MAG Transit Committee - March 13, 2014

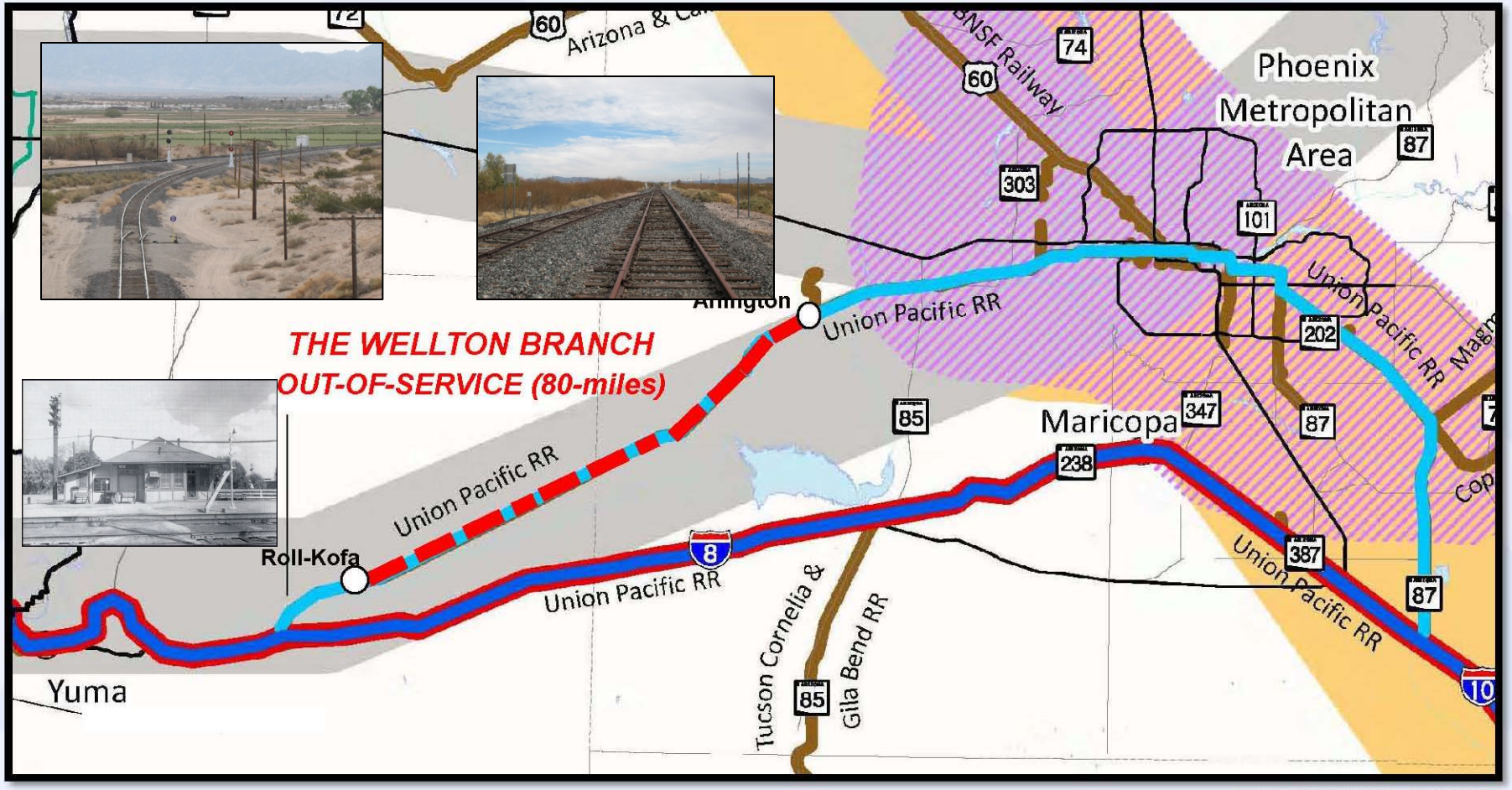
Final Report Contents

- Literature review
- Field visits
- Corridor and crossing cost elements: grade separated crossings, bridges, culverts/canals, switches, and utilities
- Assumed corridor cross-section
- Corridor development options
- Cost element quantities for each corridor option
- Planning-level cost for each corridor option

