial Attact. A	13	15	16	13,14,15

Attachment C
Field Photographs

WP 1 – Looking Upstream

WP 1 – Looking Downstream

WP 1 – Atop grade control structure looking north



WP 1 – Bed material

WP 2 – Bed Material

WP 2 – Looking Upstream

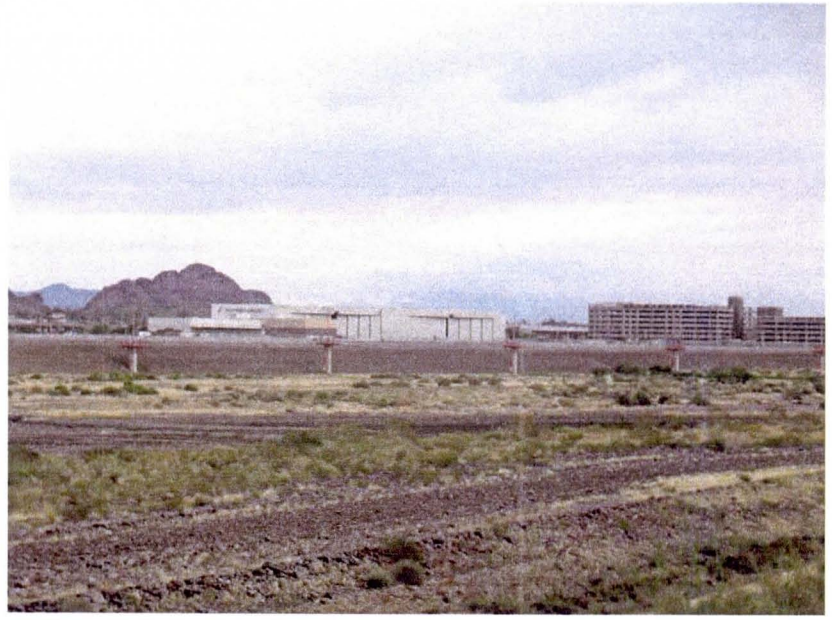
WP 2 – Looking Downstream

WP 3 – Eroding Bank Protection

WP 3 – Eroding Bank Protection

WP 3 – Eroding Bank Protection

Viewed from WP 4 – Obstruction in Channel



Viewed from WP 5 - Airport runway guide lights in channel

Viewed from WP 5 – Grade control structure

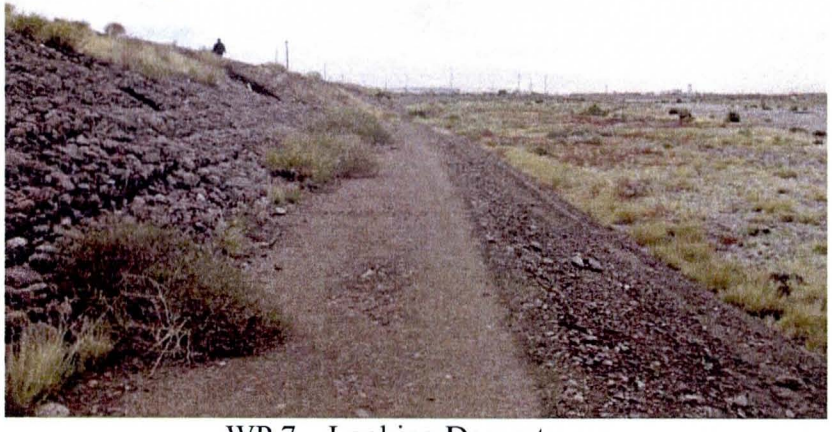
WP 6 – Bed Material

WP 6 – Looking Upstream

WP 6 – Looking Downstream

WP 7 – Bed Material

WP 7 – Looking Upstream



WP 7 – Looking Downstream

WP 8 – Bed Material

WP 8 – Looking Upstream

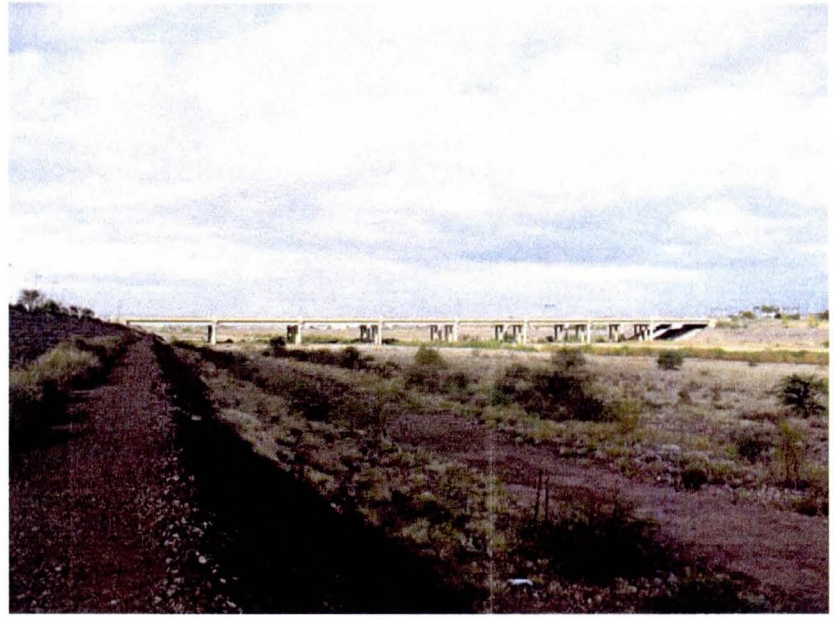
WP 8 – Looking Downstream

WP 8 – Marsh

East of WP 8 – Air Lane Road Culvert, north bank

