Appendix B-1
Alternatives Evaluation Matrices

Potential Alternatives Considered

As part of the scoping process, which began with the publication of the Notice of Intent to prepare an EIS in the Federal Register on August 26, 2013, FHWA and NYSDOT provided opportunities for public input and considered comments from the public on potential alternatives. The initial list of potential alternatives was included in the Project's *Draft Scoping Report* (June 2014). The screening of potential alternatives was presented to the public in the project's *Scoping Report* (April 2015) and included consideration of several concepts suggested by the public (V-5, T-4, O-1, and O-2). In response to public input after the publication of the *Scoping Report,* and as described in the *Tunnel Feasibility Study* (**Appendix B-2**), NYSDOT developed additional potential alternatives in response to public comments (T-5, T-6, and T-7). In 2018, NYSDOT developed the Orange tunnel concept based on the recommendation of an independent consultant (see **Appendix B-3**, which contains the independent consultant's report, and **Appendix B-4**, which contains the results of the Orange tunnel concept study).

Potential alternatives were evaluated and screened based on their ability to satisfy the Project's need, meet the Project's purpose and objectives, and meet the following screening criteria:

- Consistency with the Project's purpose, objectives, and stated needs;
- Property needs as defined by the number of buildings that may need to be acquired;
- Constructability considerations, including difficulty and duration of construction and the ability to maintain adequate traffic flow during construction; and
- The estimated construction cost in that an alternative was considered reasonable if the cost would be less than 2.5 times the estimated cost of Alternative V-1 (Rehabilitation), which was $800 million (updated to $940 million in 2018 to account for inflation).

Each potential alternative was developed in sufficient detail to produce order-of-magnitude cost estimates and assess its ability to meet the above criteria.

Table 1 contains summaries of these potential alternatives, and **Table 2** presents the results of the evaluation and screening of the potential alternatives and options.

Table 1

List of Potential Alternatives Considered for the I-81 Viaduct Project

Alternatives	Description
No Build (NB) Alternative Required by NEPA; serves as the benchmark to which the build alternatives are compared. Would maintain existing highway in its current configuration, with continual maintenance and repairs.	
NB: No Build	Would involve maintaining the highway in its existing configuration, performing continual maintenance and repairs to ensure the safety of the traveling public, and implementing safety measures to the extent feasible and practical.
Viaduct (V) Alternatives[1] Considered five potential Viaduct Alternatives: one would rehabilitate the existing viaduct; three would replace it with a new, wider, and taller viaduct in the same general location; and one would replace it with a new two-tier viaduct. All viaduct concepts would be designed to meet current federal and state highway requirements; maintain north-south interstate highway access to and from Downtown Syracuse; reconstruct I-81 from I-690 to Hiawatha Boulevard; reconstruct I-690 from Leavenworth Avenue to Lodi Street, including a full interchange with I-690; and include local street, bicycle, pedestrian and urban design improvements.	
V-1: Rehabilitation	Would involve a long-term program, implemented as funding permits, to address I-81 deterioration by reconfiguring ramps to improve existing connections between I-81 and I-690, modifying the exit lane at Exit 18 (Harrison Street/Adams Street), repairing or replacing 42 bridges, and correcting structural deficiencies on I-81 and I-690 within viaduct area. Some nonstandard and nonconforming features would be eliminated, but most (e.g., sharp curves, narrow shoulders, and insufficient distance between on- and off-ramps) would remain. Almond Street would remain much the same as it is today. **Cost:** $800 million (updated to $940 million in 2018 to account for inflation). **Construction duration:** 2-4 years. **Building acquisitions:** 0
V-2: New Viaduct Fully Improved to Current Standards	Would involve a full reconstruction of I-81 between approximately Colvin Street and Hiawatha Boulevard and of I-690 from Leavenworth Avenue to Lodi Street. All highway elements would be reconstructed to 60 miles per hour (mph) design standards. **Cost:** $1.4 billion **Construction duration:** 6 years. **Building acquisitions:** 36 buildings
V-3: New Viaduct with Substantial Design Improvements	Would involve a full reconstruction of I-81 between approximately Colvin Street and Hiawatha Boulevard and of I-690 from Leavenworth Avenue to Lodi Street. All highway elements would be reconstructed to 60 mph design standards except for four curves within the I-81/I-690 interchange that would meet 55 mph design standards and one curve that would meet 50 mph design standards for horizontal stopping sight distance. **Cost:** $1.4 billion. **Construction duration:** 6 years. **Building acquisitions:** 29 buildings
V-4: New Viaduct with Considerable Design Improvements	Would involve a full reconstruction of I-81 between approximately Colvin Street and Hiawatha Boulevard and of I-690 from Leavenworth Avenue to Lodi Street. All highway elements would be reconstructed to 60 mph design standards except for three curves within the I-81/I-690 interchange that would meet 55 mph design standards and two curves that would meet 50 mph design standards for horizontal stopping sight distance. **Cost:** $1.4 billion. **Construction duration:** 6 years. **Building acquisitions:** 24 buildings
V-5: New Stacked Viaduct	Would involve removal of the existing viaduct and construction of a new two-level viaduct above Almond Street from Burt Street to East Genesee Street, with northbound and southbound traffic on stacked decks. The stacked viaduct would be approximately 30 feet taller and approximately 11 feet narrower than the existing viaduct. Would include a full interchange between I-81 and I-690 and new auxiliary lanes (new lanes between highway interchanges) to improve safety for motorists entering and exiting the highway. **Cost:** $1.6 billion. **Construction duration:** 5-7 years. **Building acquisitions:** 30-40 buildings

