

ALIGNMENT ANALYSIS
FOR WIDENING
ALMA SCHOOL ROAD SOUTH BRIDGE
AT SALT RIVER

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

WORK ORDER NO. 68931

CONTRACT NO. CY 1997-09

DRAFT

May - 1997

Hoffman-Miller/DeLeuw Cather
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TECHNICAL MEMORANDUM

ALMA SCHOOL ROAD

WORK ORDER NO. 68931

ALIGNMENT ANALYSIS McLellan Road to McKellips Road

Technical Memorandum Purpose:

The purpose of this Technical Memorandum is to review the alignment information presented in the Candidate Assessment Report, Operational Study and other documents relating to the Alma School Road corridor, further analyze new or updated information, and determine the preferred alignment to be included in the final Design Concept Report.

Introduction:

Alma School Road is currently a four-lane rural arterial road with a paved median and two bridge crossings of the Salt River. Both the north bridge over the main Salt River channel and the south bridge over the secondary channel were constructed by Maricopa County in 1980-81 (W.O. Nos. 60400 and 60401). The bridges are both 25.6 m (84') wide with clear roadway width of 20.7 m (68'), 1.2m (3'-10") sidewalk on the west side and 2.1m (6'-10") sidewalk on the east side, separated from the roadway by concrete traffic barriers.

North of McKellips Road Alma School Road continues in the Salt River Pima-Maricopa Indian Community as a four-lane roadway with paved median. South of McLellan Road, in the City of Mesa, Alma School Road has been improved to an urban arterial road with 26.8m (88') clear width consisting of six 3.35 m (11') wide lanes, a 3.35 m (11') wide paved median and two 1.6 m (5.5') paved shoulders.

MCDOT has proposed widening the south bridge to a seven lane section. The north bridge is not being modified under this project. In addition to the bridge widening, a channelized "T" intersection is being proposed for the main access to Sunward Materials.

Existing Alignment:

The existing Alma School Road project alignment begins on a left-hand curve (looking north - up station) established by ADOT for the Red Mountain Interchange on the south. The PT of this curve is located 0.944 m onto the south end of the bridge to be widened under this project. The

combination of ADOT's 0°45'00" curve and 64 km/h (40 mph) design speed does not require superelevation. ADOT's improvements are currently under construction.

Beyond the PT of the existing curve, the roadway continues on a tangent for 378.437 m. This stretch of roadway includes the bridge to be widened and the "channelized T" intersection proposed for Sunward Materials access.

Following the tangent, the alignment curves back to the right with a 2°0'00" curve ending on the approach slab 3.620 m south of the existing north bridge over the Salt River. This bridge will not be modified during this project and the proposed improvements will match the existing bridge section. As-builts show that this curve is superelevated at 2% and that the super transitions back to a normal crown by the PT. Current MCDOT standards require a superelevation of 2.5% for a 64 km/h (40 mph) design speed.

Existing right-of-way varies significantly throughout the project. A tight spot exists north of the main Sunward driveway, between the driveway and the north bridge over the Salt River where the right-of-way is 16.839 m from the existing centerline. Additional right-of-way may be required in this area.

Sunward Materials operation currently has access from four points located essentially at each quadrant of the south bridge. The northeast access is the main entrance to the Sunward plant, all other access points are used by their trucks either going to or from their operation. The southeast access is currently not in use but needs to be provided for in this project.

The existing posted speed is 40 mph which is equivalent to 64 km/h. The existing roadway has a normal crown of 2%.

Alternative Alignments:

Two alignments were considered during development of this Technical Memorandum. The first is to widen about the existing center line and the second is to widen all to the east side.

The first alternative, to widen on each side of the existing centerline, is based on the contract documents and has been the concept throughout the various past study phases of this project. Widening along this alignment would require relocation of the existing 12kV overhead power lines currently located on the west side of Alma School Road. The existing south bridge would also require widening on each side resulting in additional foundation costs. See the Bridge Selection Report Technical Memorandum for a full discussion of the bridge advantages/disadvantages for each alignment. From a geometric standpoint, widening on each side poses no clear advantage. Conversely, in addition to the utility relocation discussed above, maintenance of traffic during construction would require shifting from side to side during the bridge construction operations.

The second alignment alternative was proposed to take advantage of the cost savings which will be realized if the bridge is widened to the east side only. See the Bridge Selection Report

Technical Memorandum for a discussion of the savings. After meeting with MCDOT, it was agreed widening to the east side would be presented as the preferred alignment.

In order to widen to the east it is proposed to end ADOT's curve at the north end of their concrete paving. From ADOT's concrete paving, a short tangent is proposed before adding a 2400 m left-hand curve ending north of the existing south bridge. This will require reconstruction/realignment of a portion of ADOT's proposed raised median. A request has been forwarded to ADOT to replace their raised median with a striped median in the interim between ADOT's and MCDOT's construction. At this time of this technical memorandum, ADOT had not yet responded.