East of WP 8 – Priest Road Bridge, Looking upstream, north abutment

East of WP 8 – Priest Road Bridge, looking upstream, south abutment



WP 9 – Priest Road Bridge, looking downstream

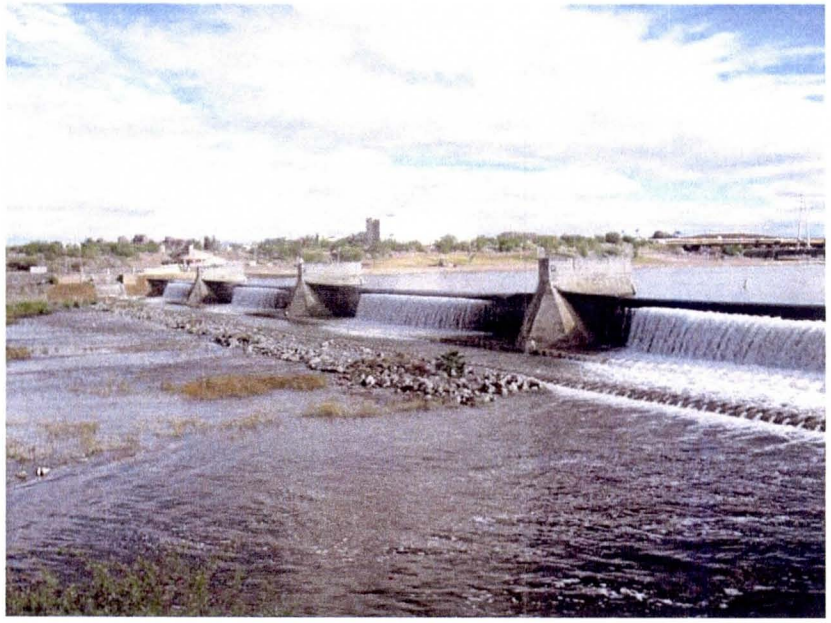
WP 9 – Bed Material

WP 9 – Channel Vegetation

WP 9 – Channel Vegetation

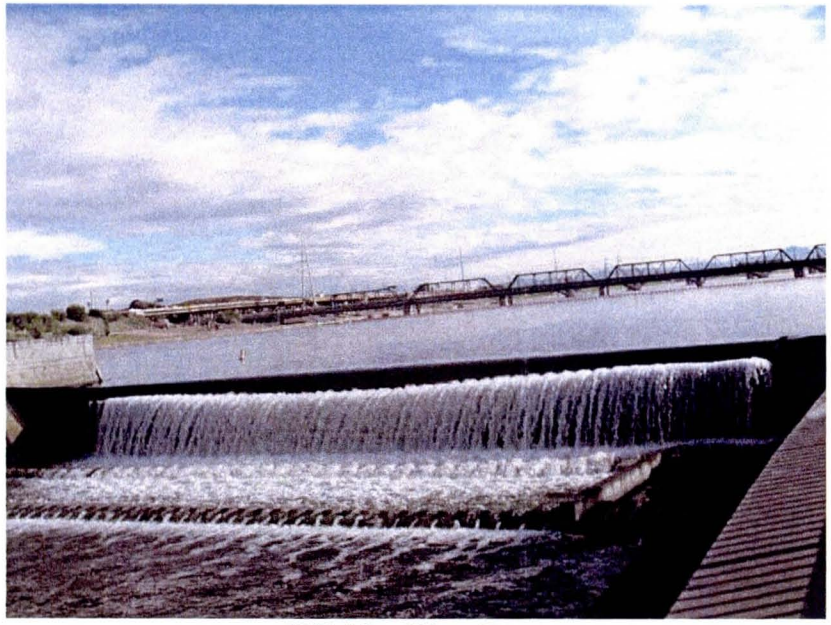
WP 9 – Channel landscaping

WP 10 – Downstream of east dam



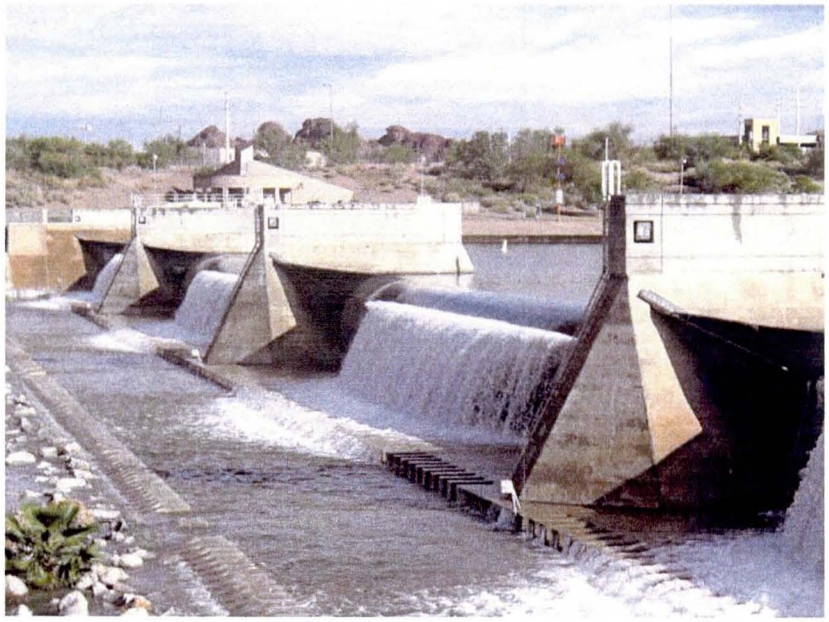
WP 10 – West Dam

WP 10 – West Dam

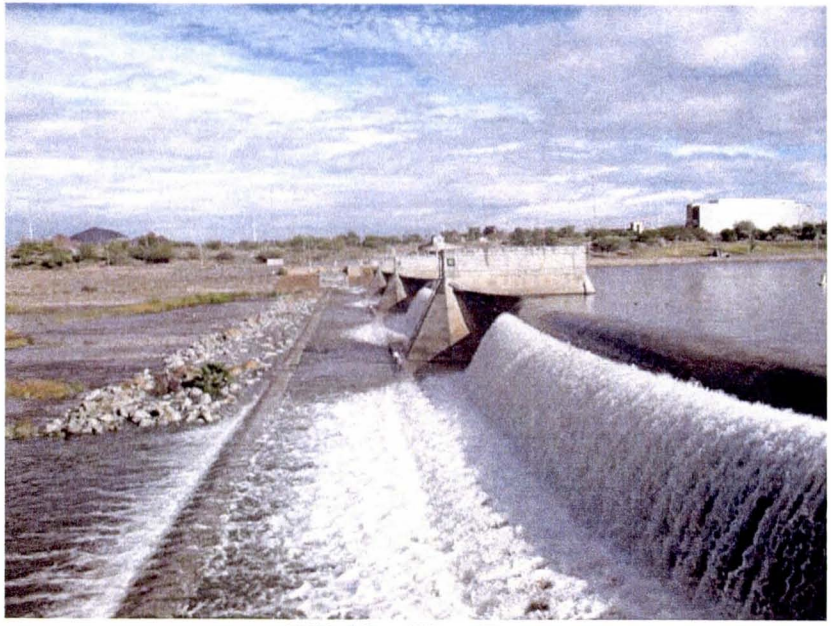


WP 10 – West Dam

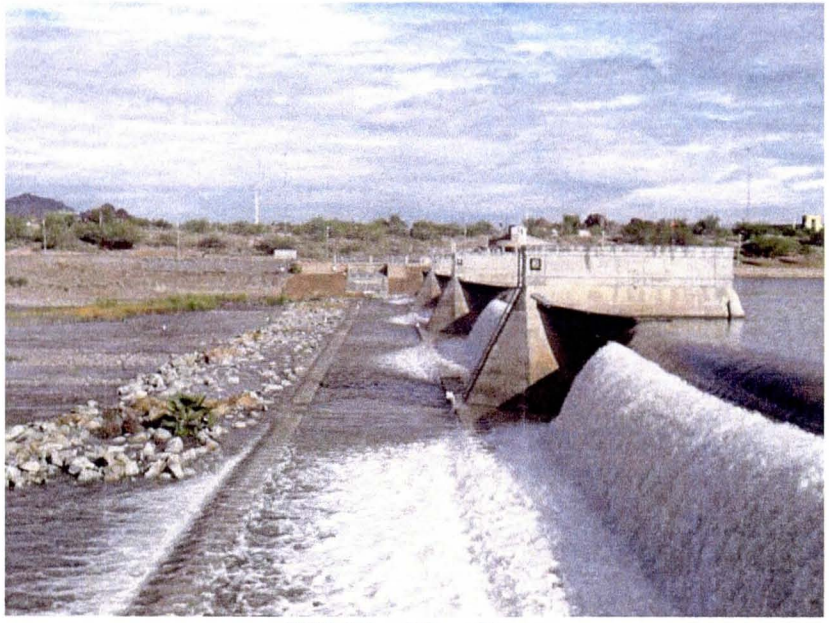
WP 10 – West Dam



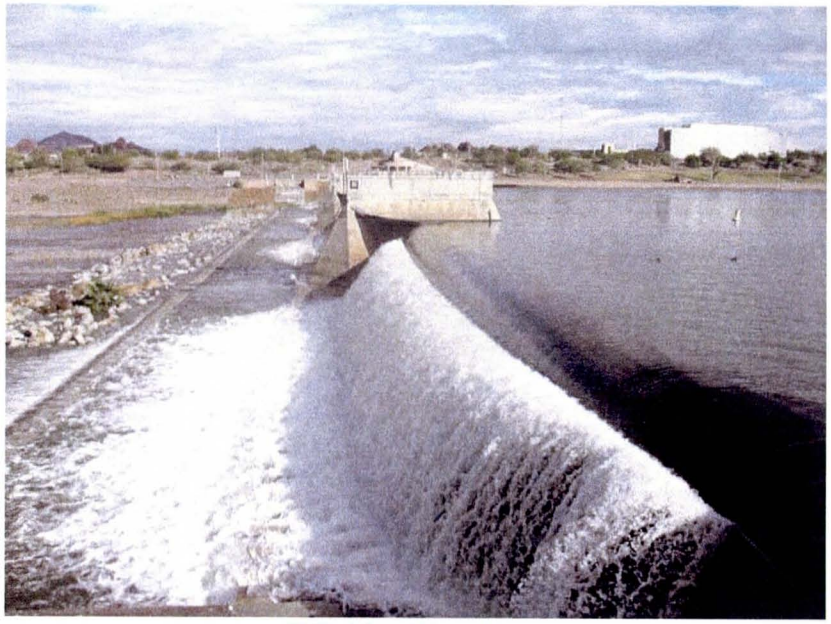
WP 10 – West Dam



WP 10 – West Dam



WP 10 – West Dam



WP 10 – West Dam

WP 10 – West dam, looking upstream

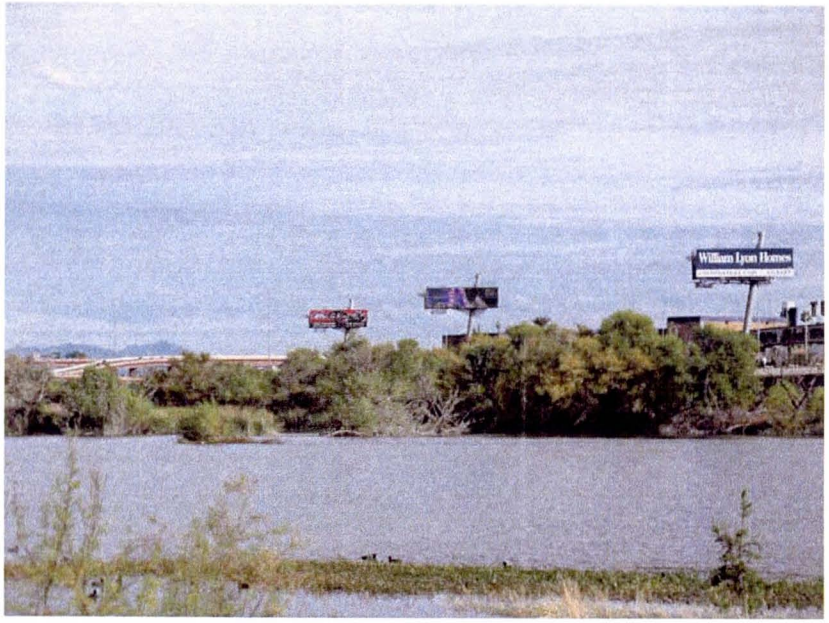
WP 10 – West dam, looking downstream

WP 11 – East Dam

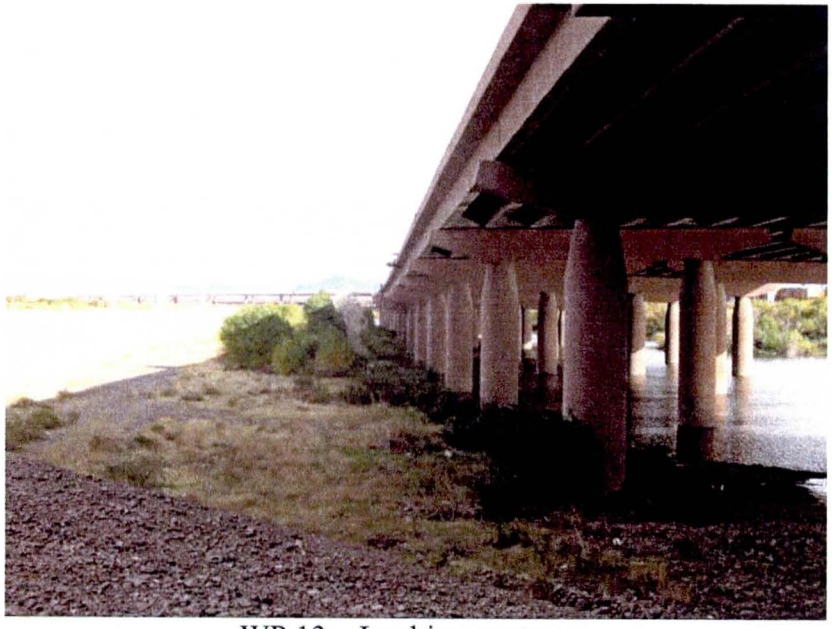
WP 12 – Looking upstream

WP 12 – Looking downstream