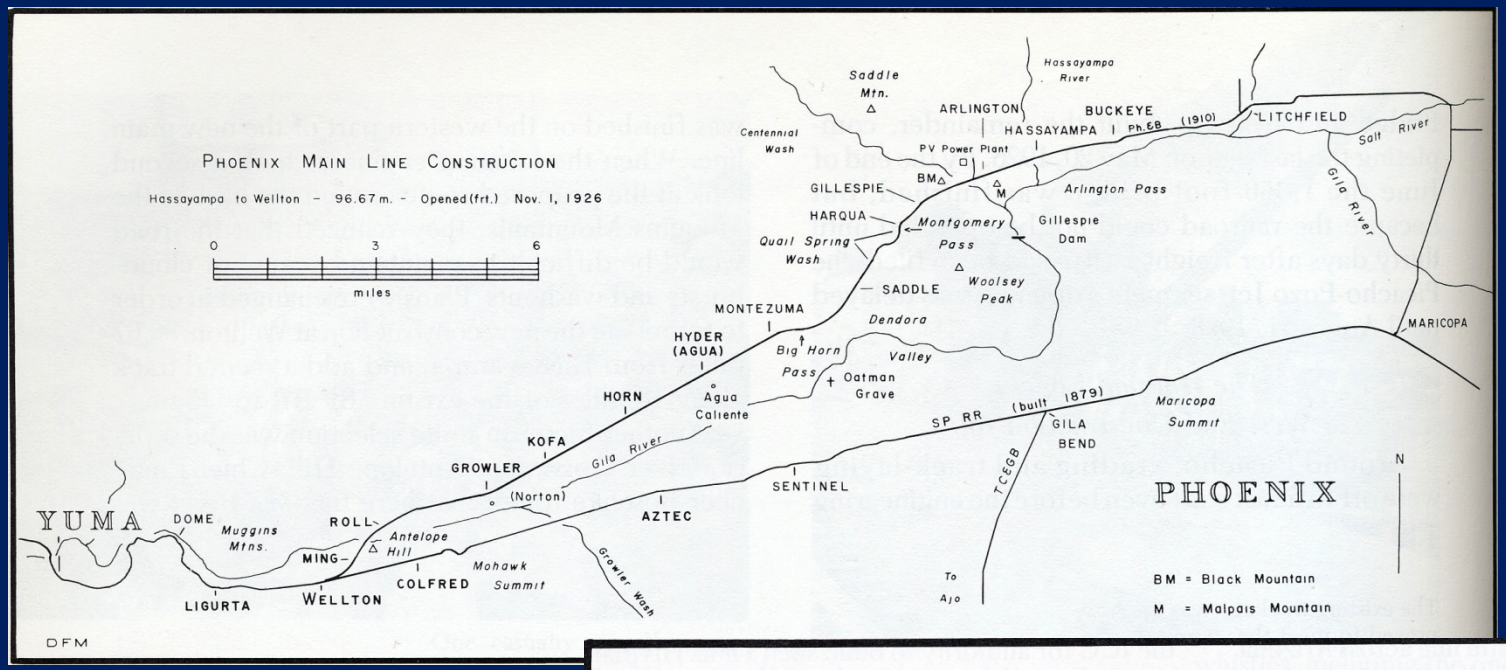
The Wellton Branch

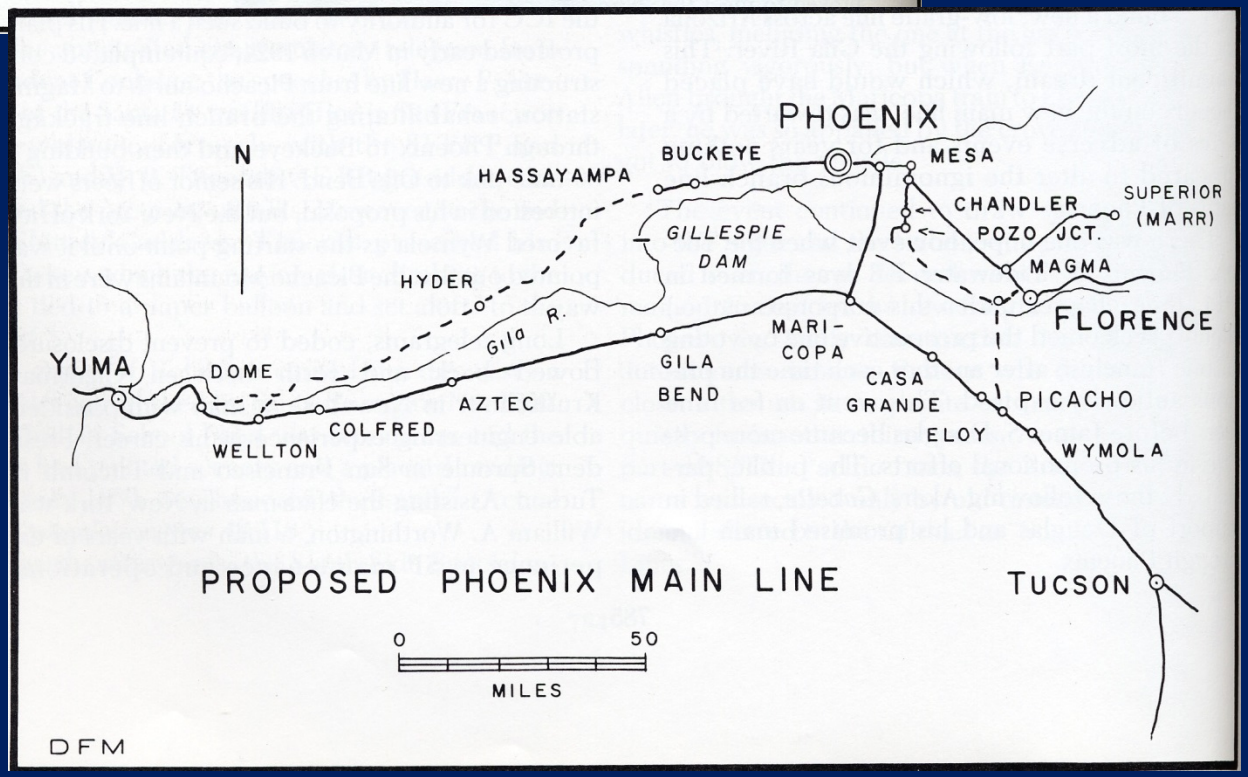
Union Pacific Railroad's Phoenix mainline and former Amtrak route through Phoenix.

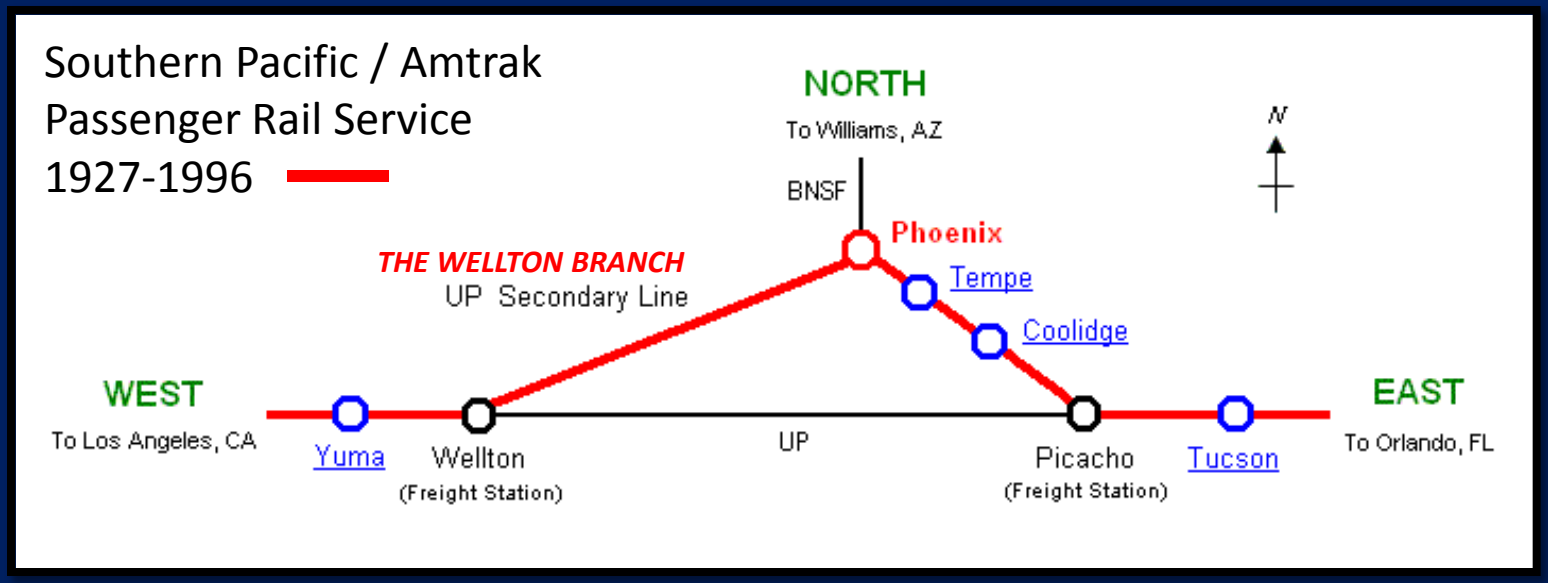
Amtrak's current route through Maricopa.

