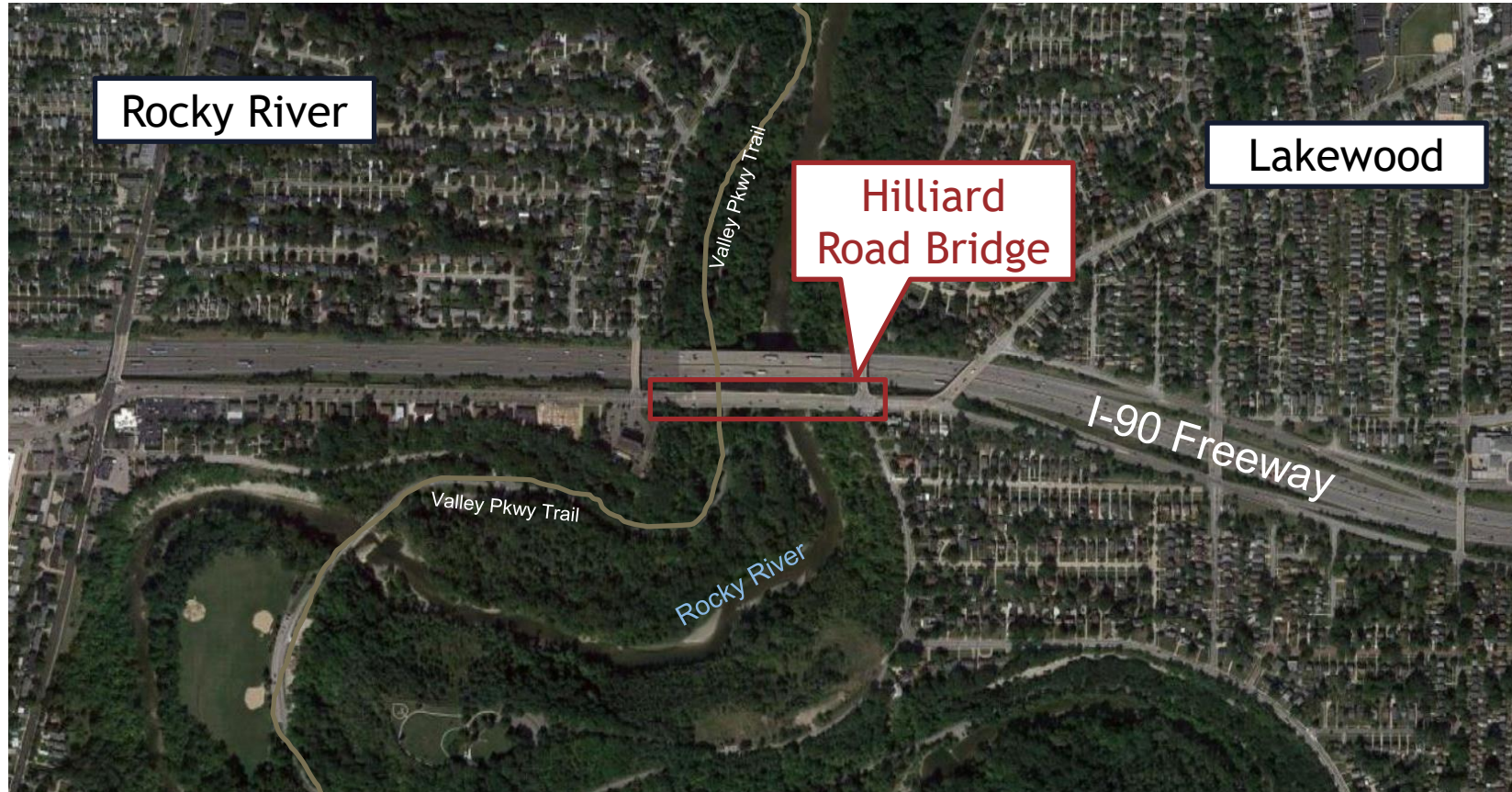


Hilliard Road Bridge Improvement Alternatives & Recommendation



Location



Project Purpose



Background / Previous Inspections and Studies

- **2013** – Bridge inspection
- **2015** – Feasibility study prepared, recommended “rehabilitation” of the bridge
- **2018** – Bridge inspection and concrete sampling showed accelerated deterioration of the structure
 - Restrictions on specific trucks and certain heavy emergency vehicles over 29 tons (type I ambulance is 7 tons) traveling on bridge
- **2019** – Revised Feasibility Study