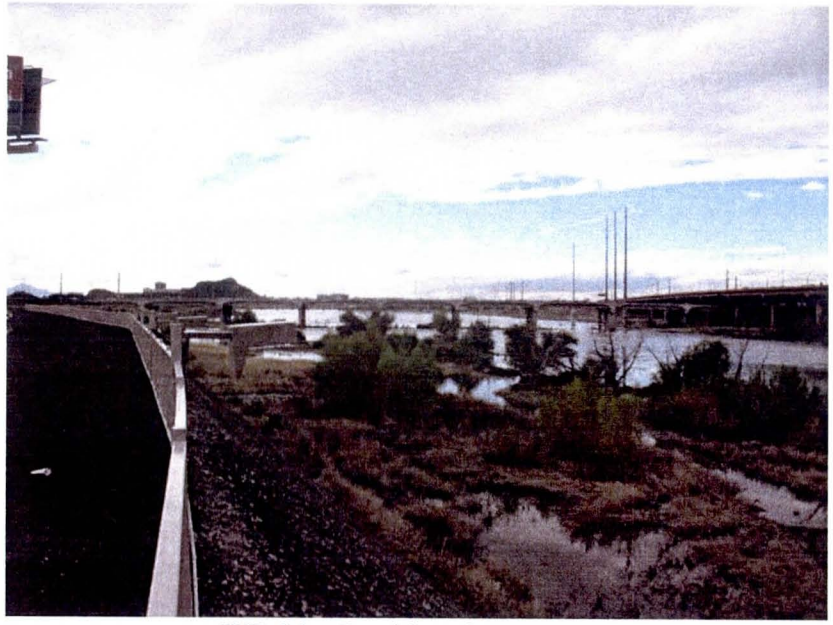
WP 13 – Bed material



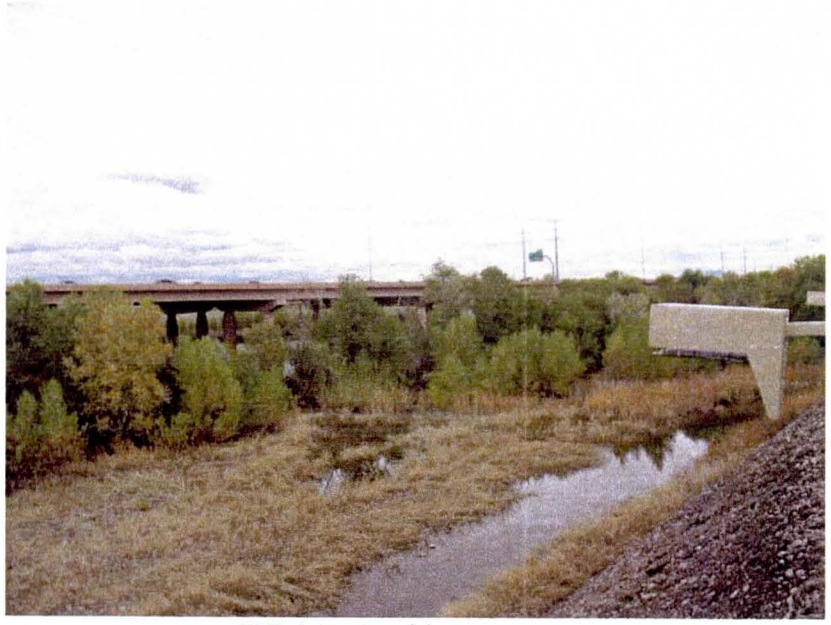
WP 13 – Looking Upstream



WP 13 – Looking upstream



WP 14 – Looking downstream



WP 14 – Looking upstream

WP 14 – Looking upstream

WP 15 – Bed material

WP 15 – Looking upstream

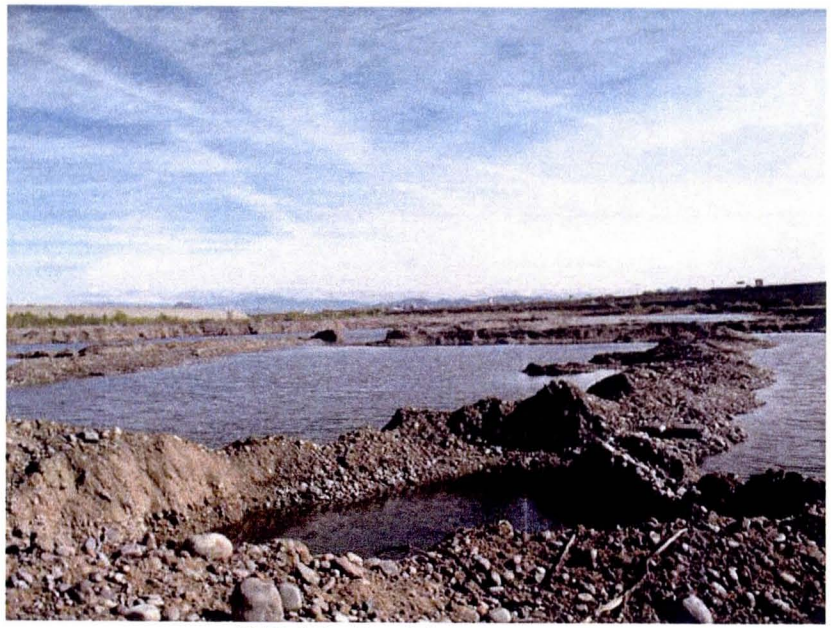
WP 15 – Looking downstream

WP 16 – looking upstream, north SB 101 abutment

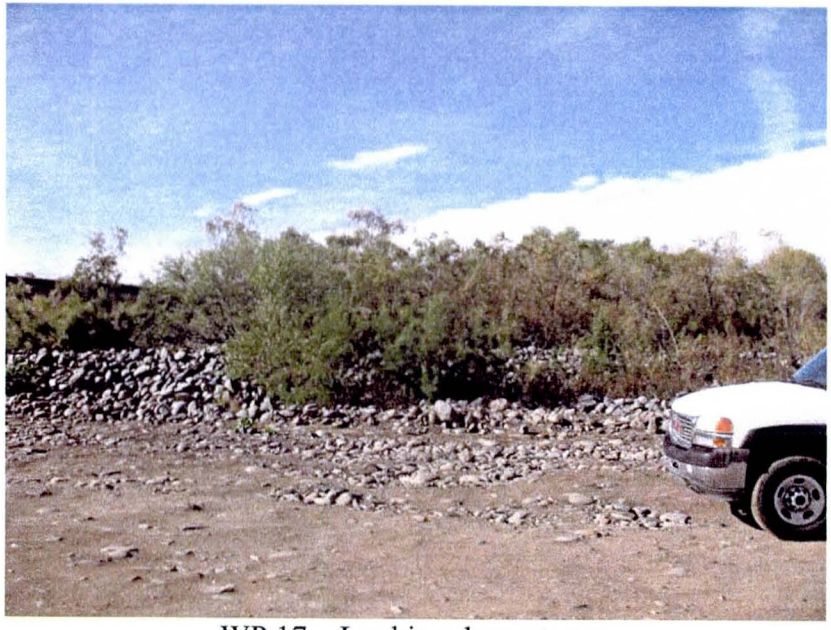
WP 16 – Looking upstream

WP 16 – looking south

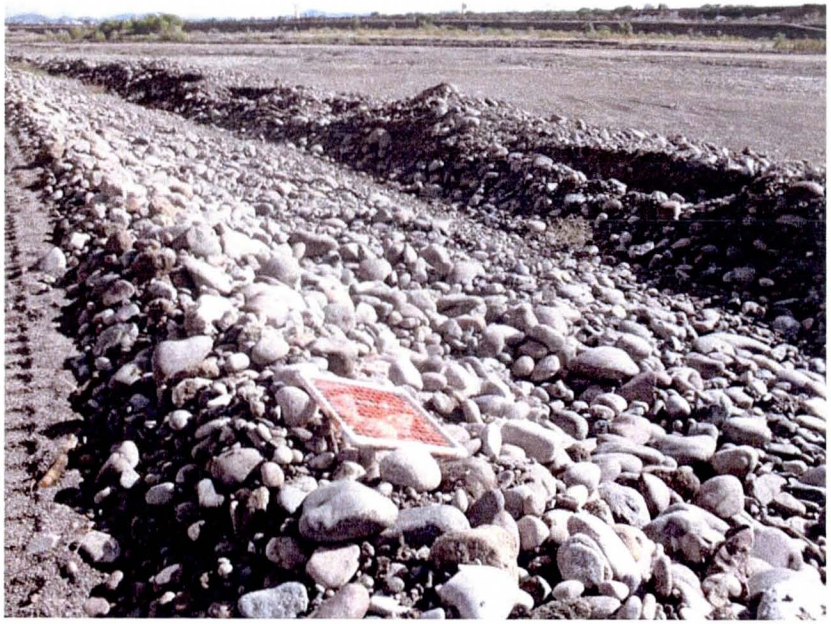
WP 17 – Bed material



WP 17 – Looking upstream



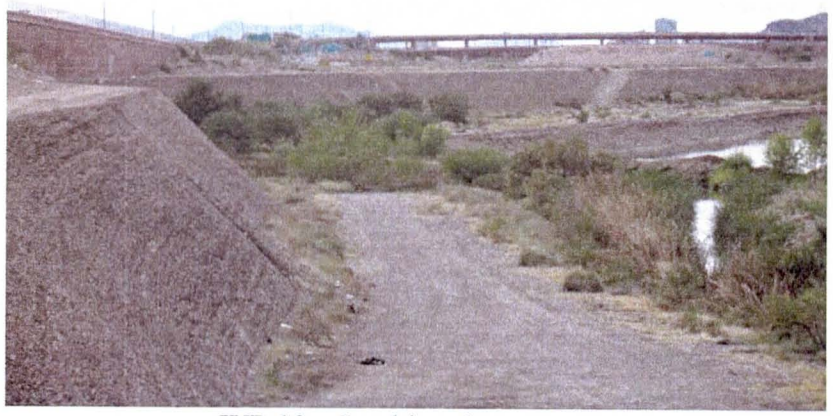
WP 17 – Looking downstream



WP 18 – Bed material

WP 18 – Looking upstream

WP 18 – Looking downstream



WP 19 – Looking downstream

WP 19 – Looking downstream

WP 19 – Looking upstream

WP 19 – Vegetation in channel

WP 20 – Looking upstream

WP 20 – Looking upstream

WP 20

WP 20 – Looking downstream

WP 21 – Looking upstream