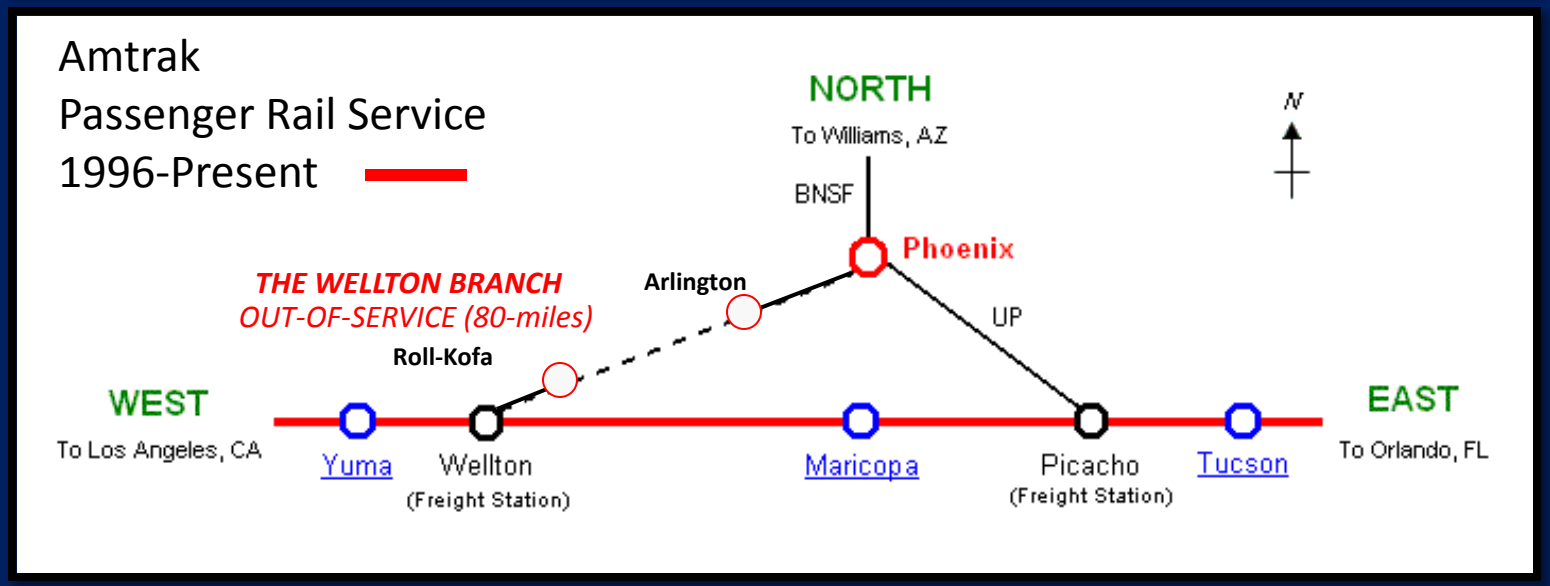


ADOT *BQAZ* / MAG- April 2010


PHOENIX MAIN LINE CONSTRUCTION
Hassayampa to Wellton - 96.67 m. - Opened (frt.) Nov. 1, 1926
0
3
6
miles
Saddle Mtn.
Hassayampa River
ARLINGTON
BUCKEYE
HASSAYAMPA
Ph.&B.
(1910)
LITCHFIELD
Salt River
Centennial Wash
PV Power Plant
BM
M
Arlington Pass
GILLESPIE
HARQUA
Montgomery Pass
Gillespie Dam
Gila River
Quail Spring Wash
Woolsey Peak
SADDLE
MONTEZUMA
Dendora Valley
MARICOPA
HYDER (AGUA)
Big Horn Pass
Oatman Grave
Agua Caliente
HORN
SP RR (built 1879)
Maricopa Summit
GILA BEND
KOFA
Gila River
GROWLER
(Norton)
SENTINEL
T.C.&G.B.
PHOENIX
N
YUMA
DOME
Muggins Mtns.
ROLL
Antelope Hill
AZTEC
MING
Mohawk Summit
Growler Wash
COLFRED
LIGURTA
WELLTON
To Ajo
BM = Black Mountain
M = Malpais Mountain
DFM


PHOENIX
N
BUCKEYE
MESA
HASSAYAMPA
CHANDLER
SUPERIOR (MARR)
POZO JCT.
GILLESPIE DAM
MAGMA
HYDER
FLORENCE
Gila R.
MARI-COPA
YUMA
DOME
GILA BEND
CASA GRANDE
PICACHO
AZTEC
COLFRED
ELOY
WELLTON
WYMOLA
PROPOSED PHOENIX MAIN LINE
TUCSON
0
50
MILES
DFM


Southern Pacific / Amtrak
Passenger Rail Service
1927-1996
NORTH
To Williams, AZ
BNSF
N
Phoenix
THE WELLTON BRANCH
UP Secondary Line
Tempe
Coolidge
WEST
To Los Angeles, CA
EAST
To Orlando, FL
Yuma
Wellton
(Freight Station)
UP
Picacho
(Freight Station)
Tucson