Comparison of 2013 and 2018 Bridge Condition



Deterioration to the underside of the arch

Comparison of 2013 and 2018 Bridge Condition



Concrete deterioration due to seasonal salt usage and freeze-thaw

Comparison of 2013 and 2018 Bridge Condition



Increasing deterioration of arches and bridge piers

Bridge Netting



Safety netting installed to protect traveling public from falling concrete debris

Project Purpose & Need



Address the poor bridge condition



Improve safety for vehicles and pedestrians on the bridge



Allow unrestricted vehicular traffic/remove load posting signs



Improve safety for park visitors under the bridge

Project Team and Involved Stakeholders

Project Team and Involved Stakeholders

Cuyahoga County
Department of Public
Works

The Ohio Department
of Transportation

TranSystems

- Lawhon
- DLZ
- Chagrin Valley Engineering Ltd.
- T2 UES Inc. (Cardno)

Cleveland Metroparks

City of Lakewood

City of Rocky River



Key Issues



Key Issues

- Estimated useful life
- Project purpose and need
- Historic bridge impacts
- Environmental impacts
- Maintenance of traffic impacts
- Right of way impacts
- Project cost



Alternatives Considered

Alternatives Considered

Four Alternatives

Alternative #1:
No-Build

Alternative #2:
Rehabilitation

Alternative #3:
Removal of the
existing bridge and
replacement on the
existing alignment

Alternative #4:
Replacement
Structure on New
Alignment & Retaining
Existing Bridge

Alternative #1 No Build

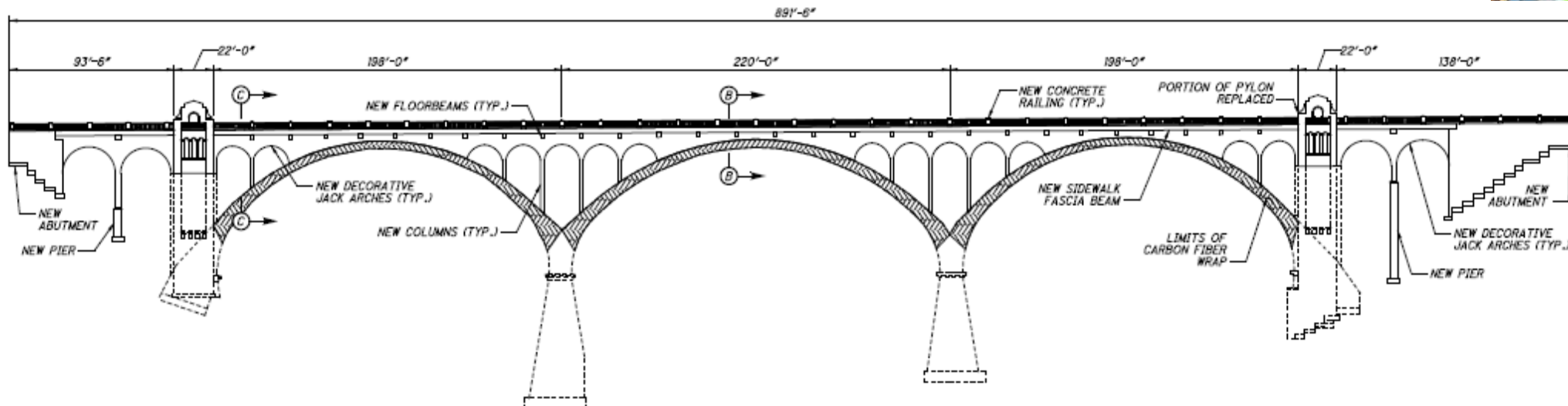
- Does not fulfill project need
- Would keep current bridge as it is now
- Debris will continue to fall from structure
- Piers in the waterway will remain
- No cost
- Beyond useful life (almost 100 years)
- No construction or maintenance or traffic impacts