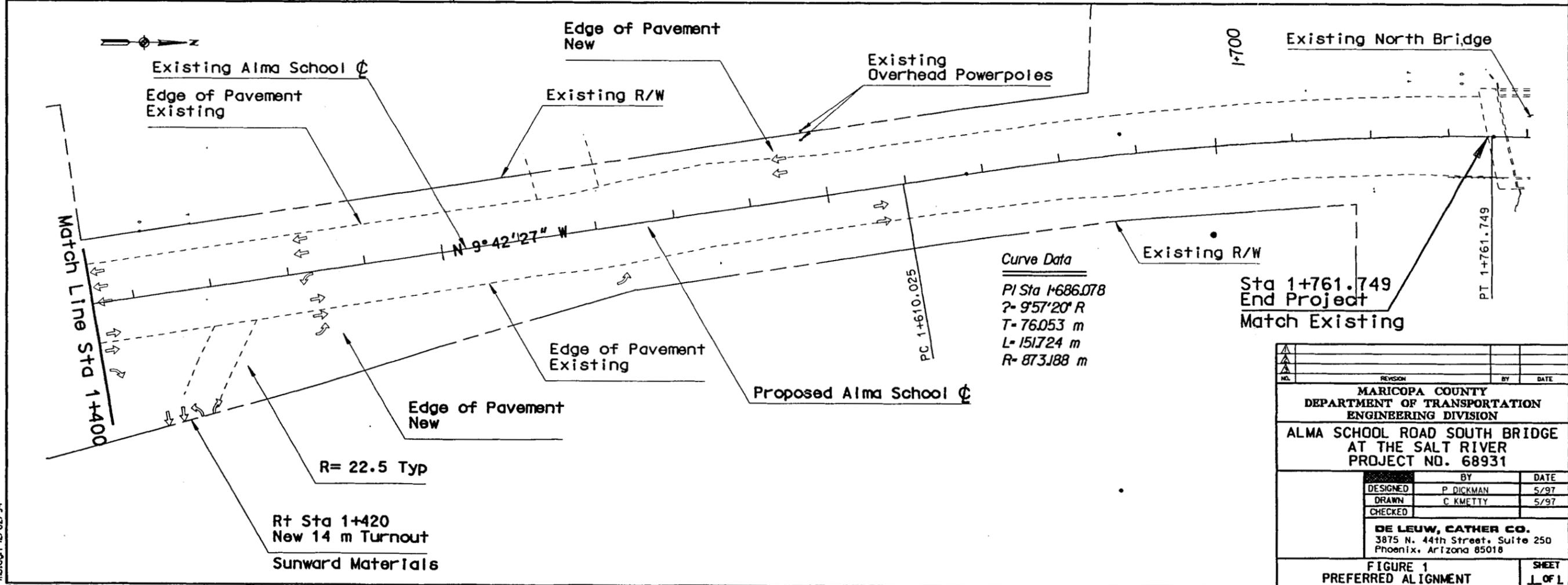
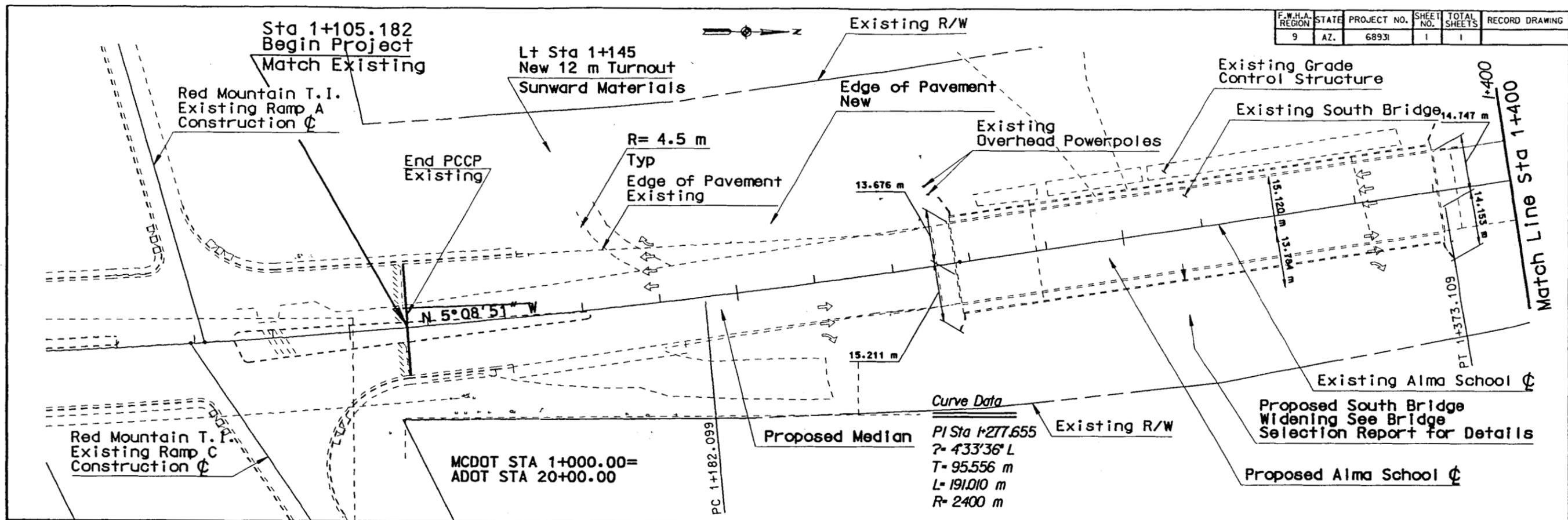
Since the existing south bridge is on a tangent and the proposed centerline is on a curve, the half-width from the centerline is not constant. Because of the lane and sidewalk width desired and the precast girder dimensions, the clear roadway width of the proposed widened south bridge is 28.905 m. The preferred typical section (Figure 5.6 of the MCDOT Roadway Design Manual) has a half-width of 14.1 m. The geometric arrangement shown on Figure 1 has a half-width which varies from a maximum of 15.211 m to a minimum of 13.676 m on the southwest end of the bridge. Several options will be proposed during final design to mitigate the narrower half-width including adjusting the geometrics and/or narrowing the median. Narrowing the lanes will only be considered as a last option. It should be noted that the City of Mesa section south of the Red Mountain Interchange is also using a seven-lane section except with a 13.411 m (44') half-width. ADOT's design carried Mesa's lane widths north through their portion of the Alma School Road/Red Mountain Interchange design before transitioning to the existing MCDOT striping south of the south bridge. Carrying Mesa's half-width across the bridge may also be a possible mitigation method.