WP 21 – Looking north

WP 21 – Looking downstream

WP 21 – Looking downstream

WP 21 – Looking downstream

WP 21 – looking southwest

WP 21 – Looking south

WP 21 – Looking southeast

WP 22 – Alma School Bridge Control Structure

WP 22 – Alma School Bridge looking north

WP 22 – Looking dowstream

WP 23 – Bed material

WP 23 – Looking downstream

WP 23 – Looking Downstream, mound in channel

Memo

Stantec

To:	Flood Control District of Maricopa County 2801 W. Durango Street Phoenix, AZ	From:	Stantec Consulting Inc. Pat Ellison, PE 8211 South 48th Street Phoenix, AZ
File:	Stantec #181300035	Date:	August 28, 2009

Reference: Salt River Hydraulic Master Plan
Manning's Roughness Sensitivity Model

An HEC-RAS model was developed to determine how the impact of variations in the Manning's roughness coefficient (n-value) would affect the resulting water surface elevations for the existing physical conditions. Two additional geometries and plans were developed. Within one plan (*SR HMP - n value +0.01*), the geometry was modified by increasing all Manning's roughness coefficients by a value of 0.01. Within another plan (*SR HMP - n value -0.01*), the geometry was modified by decreasing all Manning's roughness coefficients by a value of 0.01.

Manning's n-value sensitivity HEC-RAS simulations were conducted utilizing the existing 100-year Post-Roosevelt Dam Modifications peak discharges. The results from simulations performed using the higher Manning's roughness coefficients resulted in higher water surface elevations, ranging from no increase (two locations, RM 226.61, and RM 216.34) up to a maximum increase of 3.96' (RM 226.49). Excluding the two cross sections where no increase was noticed, the next lowest water surface elevation increase was 0.33'. Overall an average increase of 2.35 feet is realized with the higher Manning's roughness coefficient.