Community Grid (CG) Alternatives (formerly known as the Street-level Alternatives)[2] Considered two potential alternatives to remove the viaduct between the New York, Susquehanna and Western Railway bridge near Renwick Street and the I-81/I-690 interchange and replace it with an urban arterial. Would include reconstruction of I-81 from I-690 to Hiawatha Boulevard, reconstruction of I-690 from Leavenworth Avenue to Beech Street, and other highway and local street improvements. Existing I-481 would be re-designated and improved as needed to operate as the new I-81. The CG concepts would be designed to meet current federal and state highway requirements, maintain north-south interstate highway access to and from Downtown Syracuse, include full or partial interstate-to-interstate connections with I-690, and include local street, bicycle, pedestrian, and urban design improvements.	
CG-1: Boulevard (formerly known as SL-1)	A reconstructed Almond Street would function as the primary thoroughfare accommodating north-south traffic and connecting to I-690, as it does today. **Cost:** $1.3). **Construction duration:** 5 years. **Building acquisitions:** 7 buildings
CG-2: Almond and Other Local Streets (formerly known as SL-2 and SL-3)	Would disperse traffic along a reconstructed Almond Street and other north-south and east-west local streets and would eliminate connection to I-690 from Almond Street, replacing it with a new I-690 interchange at Crouse and Irving Avenues. After this screening, the option was revised so that a portion of I-81 that now travels through Syracuse would be reclassified as Business Loop 81 (BL 81). BL 81 would extend between the existing southern Interstate 481 (I-481) interchange (Exit 16A) and the existing northern I-481 interchange (Exit 29). **Cost:** $1.3. **Construction duration:** 5 years. **Building acquisitions:** 7 buildings (updated to 4 buildings in 2017)
Tunnel (T) Alternatives Four concepts to replace existing viaduct with a tunnel (T-1, T-2, T-3, T-4) were considered in the initial phase of the Project and presented in the *Draft Scoping Report* in June 2014 and the *Scoping Report* in April 2015. In response to public input after the publication of the *Scoping Report*, additional engineering and further analyses were conducted to determine whether a tunnel alternative that satisfies the Project's needs and meets the Project's purpose, objectives, and established screening criteria could be developed. As a result, three new potential tunnel alternatives (T-5, T-6, and T-7) were considered. As a result of public input, NYSDOT contracted an outside consultant, not part of the I-81 Viaduct Project team, to conduct an independent study "to ensure that a tunnel and depressed highway were sufficiently analyzed to assess their feasibility and cost" (see November 2017 report in **Appendix B-3**); based on their recommendations, NYSDOT developed the Orange Tunnel Concept. All tunnel concepts would be designed to meet current federal and state highway requirements, maintain north-south interstate highway access to and from Downtown Syracuse, include a full or partial interchange with I-690; and local street, bicycle, pedestrian, and urban design improvements on the surface street above the tunnel.	
T-1: Tunnel Under Almond Street from Dr. Martin Luther King, Jr. East (MLK, Jr. East) to Butternut Street	Would replace I-81 viaduct with a two-mile-long tunnel providing two travel lanes in each direction. Tunnel would follow Almond Street from MLK, Jr. East to approximately East Fayette Street, curve northwesterly to Butternut Street, then ascend to meet existing I-81 highway. Almond Street, above the tunnel, would be reconstructed to serve local traffic. New ramps would connect the I-81 tunnel and I-690. **Cost:** $2.7 billion. **Construction duration:** 7-9 years. **Building acquisitions:** 35-40 buildings
T-2: Almond Street Tunnel from MLK, Jr. East to Genesee Street	Would replace I-81 viaduct an approximately one-mile-long tunnel, with two travel lanes in each direction. North of Genesee Street, I-81 would transition from tunnel to elevated highway. New ramps would connect I-81 and I-690. Almond Street above the tunnel would be reconstructed. **Cost:** $1.8 billion. **Construction duration:** 5-6 years. **Building acquisitions:** 35-40 buildings