Hilliard Road bridge deck

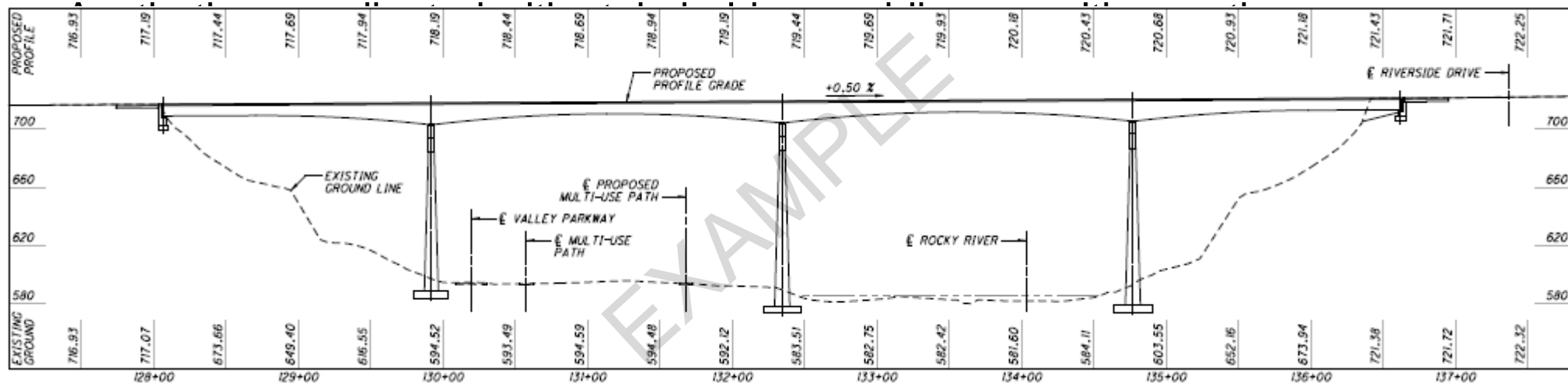
Alternative #2 Rehabilitation

- Partially fulfills project need
- 70% of current bridge will likely be removed
- Temporary park and river impacts during construction, falling debris reduced
- \$52.8 Million (construction and right-of-way cost)
- Estimated design life of 25 years
- Three-year detour during three-year construction
- **Unknown condition/cost**



Alternative #3: Removal of the existing bridge and replacement on existing alignment (Recommended Alternative)

- Fulfills project need
- Remove current bridge
- Temporary park and river impacts during construction, no falling debris
- Potential for piers outside of river
- \$40.7-\$55.2 Million depending on the type of bridge (construction and right-of-way cost)
- Estimated 75 years design life
- Two to three-year detour during construction



Alternative #4: Replacement Structure on New Alignment & Retaining Existing Bridge

- Partially fulfills project need
- Current bridge remains, new bridge built
- Permanent park and trail impacts, permanent relocation of five homes and one condo building (shown as red X's)
- Temporary impacts to park and river during construction
- Debris would continue to fall
- \$47.2-\$62.2 Million depending on the type of bridge (construction and right-of-way cost)
- Does not factor in maintenance costs
- Existing bridge is beyond useful life, new bridge estimated 75 years
- Two-year construction



Hilliard Road on New Alignment

Comparison Chart

Recommended Alt.

Alt	Description	Estimated Useful Life	Purpose & Need	Historic Bridge Impacts	Permanent Park Impacts	Park Impacts During Construction	River Impacts	Construction Schedule and Maintenance of Traffic	Right of Way Impact	Estimated Right-of-Way Cost (to be added to construction cost)	Estimated Initial Construction Cost (2023)
1	No Build	Beyond useful life.	Does not address P&N.	Historic bridge remains in place. Deterioration continues. Continual maintenance required.	No physical impacts to park. Debris continues to fall from structure.	N/A	No stream impacts from construction. Debris continues to fall in river.	N/A	N/A	N/A	N/A
2	Rehabilitation of Existing Bridge	Estimated 25 years.	Partially addresses P&N. Continued deterioration of piers and arches.	Removal of superstructure above arches. Fiber wrap of arches and piers below arches. Historic character likely to be compromised.	Can move path back to original location. Poor aesthetics of patched arches and piers. Debris problem reduced.	Temporary occupation during three-year construction.	Three-year temporary causeway. Debris problem reduced.	Three-year construction. Detour for 3 years.	Temporary from park	\$1.8 Million	\$51 Million
3	Bridge Replacement	Estimated 75 years.	Meets P&N.	Historic bridge removed.	Can move path back to original location. Potential for improved aesthetics.	Temporary occupation during two-year construction	Two-year temporary causeway. Debris problem alleviated.	Two-year to three-year construction (based on the method of demolition used by the contractor). Detour during construction. Short closure of I-90 during demolition if blasting required.	Temporary from park	\$1.2 Million	<p>Bridge replacement with a <u>4 span</u> high level bridge steel girder structure: \$39.5 million</p> <p>Bridge replacement with concrete prestressed arch bridge: \$54 Million</p>
4	Bridge Replacement - New Alignment, Existing Bridge to Remain	Beyond useful life of remaining structure. Estimated 75 years for new structure.	Does not address P&N; keeps existing structure with continued deterioration and debris.	Historic bridge remains in place. Deterioration continues. Continual maintenance required on existing bridge.	Permanent impacts from new bridge alignment. Debris problem continues.	Temporary impacts during construction. Larger area of vegetation removal.	Two-year temporary causeway. Additional pier in river for new bridge. Debris continues to fall in river.	Two-year construction. Short-term detour to tie in approach pavement after construction of new bridge.	Temp and permanent from park. Relocation of five homes and possibly one condo building.	\$8.2 Million	<p>Bridge replacement with a <u>4 span</u> high level bridge steel girder structure: \$39 million</p> <p>Bridge replacement with concrete prestressed arch bridge: \$54 Million</p>