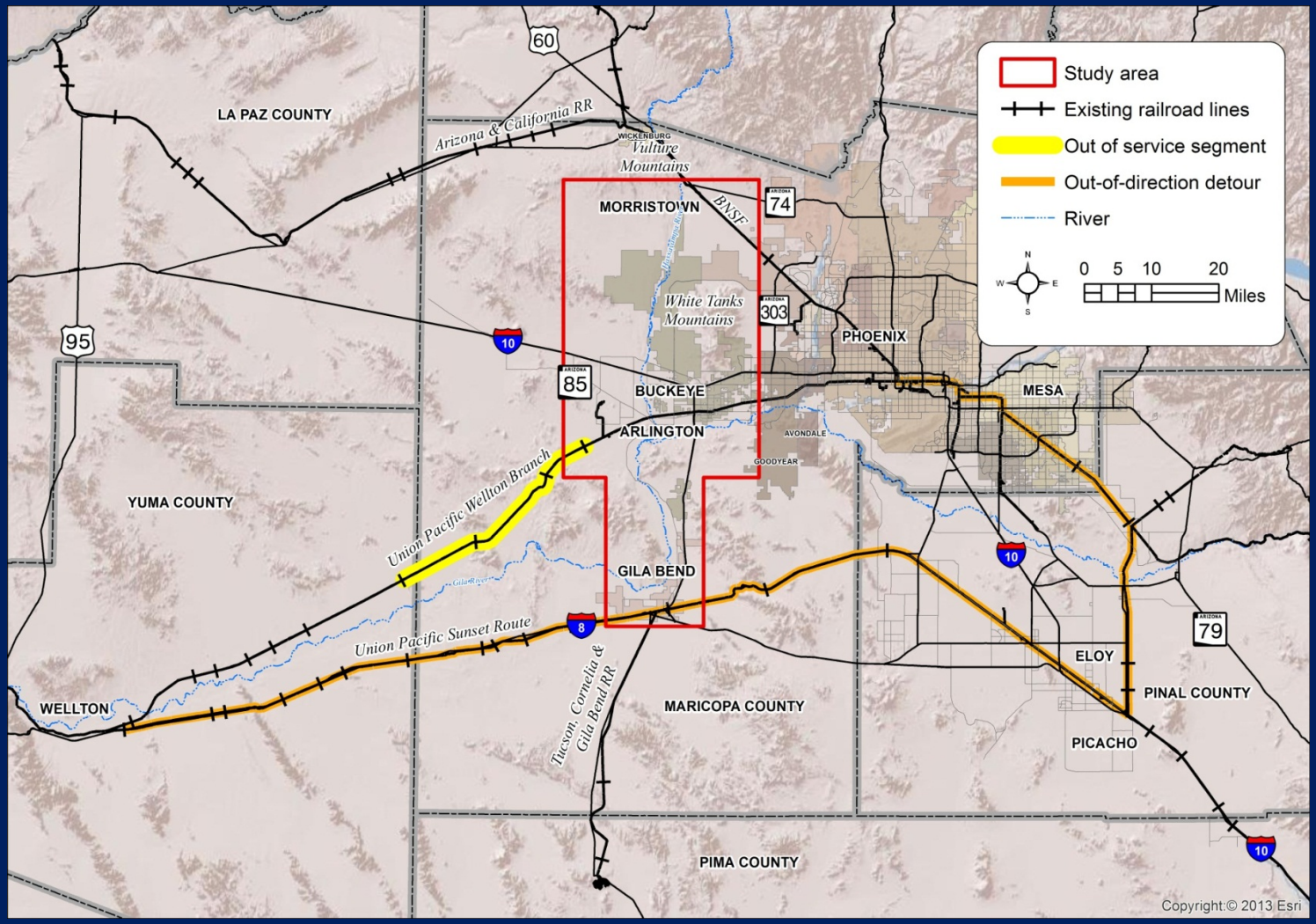

Amtrak
Passenger Rail Service
1996-Present
NORTH
To Williams, AZ
BNSF
N
Phoenix
THE WELLTON BRANCH
OUT-OF-SERVICE (80-miles)
Arlington
UP
Roll-Kofa
WEST
To Los Angeles, CA
EAST
To Orlando, FL
Yuma
Wellton
(Freight Station)
Maricopa
Picacho
(Freight Station)
Tucson

Most populous metro areas/cities in U.S. lacking Amtrak service

1. Phoenix, Arizona (Metro Population 4,281,899) Lost service in 1996.
2. Las Vegas, Nevada (Metro Population 1,865,746) Lost service in 1997.
3. Columbus, Ohio (1,773,120) Lost service in 1979.
4. Nashville, Tennessee (1,550,733) Lost service with in 1979.
5. Louisville, Kentucky (1,244,696) Lost service in 2003.
6. Tulsa, Oklahoma (916,079) Lost service in 1979.
7. Dayton, Ohio (848,153) Lost service in 1979.
8. Allentown, Pennsylvania, (808,210)
9. Baton Rouge, Louisiana (774,327)
10. McAllen, Texas (710,514)
11. Knoxville, Tennessee, (691,152)
12. Colorado Springs, Colorado (617,714)
13. Wichita, Kansas, (603,716) Service lost in 1979,
14. Boise, Idaho (599,753) Lost service in 1997.
15. Madison, Wisconsin, (561,505)
16. Des Moines, Iowa (556,230)
17. Augusta, Georgia (534,218)
18. Chattanooga, Tennessee, (518,441)
19. Tri-Cities, Tennessee, (500,538)
20. Lexington, Kentucky, (453,424)
21. Fayetteville, Arkansas, (443,976)
22. Springfield, Missouri, (426,206)
23. Corpus Christi, Texas, (415,376)
24. Fort Wayne, Indiana (411,154) Lost service in 1990.
25. Asheville, North Carolina, (408,436)