T-3: Townsend Street Tunnel	Would replace I-81 viaduct with a new tunnel, with two travel lanes in each direction, under Oakwood Avenue and Townsend Street from approximately MLK, Jr. East to Butternut Street. At Butternut Street, the tunnel would rejoin the existing I-81 alignment. New ramps would connect I-81 and I-690. Townsend Street would be reconstructed between approximately MLK, Jr. East and East Genesee Street. **Cost:** $2.6 billion. **Construction duration:** 7-9 years. **Building acquisitions:** 55-75 buildings
T-4: Tunnel on an Eastern Alignment (81' Below Syracuse)	Called "81 feet below Syracuse" by member of the public who submitted the concept, T-4 would place I-81 in a tunnel to the east of the viaduct, which would be removed. The tunnel roof would be about 81 feet below grade, a depth that would allow the tunnel to be constructed in bedrock with a tunnel-boring machine. From south to north, the tunnel would begin at I-481 and extend northward below Comstock Avenue, east of Morningside Cemetery, Oakwood Cemetery, and Syracuse University. Separate tubes, each providing two or three travel lanes, would accommodate northbound and southbound traffic. Near Genesee Street, vehicles would exit the tunnel and travel on a highway, which would include a new interchange with I-690 approximately one mile east of the existing interchange, then enter a second tunnel just south of Lincoln Park. Vehicles would exit the second tunnel and rejoin the existing I-81 just south of Bear Street near Destiny USA. New interchanges with I-481, I-690, and former I-81 near Bear Street would be constructed. The section of I-81 between I-690 and Bear Street would be removed and re-designated as a new highway. Almond Street would be reconstructed. **Cost:** $3.3 billion. **Construction duration:** 6-8 years. **Building acquisitions:** over 100 buildings
T-5: Shallow Tunnel under Almond Street	Would replace I-81 viaduct with an approximately two-mile-long tunnel, carrying two lanes in each direction, from approximately East Kennedy Street to Butternut Street. New ramps would connect I-81 and I-690. Almond Street above the tunnel would be reconstructed. **Cost:** $3.1 billion. **Construction duration:** 4 years (tunnel portion only). **Building acquisitions:** 34 buildings and one parking lot
T-6: Deep Tunnel West of Almond Street	Would replace I-81 viaduct with an approximately two-mile-long tunnel with two travel lanes in each direction. The south tunnel portal would be located approximately 1,000 feet south of MLK, Jr. East, follow South Townsend Street, and make a westward turn near East Genesee Street. New ramps would connect I-81 and I-690. Almond Street above the tunnel would be reconstructed. **Cost:** $2.6 billion. **Construction duration:** 3 years (tunnel portion only). **Building acquisitions:** 16 buildings and one open space
T-7: Deep Tunnel West of Almond Street (Non-Interstate)	Would involve construction of a high speed, non-interstate tunnel, with two lanes in each direction, through Downtown Syracuse from MLK, Jr. East to Hickory Street, as well as elements of Option CG-2, including the conversion of I-481 to I-81 and a new I-690 interchange at Crouse and Irving Avenues. The CG portion would include new ramps to connect I-81 and I-690. Almond Street above the tunnel would be reconstructed. **Cost:** $2.5 billion. **Construction duration:** 3 years (tunnel portion only); 5 years CG portion. **Building acquisitions:** 11 buildings
Orange Tunnel Concept: Deep Tunnel from MLK, Jr. East to James Street	Would involve the demolition of the existing viaduct between the NYS&W Railway bridge and the I-81/I-690 interchange and construction of tunnel, carrying two lanes in each direction, from approximately 400 feet south of MLK, Jr. East to approximately James Street. Alignment would be about 1.7 miles long (consisting of a 1.4-mile-long tunnel and .3 miles of depressed roadway segments). The tunnel main line would be constructed primarily with a tunnel-boring machine (TBM) in bedrock, the highway would be depressed as it travels to and from the tunnel portals and connections, and the approaches would involve cut and cover and sequential excavation methods of construction. I-690, including the I-81/I-690 interchange, would be reconstructed from Leavenworth Avenue to Lodi Street. The section of I-81 between the southern I-81/I-481 interchange (Interchange 16A) and the I-81/I-481 northern interchange (Interchange 29) in Cicero would be re-designated as a business loop of I-81 (BL 81). **Cost:** $4.9 billion. **Construction duration:** 11 years. **Building acquisitions:** 17 building acquisitions with the partial I-690 interchange and 22 building acquisitions with the full I-690 interchange
Depressed Highway (DH) Alternatives Considered two concepts that would remove the viaduct and replace it with a depressed, or below-grade, highway. The DH concepts would be designed to meet current federal and state highway requirements, maintain north-south interstate highway access to and from Downtown Syracuse, include a full interchange with I-690, and local street, bicycle, pedestrian, and urban design improvements.	
DH-1: Depressed Highway from	Would replace viaduct with a highway, with two lanes in each direction, in an open trench approximately 25 feet below street level from Adams Street to Butternut Street. The new highway would rejoin existing I-81 at Butternut Street. Service roads would be constructed on either side of the depressed highway. **Cost:** $1.8 billion. **Construction duration:** 7-9 years. **Building acquisitions:** 30-40 buildings