The results from simulations performed using the lower Manning's roughness coefficients resulted in lower water surface elevations, ranging from no decrease (two locations, RM 226.61, and RM 216.34), up to a maximum decrease of 3.75' (RM 223.08). Excluding the two cross sections where no decrease was noticed, the next lowest water surface elevation decrease was 0.26' (RM 216.42). Overall an average decrease of 2.30 feet is obtained when utilizing the lower Manning's roughness coefficient.

Attachment A depicts the water surface elevation profiles of the existing 100-year Post-Roosevelt Dam Modifications (*100-yr post WSE*), and the two 100-year Post-Roosevelt Dam Modifications with Manning's roughness coefficients increased (*n +0.01)* and decreased (*n -0.01)* by 0.01, along with top of levee elevations, and minimum channel elevations.

Reference: 2BSalt River Hydraulic Master Plan
Manning's Roughness Sensitivity Model

Attachment B contains in tabular format the water surface elevations of the three aforementioned water surface elevation profiles along with the resulting water surface elevation differences for each change in Manning's roughness coefficient.

Attachment C contains the CD with the hydraulic model used for the sensitivity analysis.

Increasing and decreasing all the Manning's roughness coefficients by a value of 0.01, has shown that relatively modest variations in the coefficients does have a significant affect on water surface elevations.

STANTEC CONSULTING INC.

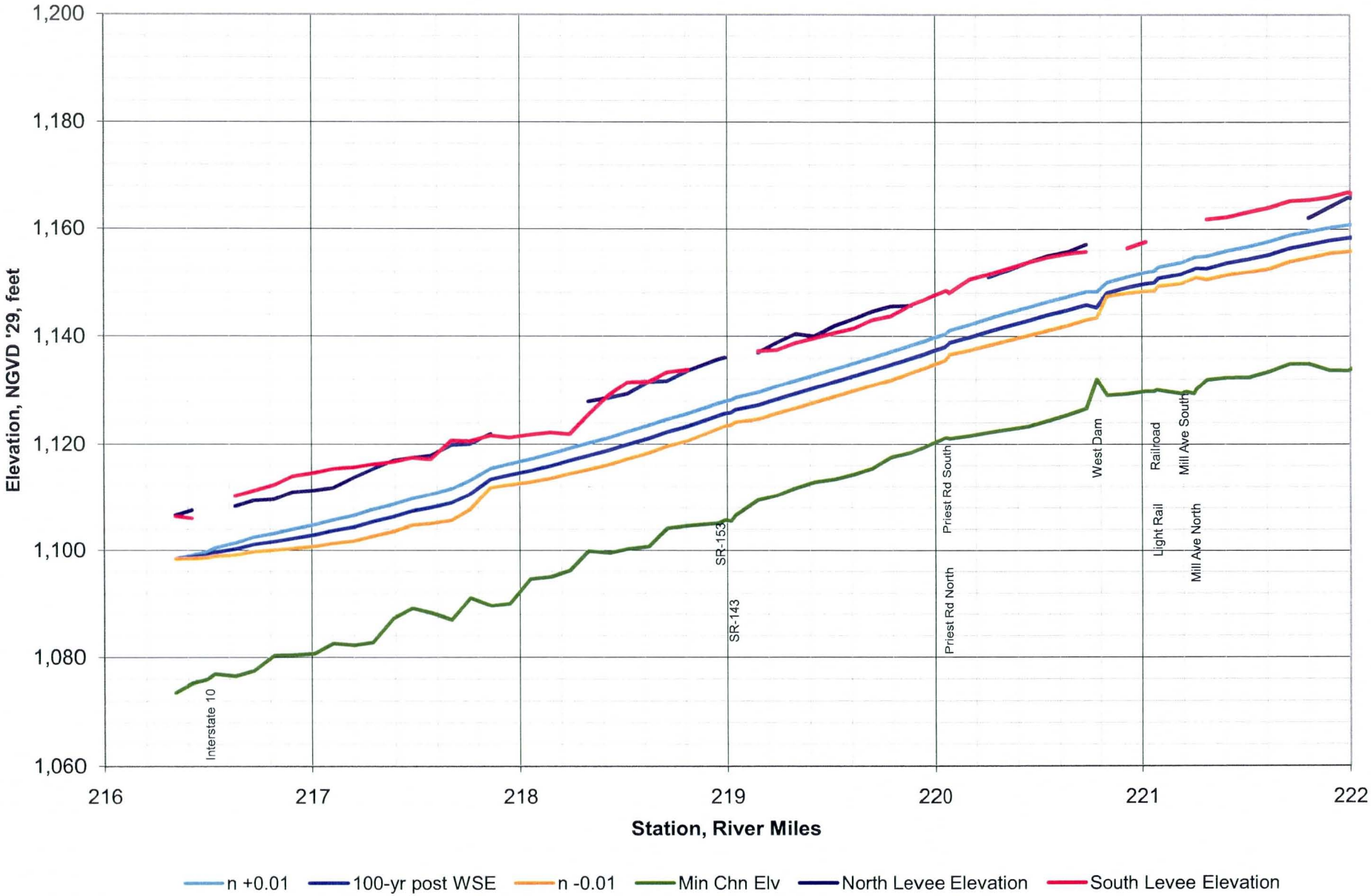
Pat Ellison, PE
Associate
pat.ellison@stantec.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
31680
PATRICK J.
ELLISON
Date Signed
ARIZONA U.S.A.
Expires 9/30/2009