AMTRAK®

Study Area


Study area
Existing railroad lines
Out of service segment
Out-of-direction detour
River
0 5 10 20
Miles
LA PAZ COUNTY
YUMA COUNTY
MARICOPA COUNTY
PINAL COUNTY
PIMA COUNTY
MORRISTOWN
BUCKEYE
ARLINGTON
GILA BEND
WELLTON
PHOENIX
MESA
ELOY
PICACHO
AVONDALE
GOODYEAR
WICKENBURG
Vulture Mountains
White Tanks Mountains
Arizona & California RR
BNSF
Union Pacific Wellton Branch
Union Pacific Sunset Route
Tucson, Cornelia & Gila Bend RR
Gila River
60
95
10
85
74
303
8
79
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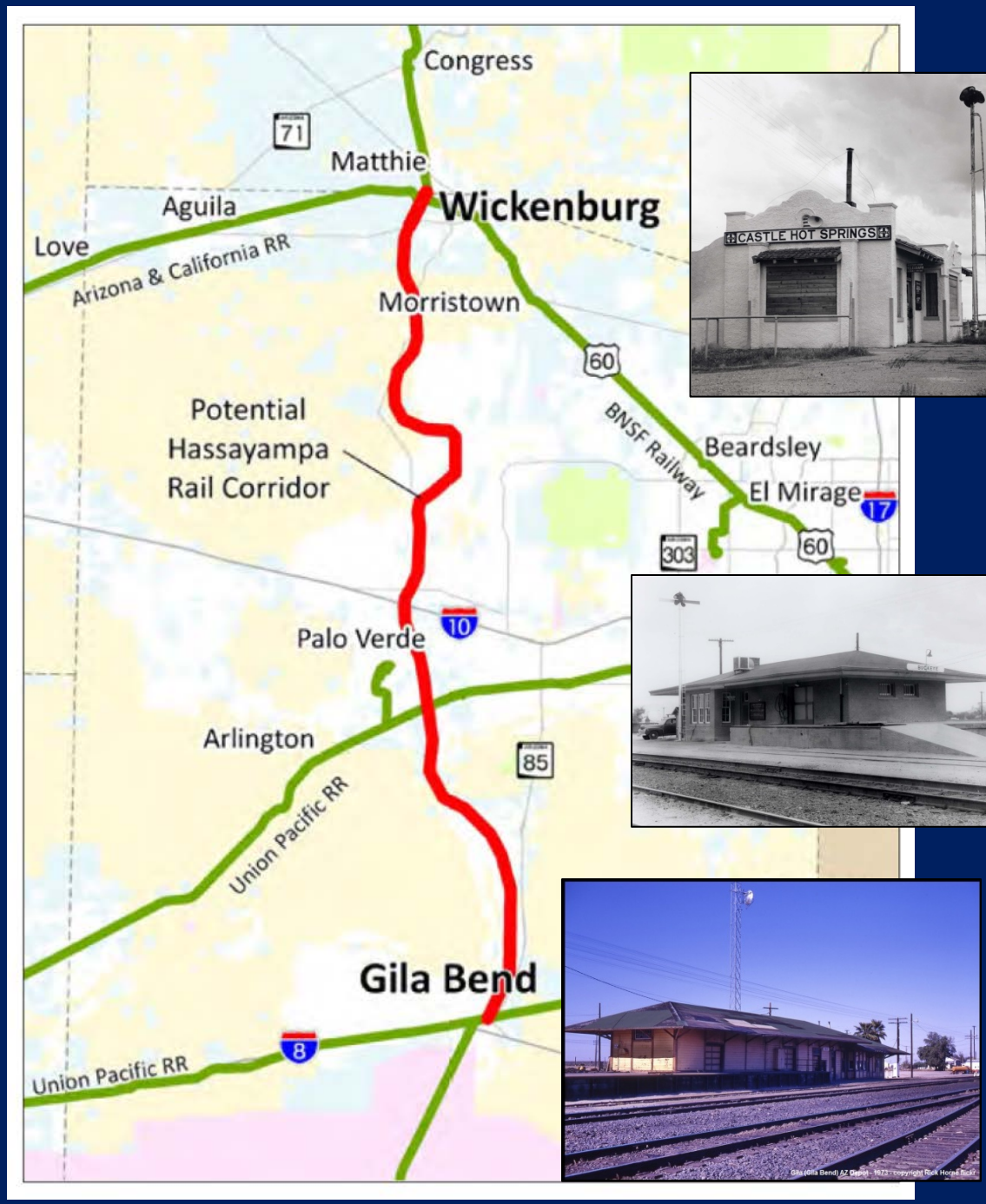
Literature Review