Adams Street to Butternut Street	
DH-2: Depressed Highway from Adams Street to Genesee Street	Would replace viaduct with a highway, with two lanes in each direction, in an open trench approximately 25 feet below street level from Adams Street to Genesee Street. At East Genesee Street, the highway would curve northwesterly and ascend to meet the elevated I-81 at its interchange with I-690. Service roads would be constructed on either side of the depressed highway. **Cost:** $1.5 billion. **Construction duration:** 5-6 years. **Building acquisitions:** 30-40 buildings
Other (O) Alternatives	
O-1: Western Bypass	Would build a new highway from the I-481 south interchange (Exit 16A) to New York State Route 481 (NY 481) or to an intermediate roadway (i.e., I-690 or NY 695). The western bypass, in combination with existing I-481, would form a partial or full highway loop around the city. Portions of or the entire existing I-81 highway through Syracuse would be removed. The new highway typically would provide two travel lanes in each direction with interchanges at key locations. I-81 right-of-way through Syracuse would be replaced by a surface street with pedestrian and bicycle enhancements. **Cost:** $2.4 billion. **Construction duration:** 4-6 years. **Building acquisitions:** over 100 buildings
O-2: West Street	Would demolish the viaduct and reconstruct Almond Street, from the NYS&W Railway bridge to about Butternut Street, as a boulevard. A new highway would be constructed between I-81 near MLK, Jr. East and I-690 at West Street. New ramps would connect the highway to I-690 and to I-81 just north of Butternut Street. The new highway typically would provide two travel lanes in each direction with interchanges at key locations. **Cost:** $1.3 billion. **Construction duration:** 4-6 years. **Building acquisitions:** 70-90 buildings

Notes:

[1] Following the publication of the *Draft Scoping Report* in June 2014, three of the Viaduct Alternatives (V-2, V-3, and V-4) were combined into one Viaduct Alternative with the following three options: Option V-2, New Viaduct Fully Improved to Current Standards; Option V-3, New Viaduct with Substantial Design Improvements; and Option V-4, New Viaduct with Considerable Design Improvements. Following the publication of the *Scoping Report* in April 2015, additional engineering and further analysis were undertaken for the three Viaduct Alternative options advanced during the initial screening. Based on these studies, Options V-2 and V-3 were dismissed (see **Table 2,** below), and Option V-4 was advanced for further study as the Viaduct Alternative. The updated cost of the Viaduct Alternative as presented in this DDR/DEIS is $2.2 billion.