ATTACHMENT A

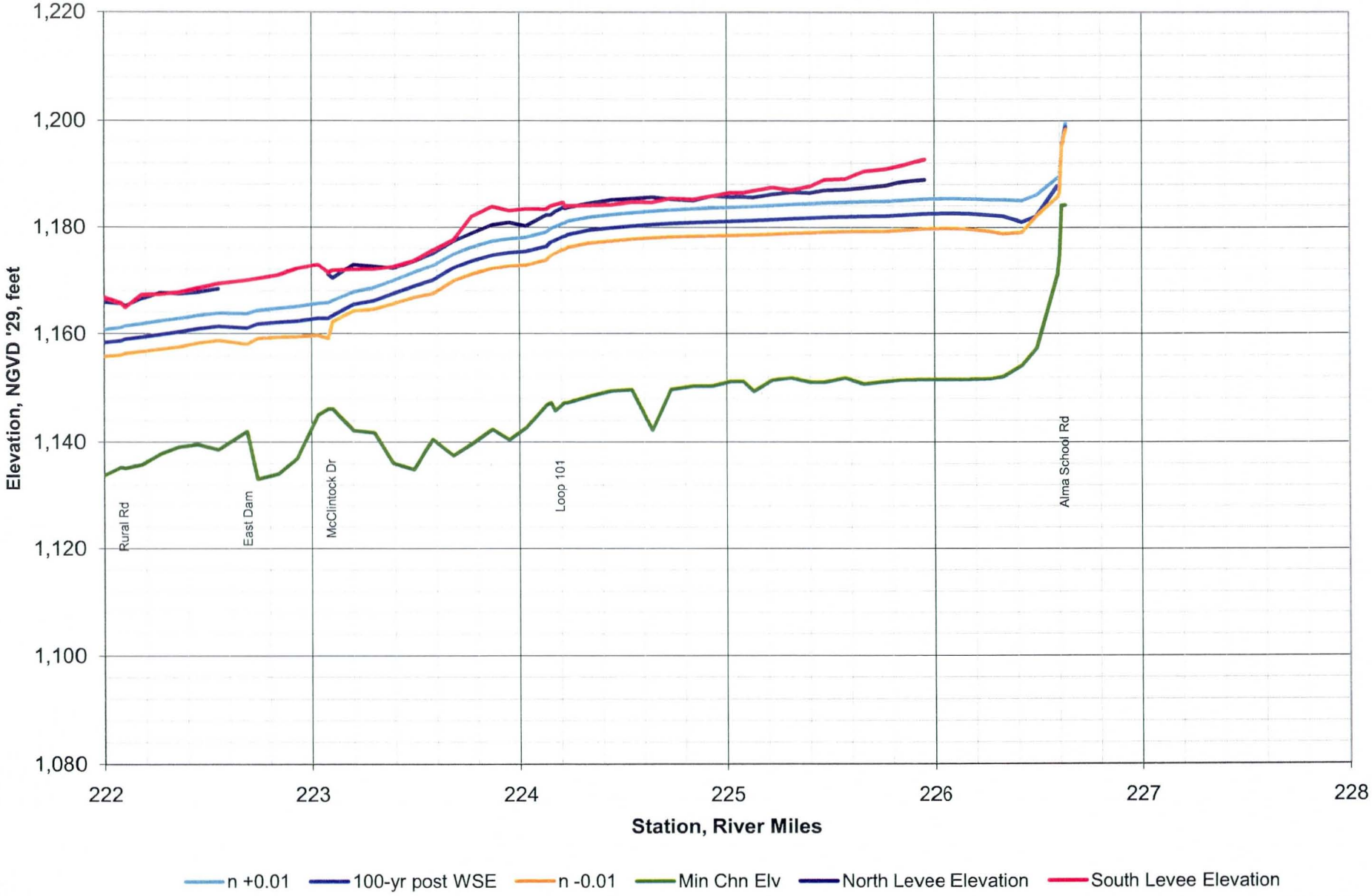
WATER SURFACE ELEVATION PROFILES

Manning's Roughness Sensitivity, +/- 0.01 adjustment
Existing Conditions 100-Year Water Surface Profile Comparison



8/3/2009

Manning's Roughness Sensitivity, +/- 0.01 adjustment
Existing Conditions 100-Year Water Surface Profile Comparison



8/3/2009

ATTACHMENT B

WATER SURFACE ELEVATION DATA

Attachment B - Water Surface Elevations

River Sta *river mile*	100-year Post WSE *feet*	100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*	WSE Differences by adjustment 100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*
226.63	1198.83	1199.41	1198.3	0.58	-0.53
226.61	1195.17	1195.17	1195.17	0	0
226.6	1186.76	1188.86	1186.36	2.1	-0.4
226.59	1187.74	1189.21	1185.62	1.47	-2.12
226.49	1182.05	1186.01	1182.05	3.96	0
226.42	1180.97	1184.92	1179	3.95	-1.97
226.33	1182.08	1185.11	1178.75	3.03	-3.33
226.27	1182.24	1185.13	1179.17	2.89	-3.07
226.16	1182.54	1185.31	1179.63	2.77	-2.91
226.06	1182.6	1185.34	1179.74	2.74	-2.86
225.95	1182.52	1185.25	1179.67	2.73	-2.85
225.84	1182.24	1185	1179.36	2.76	-2.88
225.76	1182.06	1184.81	1179.18	2.75	-2.88
225.66	1182.03	1184.75	1179.2	2.72	-2.83
225.57	1181.95	1184.65	1179.14	2.7	-2.81
225.47	1181.83	1184.52	1179.04	2.69	-2.79
225.4	1181.72	1184.4	1178.93	2.68	-2.79
225.31	1181.59	1184.25	1178.83	2.66	-2.76
225.22	1181.41	1184.05	1178.67	2.64	-2.74
225.13	1181.27	1183.9	1178.57	2.63	-2.7
225.08	1181.16	1183.79	1178.46	2.63	-2.7
225.02	1181.08	1183.69	1178.4	2.61	-2.68
224.93	1180.97	1183.55	1178.33	2.58	-2.64
224.84	1180.87	1183.43	1178.26	2.56	-2.61
224.73	1180.68	1183.2	1178.12	2.52	-2.56
224.64	1180.5	1182.99	1177.98	2.49	-2.52
224.54	1180.21	1182.69	1177.72	2.48	-2.49
224.44	1179.85	1182.33	1177.38	2.48	-2.47
224.33	1179.4	1181.86	1176.96	2.46	-2.44
224.23	1178.58	1181.07	1176.17	2.49	-2.41
224.22	1178.29	1180.79	1175.86	2.5	-2.43
224.21	1178.22	1180.72	1175.79	2.5	-2.43
224.17	1177.51	1180.07	1175.01	2.56	-2.5
224.15	1177.17	1179.77	1174.63	2.6	-2.54
224.13	1176.41	1179.09	1173.77	2.68	-2.64
224.03	1175.4	1178.08	1172.8	2.68	-2.6
223.95	1175.19	1177.82	1172.65	2.63	-2.54
223.87	1174.73	1177.37	1172.21	2.64	-2.52
223.77	1173.62	1176.27	1171.09	2.65	-2.53
223.68	1172.27	1174.88	1169.81	2.61	-2.46
223.58	1169.98	1172.72	1167.39	2.74	-2.59
223.49	1168.89	1171.44	1166.75	2.55	-2.14
223.39	1167.44	1169.95	1165.55	2.51	-1.89
223.3	1166.18	1168.66	1164.57	2.48	-1.61