The current posted speed limit is 40 mph which is equivalent to 64 km/h. This suggests a desired design speed of approximately 80 km/h which is preferred by MCDOT. While the horizontal sight distance is adequate for a 80 km/h design speed, existing conditions may warrant a lower design speed. ADOT used a design speed of 64 km/h (40 mph) at the south end of this project. A higher design speed would have required superelevation for their ending curve. At the north end of this project the existing curve ends at the south end of the north bridge. This curve is a two degree curve which by current MCDOT standards would require super elevation to 2.5% at 64 km/h (40 mph). Currently the curve is super elevated at 2% and transitions to normal crown at the PT of the curve to keep the super elevation off of the north bridge. This existing transition method will have to be maintained for the proposed improvements. The use of a 80 km/h design speed will be contingent upon the existing super elevation conditions.

The table on the following page summarizes and compares the issues of the existing centerline alternative with the preferred alternative of widening to the east.

Criteria	Widen on Each Side of Existing Centerline Alternative	Widen To East Side Only Alternative
Cross Slope	NC 2%	NC 2%
Curvature	R1= 2328.500 m (Existing - ADOT) R2=873.188 m (Existing - N Bridge)	R1= 2328.500 m (Existing - ADOT) R2=2400.000 m (New) R3=873.188 m (Existing - N Bridge)
Design Speed	80 km/h	80 km/h
Lane Widths	Full width	Median narrowed along south bridge
Right-of-Way	Additional right-of-way required	More right-of-way required than widening about centerline (centerlines are approx. 1.8 m apart)
Sight Distance	Min 122 m, desired 145 m @ 80 km/h Actual = 145 m+	Min 122 m, desired 145 m @ 80 km/h Actual 145 m
Typical Section	*Figure 5.6	*Figure 5.6
Major Utility Impacts	Relocation of 69kV lines on west side of Alma School Rd. required	
Superelevation	Match existing north curve	Match existing north curve
Maintenance of Traffic	Widening to both sides will require shifting traffic during construction	Widening to east can be accomplished with minor disruption to existing traffic
Earthwork	No advantage	No advantage
Vertical Clearance	Widening may require minor regrading of the dirt road under the bridge to maintain existing vertical clearance	Widening may require minor regrading of the dirt road under the bridge to maintain existing vertical clearance
Sunward Access	Widening to both sides will impact proposed SW access road and SE access road	Widening to east will impact proposed SE access road

F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68931	1	1	



REVISION	BY	DATE
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION		
ALMA SCHOOL ROAD SOUTH BRIDGE AT THE SALT RIVER PROJECT NO. 68931		
DESIGNED	BY	DATE
DRAWN	P. DICKMAN	5/97
CHECKED	C. KMETTY	5/97
DE LEUW, CATHER CO. 3875 N. 44th Street, Suite 250 Phoenix, Arizona 85018		
FIGURE 1 PREFERRED ALIGNMENT		SHEET 1 OF 1