[2] Following the publication of the Draft Scoping Report, the three Street-Level Alternatives (SL-1, SL-2, and SL-3) were combined into one alternative and renamed the Community Grid (CG) Alternative with the following two options: Option CG-1, Boulevard; and Option CG-2, Almond Street and Other Local Streets. Following the publication of the *Scoping Report* in April 2015, additional engineering and further analysis were undertaken for the two CG options advanced during the initial screening. Based on these studies, Option CG-1 was dismissed (see **Table 2,** below), and Option CG-2 was advanced for further study as the Community Grid Alternative. The updated cost of the Community Grid Alternative as presented in this DDR/DEIS is $1.9 billion.

Table 2

Results of the Potential Alternatives Screening

Alternative	Recommended/Pass (✓) or Not Recommended/Fail (X)				
	Purpose and Need	Property	Construct-ability	Cost	Overall
Alternative NB1 No Build	N/A	N/A	N/A	N/A	✓
Alternative V-1 Rehabilitation	X	✓	✓	✓	X
Alternative V-2 New Viaduct Fully Improved to Current Standards	✓	✓	✓	✓	✓
Alternative V-3 New Viaduct with Substantial Design Improvements	✓	✓	✓	✓	✓
Alternative V-4 New Viaduct with Considerable Design Improvements	✓	✓	✓	✓	✓
Alternative V-5 New Stacked Viaduct	X	✓	✓	✓	X
Alternative SL-1 Boulevard	✓	✓	✓	✓	✓
Alternative SL-2 One-way Traffic on Almond Street and Other Local Street(s)	✓	✓	✓	✓	✓
Alternative SL-3 Two-way Traffic on Almond Street and Other Local Street(s)	✓	✓	✓	✓	✓
Alternative T-1 Almond Street Tunnel from MLK, Jr. East to Butternut Street	X	✓	X	X	X
Alternative T-2 Almond Street Tunnel from MLK, Jr. East to Genesee Street	X	✓	X	✓	X
Alternative T-3 Townsend Street Tunnel	X	X	X	X	X
Alternative T-4 Tunnel on Eastern Alignment (81' Below Syracuse)	✓	X	✓	X	X
Alternative T-5 Shallow Tunnel under Almond Street	✓	✓	X	X	X
Alternative T-5: Deep Tunnel West of Almond Street	X	✓	✓	X	X
Alternative T-6: Deep Tunnel West of Almond Street (Non-Interstate)	✓	✓	✓	X	X
Orange Tunnel Concept: Deep Tunnel from MLK, Jr. East to James Street	X	✓	X	X	X
Alternative DH-1 Depressed Highway from Adams Street to Butternut Street	X	✓	X	✓	X
Alternative DH-2 Depressed Highway from Adams Street to Genesee Street	X	✓	X	✓	X
Alternative O-1 Western Bypass	✓	X	✓	X	X
Alternative O-2 West Street (Salt City Circuit)	X	X	X	✓	X

Notes:

1. The No Build Alternative does not address the Project's needs or meet the Project's purpose and objectives, but it passes the preliminary screening because NEPA requires an examination of a No Build Alternative in the EIS.
2. After the first screening, Viaduct Alternatives V-2, V-3, and V-4 were combined into one Viaduct Alternative with the following three options: Option V-2, New Viaduct Fully Improved to Current Standards; Option V-3, New Viaduct with Substantial Design Improvements; and Option V-4, New Viaduct with Considerable Design Improvements. Options V-2 and V-3 were dismissed from further consideration and Option V-4 became the Viaduct Alternative.
3. After the initial screening, the Street-Level Alternatives SL-1, SL-2, and SL-3 were combined into one alternative and renamed the Community Grid (CG) Alternative with the following two options: Option CG-1, Boulevard; and Option CG-2, Almond Street and Other Local Streets. Option CG-1 was dismissed from further consideration and Option CG-2 became the Community Grid Alternative.