Attachment B - Water Surface Elevations

River Sta *river mile*	100-year Post WSE *feet*	100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*	WSE Differences by adjustment 100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*
223.2	1165.46	1167.81	1164.24	2.35	-1.22
223.1	1163.37	1166.22	1162.21	2.85	-1.16
223.08	1162.88	1165.81	1159.13	2.93	-3.75
223.03	1162.88	1165.68	1159.66	2.8	-3.22
222.93	1162.38	1165.09	1159.42	2.71	-2.96
222.84	1162.15	1164.75	1159.37	2.6	-2.78
222.74	1161.84	1164.39	1159.13	2.55	-2.71
222.69	1161.09	1163.8	1158.05	2.71	-3.04
222.55	1161.39	1163.86	1158.79	2.47	-2.6
222.45	1160.93	1163.43	1158.27	2.5	-2.66
222.36	1160.35	1162.91	1157.6	2.56	-2.75
222.27	1159.9	1162.43	1157.19	2.53	-2.71
222.18	1159.39	1161.91	1156.73	2.52	-2.66
222.1	1159.04	1161.52	1156.43	2.48	-2.61
222.08	1158.73	1161.23	1156.08	2.5	-2.65
221.99	1158.38	1160.82	1155.83	2.44	-2.55
221.9	1157.91	1160.29	1155.46	2.38	-2.45
221.8	1157.12	1159.53	1154.62	2.41	-2.5
221.71	1156.45	1158.89	1153.92	2.44	-2.53
221.61	1155.21	1157.71	1152.54	2.5	-2.67
221.51	1154.37	1156.77	1151.93	2.4	-2.44
221.41	1153.63	1155.96	1151.39	2.33	-2.24
221.31	1152.57	1154.92	1150.5	2.35	-2.07
221.26	1152.67	1154.82	1150.92	2.15	-1.75
221.25	1152.48	1154.65	1150.73	2.17	-1.75
221.21	1151.86	1154.07	1150.11	2.21	-1.75
221.19	1151.54	1153.76	1149.76	2.22	-1.78
221.08	1150.76	1152.88	1149.27	2.12	-1.49
221.07	1150.36	1152.54	1148.81	2.18	-1.55
221.065	1150.17	1152.35	1148.63	2.18	-1.54
221.06	1149.94	1152.16	1148.37	2.22	-1.57
221.02	1149.76	1151.9	1148.33	2.14	-1.43
220.93	1149.03	1151.06	1147.94	2.03	-1.09
220.83	1148.05	1149.97	1147.37	1.92	-0.68
220.78	1145.3	1148.24	1143.35	2.94	-1.95
220.73	1145.75	1148.24	1142.97	2.49	-2.78
220.64	1144.8	1147.31	1141.94	2.51	-2.86
220.54	1143.85	1146.35	1141.01	2.5	-2.84
220.45	1142.86	1145.34	1140.04	2.48	-2.82
220.35	1141.85	1144.29	1139.13	2.44	-2.72
220.26	1140.87	1143.25	1138.3	2.38	-2.57
220.17	1139.78	1142.13	1137.34	2.35	-2.44
220.07	1138.77	1141.05	1136.55	2.28	-2.22
220.063	1138.44	1140.77	1136.06	2.33	-2.38

Attachment B - Water Surface Elevations

River Sta *river mile*	100-year Post WSE *feet*	100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*	WSE Differences by adjustment 100-year Post WSE (n +0.01) *feet*	100-year Post WSE (n -0.01) *feet*
220.06	1138.43	1140.75	1136.06	2.32	-2.37
220.05	1138.08	1140.46	1135.51	2.38	-2.57
219.89	1135.91	1138.35	1133.14	2.44	-2.77
219.79	1134.69	1137.15	1131.78	2.46	-2.91
219.7	1133.64	1136.05	1130.86	2.41	-2.78
219.61	1132.59	1134.98	1129.83	2.39	-2.76
219.52	1131.52	1133.9	1128.83	2.38	-2.69
219.42	1130.41	1132.79	1127.68	2.38	-2.73
219.33	1129.37	1131.76	1126.65	2.39	-2.72
219.24	1128.35	1130.75	1125.66	2.4	-2.69
219.15	1127.23	1129.62	1124.59	2.39	-2.64
219.04	1126.36	1128.65	1124.04	2.29	-2.32
219.02	1125.87	1128.19	1123.44	2.32	-2.43
218.99	1125.68	1127.97	1123.34	2.29	-2.34
218.96	1125.29	1127.59	1122.86	2.3	-2.43
218.81	1123.29	1125.68	1120.59	2.39	-2.7
218.71	1122.23	1124.61	1119.57	2.38	-2.66
218.62	1121.04	1123.44	1118.27	2.4	-2.77
218.52	1119.93	1122.32	1117.2	2.39	-2.73
218.43	1118.84	1121.22	1116.15	2.38	-2.69
218.33	1117.82	1120.18	1115.19	2.36	-2.63
218.24	1116.9	1119.21	1114.44	2.31	-2.46
218.15	1115.88	1118.18	1113.54	2.3	-2.34
218.05	1114.95	1117.19	1112.83	2.24	-2.12
217.95	1114.15	1116.3	1112.33	2.15	-1.82
217.86	1113.36	1115.41	1111.81	2.05	-1.55
217.76	1110.55	1113.13	1107.72	2.58	-2.83
217.67	1108.95	1111.56	1105.65	2.61	-3.3
217.57	1108.06	1110.52	1105.1	2.46	-2.96
217.48	1107.41	1109.75	1104.77	2.34	-2.64
217.39	1106.33	1108.68	1103.53	2.35	-2.8
217.29	1105.38	1107.68	1102.64	2.3	-2.74
217.2	1104.37	1106.6	1101.76	2.23	-2.61
217.1	1103.65	1105.72	1101.34	2.07	-2.31
217.01	1102.88	1104.82	1100.77	1.94	-2.11
216.91	1102.23	1103.99	1100.39	1.76	-1.84
216.82	1101.64	1103.2	1100.07	1.56	-1.57
216.72	1101.1	1102.47	1099.79	1.37	-1.31
216.63	1100.22	1101.37	1099.15	1.15	-1.07
216.53	1099.62	1100.46	1098.9	0.84	-0.72
216.49	1099.04	1099.63	1098.56	0.59	-0.48
216.42	1098.72	1099.05	1098.46	0.33	-0.26
216.34	1098.4	1098.4	1098.4	0	0

ATTACHMENT C

CD WITH HYDRAULIC MODEL

Model is provided digitally on the Master CD located at the front of this binder.