Recommendation

Recommendation Summary

We did not recommend Alternative #2 because of the following:

- Rapid degradation of the structure at an increasing rate (2013-2018)
- Would require more frequent repairs, lifespan of bridge is not greatly increased
- More than 70% of the original bridge will need to be replaced, compromising its historical significance
- Higher risk for unforeseen and unbudgeted construction costs
- Road closures and construction time are not predictable

Recommendation

The steering committee has recommended:

Alternative #3

Removal of the Existing Bridge and
Replacement on the Existing Alignment

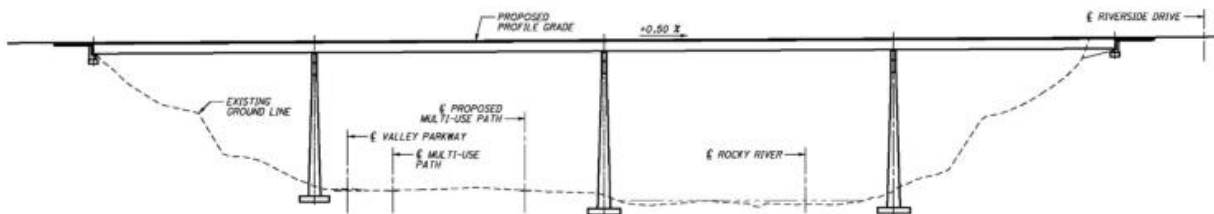
Structure Type Study



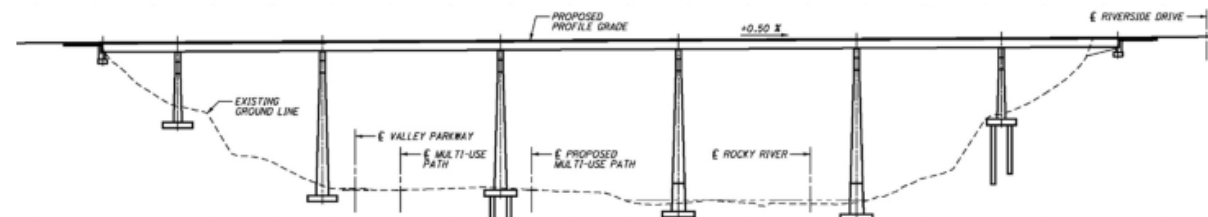
Requirements

- **Determine the best structure alternative and why**
 - **Geometry**
 - **Economics**
 - **Maintainability**
 - **Constructability**
 - **Right-of-way constraints**
 - **Disruption to traveling public**
 - **Waterway crossing requirements**
 - **Foundation considerations**
 - **Historical and environmental concerns**
 - **Debris and ice flow problems**
 - **Cost analysis (initial construction and future rehab/maintenance)**

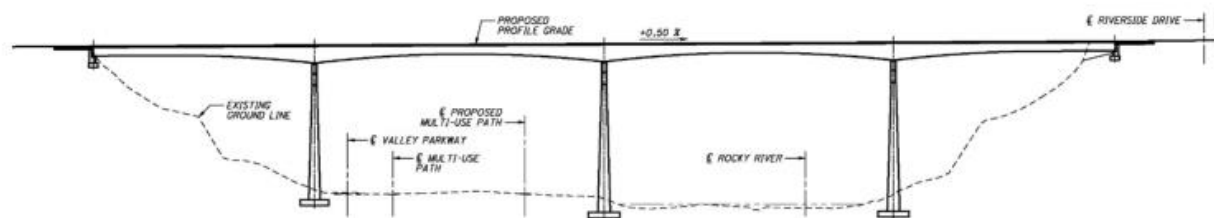
Bridge Types Considered



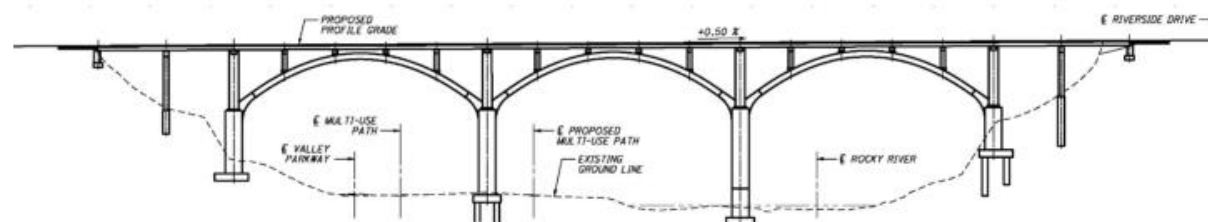
Alternative 1 - Straight Steel Plate Girders Profile