- Arizona
- State
- Rail Plan



Literature Review

- MCDOT Hidden Waters Corridor Feasibility Study

Field Review

SR 85

Field Review

UPRR Sunset Route/Gila Mainline

Field Review

Old Highway 80 - Gillespie Bridge

Field Review

Old Highway 80

Field Review

Wellton Branch Line, Palo Verde Road

Field Review

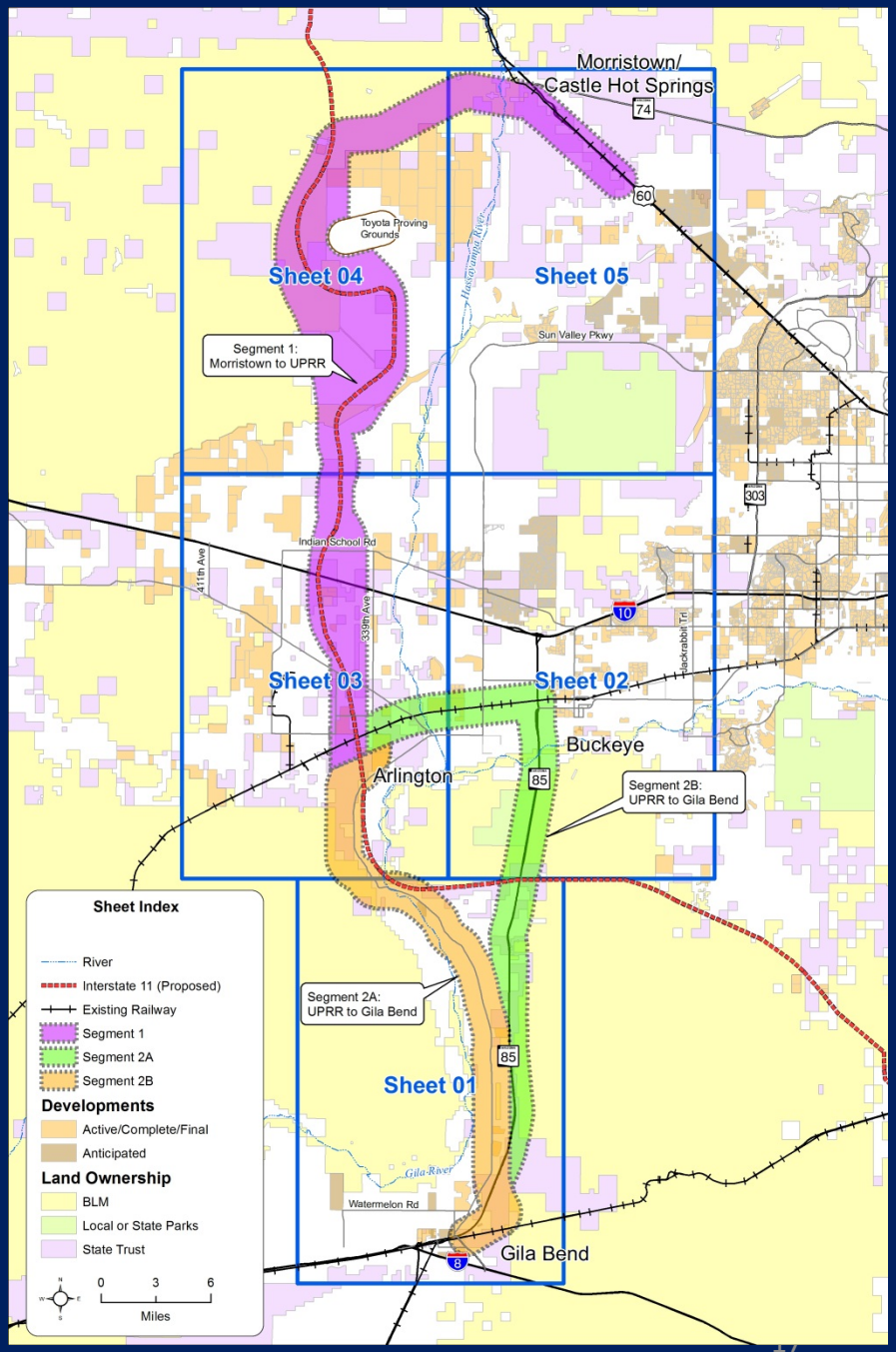
Vulture Mine Road

Field Review

BNSF Railway, Gates Road

Conceptual Corridors

- Segment 1: Morristown to Buckeye
- Segment 2: Buckeye/ Arlington to Gila Bend
    - 2A: Old Highway 80
    - 2B: SR 85



Corridor Cost Elements

Item No.	Description	Unit	Unit Cost	Assumptions and Notes	References
1	Main Track - New (On New ROW)	MI	$2,500,000.00	136# CWR, conc. ties, ballast, subballast, service road	Oregon Rail Study Appendix G
2	Main Track - Upgrades	MI	$1,600,000.00	136# CWR, conc. ties	Wellton Branch Cost Analysis Alt #3
3	Second Main Track	MI	$2,500,000.00	136# CWR, conc. ties, ballast, subballast	Oregon Rail Study Appendix G
4	Sidings	MI	$2,500,000.00	136# CWR, conc. ties, ballast, subballast	Oregon Rail Study Appendix G
5	Turnouts/Switches New #20 TO	EA	$188,000.00	136# wood ties	Wellton Branch Cost Analysis Alt #3
6	Diamond Crossing New	EA	$300,000.00	-	-
7	Bridges Steel Ballast Deck	LF	$8,000.00	estimate total bridge length for each corridor	Wellton Branch Cost Analysis Alt #3
8	Culverts, Concrete pipes 36"	LF	$250.00	estimate total culvert length for each corridor	Wellton Branch Cost Analysis Alt #3

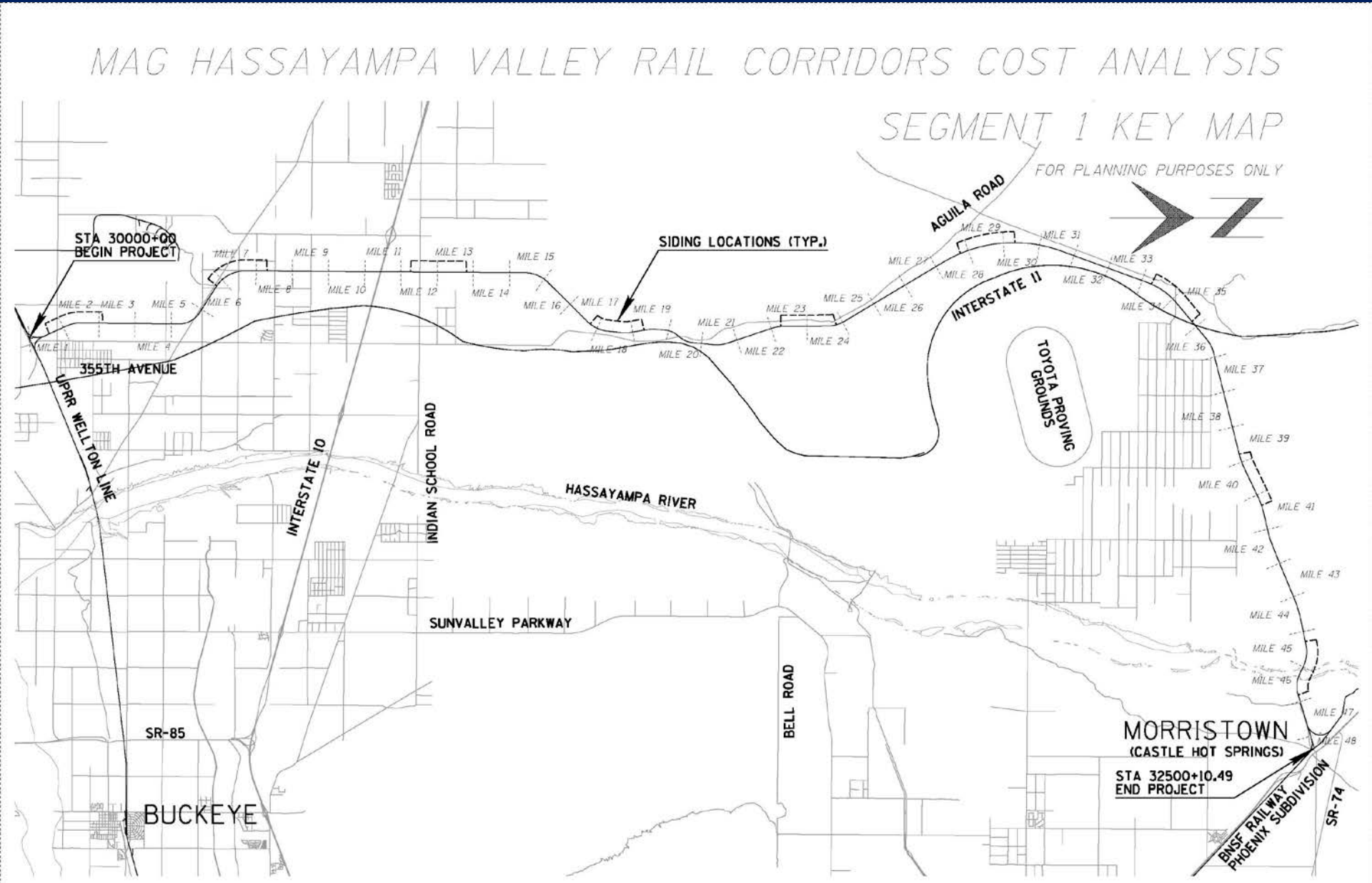
Corridor Cost Elements

Item No.	Description	Unit	Unit Cost	Assumptions and Notes	References
9	Canals (Railroad Steel Ballast Deck Bridge)	EA	$8,000.00	estimate total bridge length for each corridor	Wellton Branch Cost Analysis Alt #3
10	Signalization System (signals and communication)	MI	$2,000,000.00	-	Oregon Rail Study Appendix G
11	Utilities (Allowance 5% of Construction cost)	LS	$37,500,000.00	-	-
12	Earthwork	CY	$20.00	estimate volume based on vertical profile modeling; volume subtracted from Corridor 1 to reflect potential tunnel	Kimley-Horn and Associates
13	Tunnel Boring	LF	$30,000.00	Assume tunnel is utilized on Segment No. 1. This represents a conservative.	Dulles Rail Project tunnel boring cost using drilling machine

Crossing Cost Elements

Item No.	Description	Unit	Unit Cost	Assumptions and Notes	References
14	At-Grade Crossing	EA	$500,000.00	Public crossing includes gates and signals	State of Arizona Rail Safety & Security Resource Guide, Oregon Rail Study Appendix G
15	At-Grade Crossing - Future	EA	$500,000.00	-	State of Arizona Rail Safety & Security Resource Guide, Oregon Rail Study Appendix G
16	Grade-Separated Crossings (Roadway Bridge Overpass)	EA	$25,000,000.00	-	-
17	Grade-Separated Crossings - Future Planned Roadways	EA	$25,000,000.00	-	-
18	Active Grade Crossing Equipment Upgrades	EA	$352,000.00	-	Wellton Branch Cost Analysis Alt #3
19	Active Grade Crossing Equipment - New	EA	$352,000.00	-	Wellton Branch Cost Analysis Alt #3 (URS)
20	Passive Sign Upgrades (NOT RECOMMENDED)	EA	-	-	-
21	Passive Sign - New (NOT RECOMMENDED)	EA	-	-	-
22	Install Positive Train Control	MI	$400,000.00	excludes rolling stock	Wellton Branch Cost Analysis Alt #3

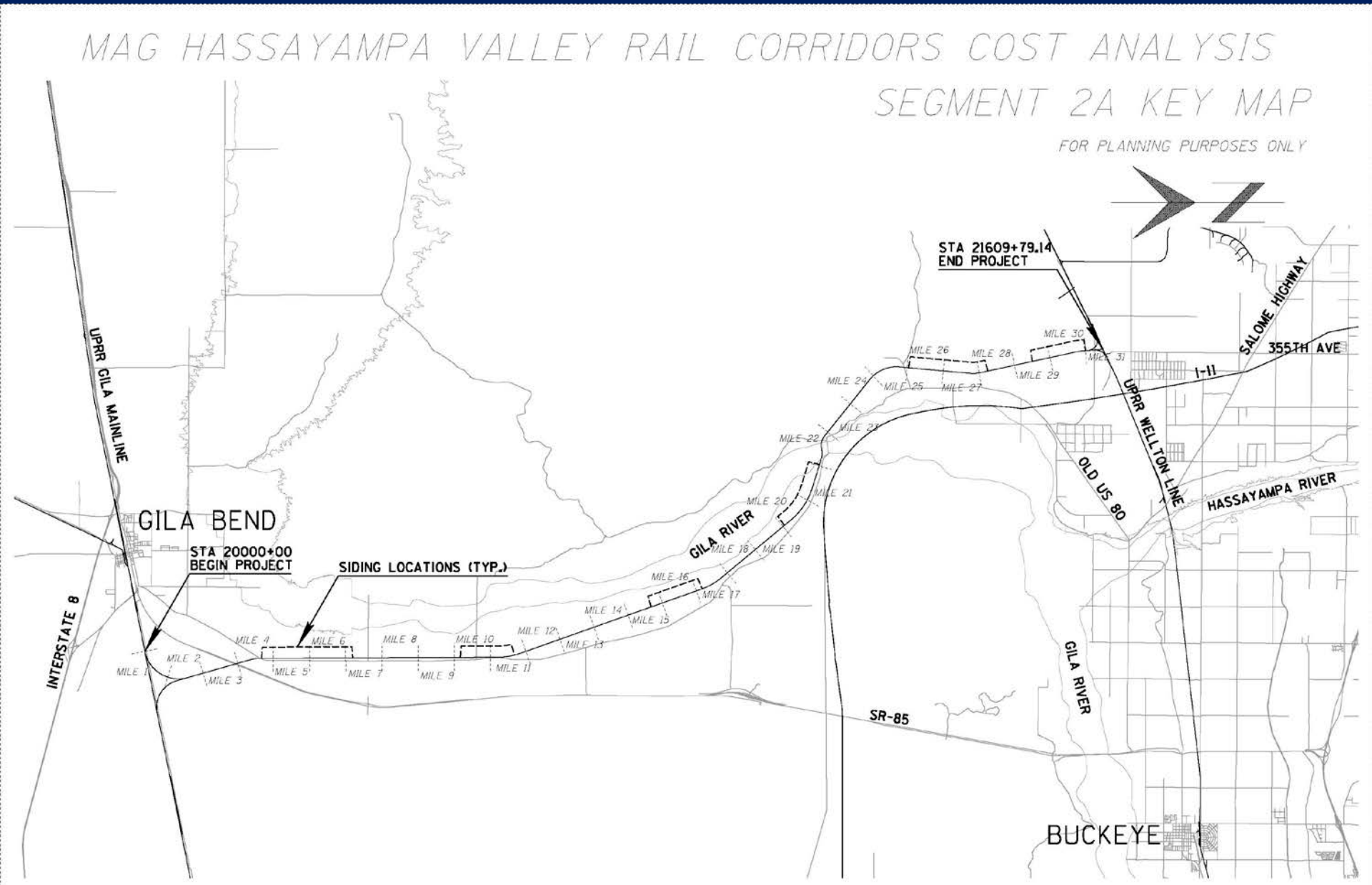
Segment No. 1: Horizontal Layout



Segment No. 1

- 48.9 miles long
- Ties to existing BNSF railway Phoenix subdivision
- 22 existing roadways crossings
- 20 future roadways crossings
- 38 wash/river crossings
- 8 major bridges (500’ or longer)
- Tunnel through Vulture Mountains (2000’)