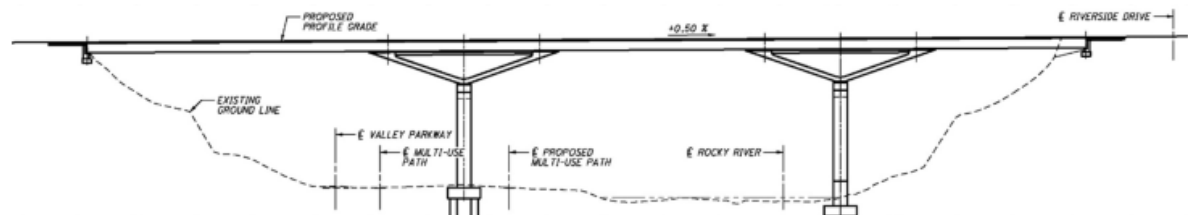
Alternative 4 - Prestressed Concrete Beams Profile



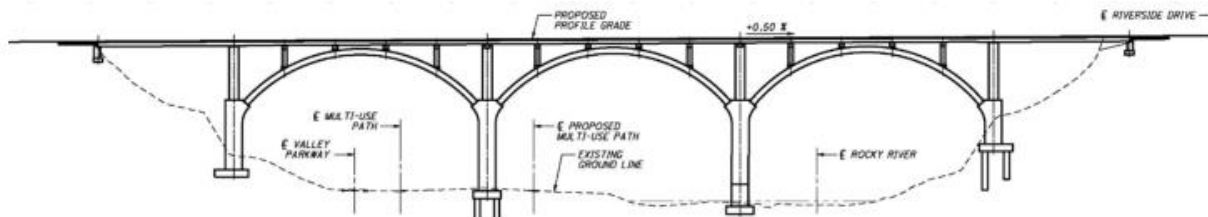
Alternative 2 - Haunched Steel Plate Girders Profile



Alternative 5 - Prestressed Concrete Arch Profile



Alternative 3 - Delta Steel Plate Girders Profile



Alternative 6 - Steel Arch Profile

Initial Cost Comparison

2023 Initial Cost Comparison Summary		
Alternative	Description	Cost
1	Straight Steel Plate Girders	\$30.2 Million
2	Haunched Steel Plate Girders	\$32.2 Million
3	Delta Steel Plate Girders	\$43.2 Million
4	Prestressed Concrete Beams	\$30.4 Million
5	Prestressed Concrete Arch	\$50.1 Million
6	Steel Arch	\$46.7 Million



Life Cycle Costs (Rehab/Maintenance)

Life Cycle Cost Comparison Summary		
Alternative	Description	Cost
1	Straight Steel Plate Girders	\$10.7 Million
2	Haunched Steel Plate Girders	\$11.2 Million
3	Delta Steel Plate Girders	\$15.2 Million
4	Prestressed Concrete Beams	\$5 Million
5	Prestressed Concrete Arch	\$6.3 Million
6	Steel Arch	\$10.5 Million



Funding and Next Steps

Secured Funding

	County	OPWC	Federal (ODOT)	Federal (NOACA)	Total
Design	\$2,676,702	\$1,000,000			\$3,676,702
Construction/ Construction Engineering	\$6,829,044		\$19,816,175	\$7,500,000	\$34,145,219



Next Steps

- **Consultation for historic bridge**
- **Bridge type**
- **Aesthetic treatments**
- **Park impact and mitigation**
- **Remaining environmental studies**
- **Design**
- **Right-of-Way Acquisition**
- **Construction**

Schedule

- **5/2021 - Public Meeting #2**
- **8/2021 – Stage 1 Plans Complete**
- **3/2022 – Stage 2 Plans Complete**
- **5/2022 – Environmental Clearance**
- **7/2022 – Stage 3 Plans Complete**
- **10/2022 – Final Plans Complete**
- **10/2022 – Right-of-Way Clearance**
- **5/2023 – Construction Begins**