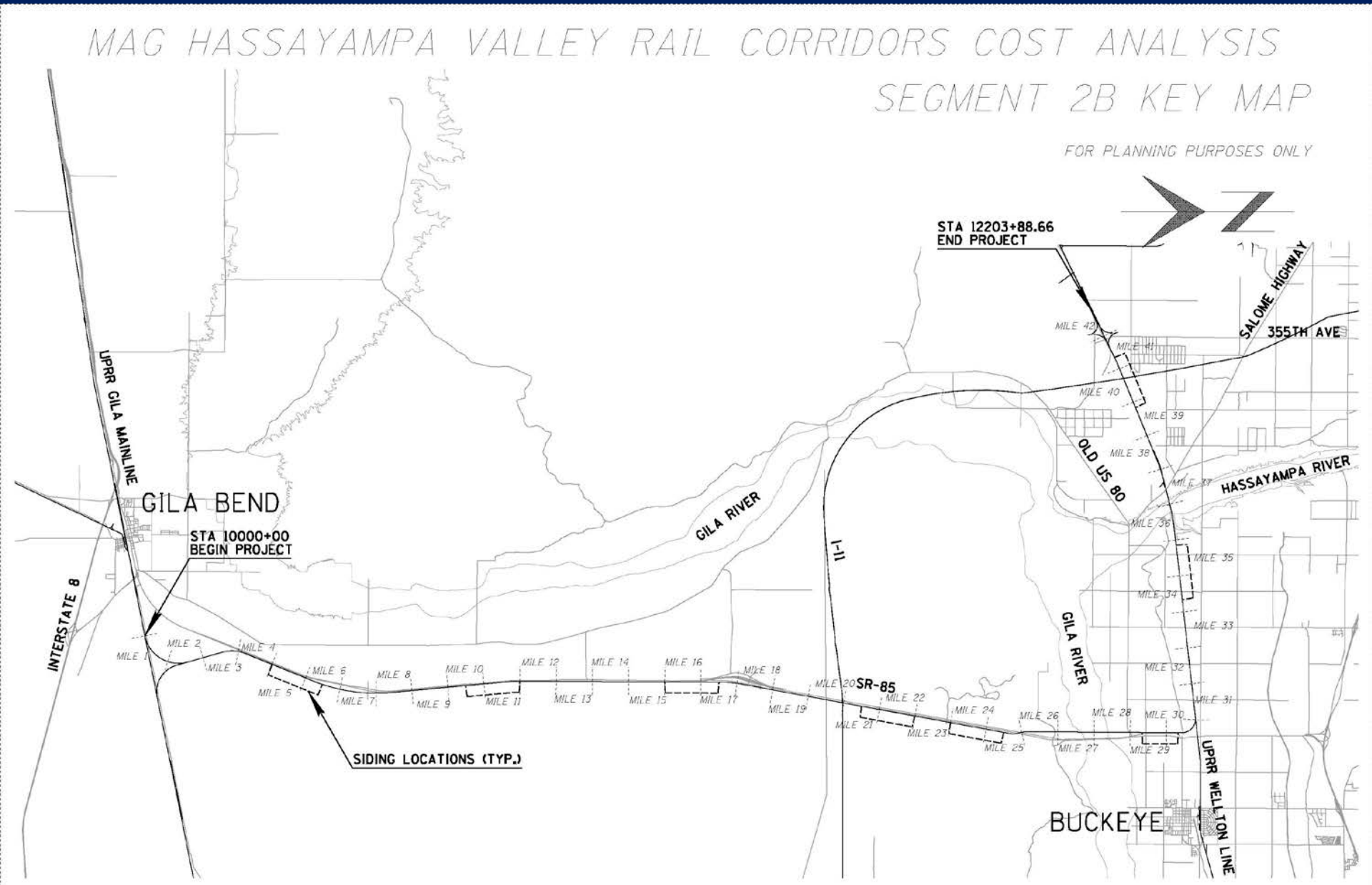
Segment No. 2A: Horizontal Layout



Segment No. 2A

- 30.5 miles long
- Ties to existing UPRR Gila Mainline and UPRR Wellton line, segments along Old Highway 80 11 existing roadways crossings
- 9 future roadways crossings
- 14 wash/river crossings
- 3 major bridges (500’ or longer)
- Gila River bridge (5,500’)
- Significant fill sections

Segment No. 2B: Horizontal Layout



Segment No. 2B (SR 85)

- 30.1 miles long
- Ties to existing UPRR Gila Mainline and UPRR Wellton line, follows SR 85 corridor
- 20 existing roadways crossings
- 14 future roadways crossings
- 14 wash/river crossings
- 7 major bridges (500’ or longer)
- Coordination within SR 85 right of way
- Significant fill sections

COST SUMMARY

Corridor	Corridor Improvements	Crossing Improvements	Right of Way	Maintenance of Way (per year)	Engineering and Planning Costs	10% Contingency	Corridor Total Cost (2013$)	Corridor Total Cost (2033$)
Segment No. 1 - Hassayampa	$630,000,000	$210,000,000	$6,000,000	$470,000	$350,000,000	$119,600,000	$1,315,600,000	$1,993,604,000
Segment No. 2A - Hidden Water-Gila Bend (Old Highway 80)	$350,000,000	$180,000,000	$4,000,000	$300,000	$220,000,000	$75,400,000	$829,400,000	$1,256,837,000
Segment No. 2B - Hidden Water-Gila Bend (SR-85)	$420,000,000	$220,000,000	$4,000,000	$300,000	$270,000,000	$91,400,000	$1,005,400,000	$1,523,540,000
Planning-Level Estimate of Probable Cost						Segments 1 and 2A	**$2,145,000,000**	**$3,250,441,000**
						Segments 1 and 2B	**$2,321,000,000**	**$3,517,144,000**

Corridor	Total Length	Total Cost / Mile (2013 $)	Total Cost / Mile (2033 $)
Segment No. 1 - Hassayampa	47.35	$27,785,000	$42,104,000
Segment No. 2A - Hidden Water-Gila Bend (Old Highway 80)	30.49	$27,204,000	$41,224,000
Segment No. 2B - Hidden Water-Gila Bend (SR-85)	41.74 (30.1 miles of new track)	$24,088,000	$36,501,000