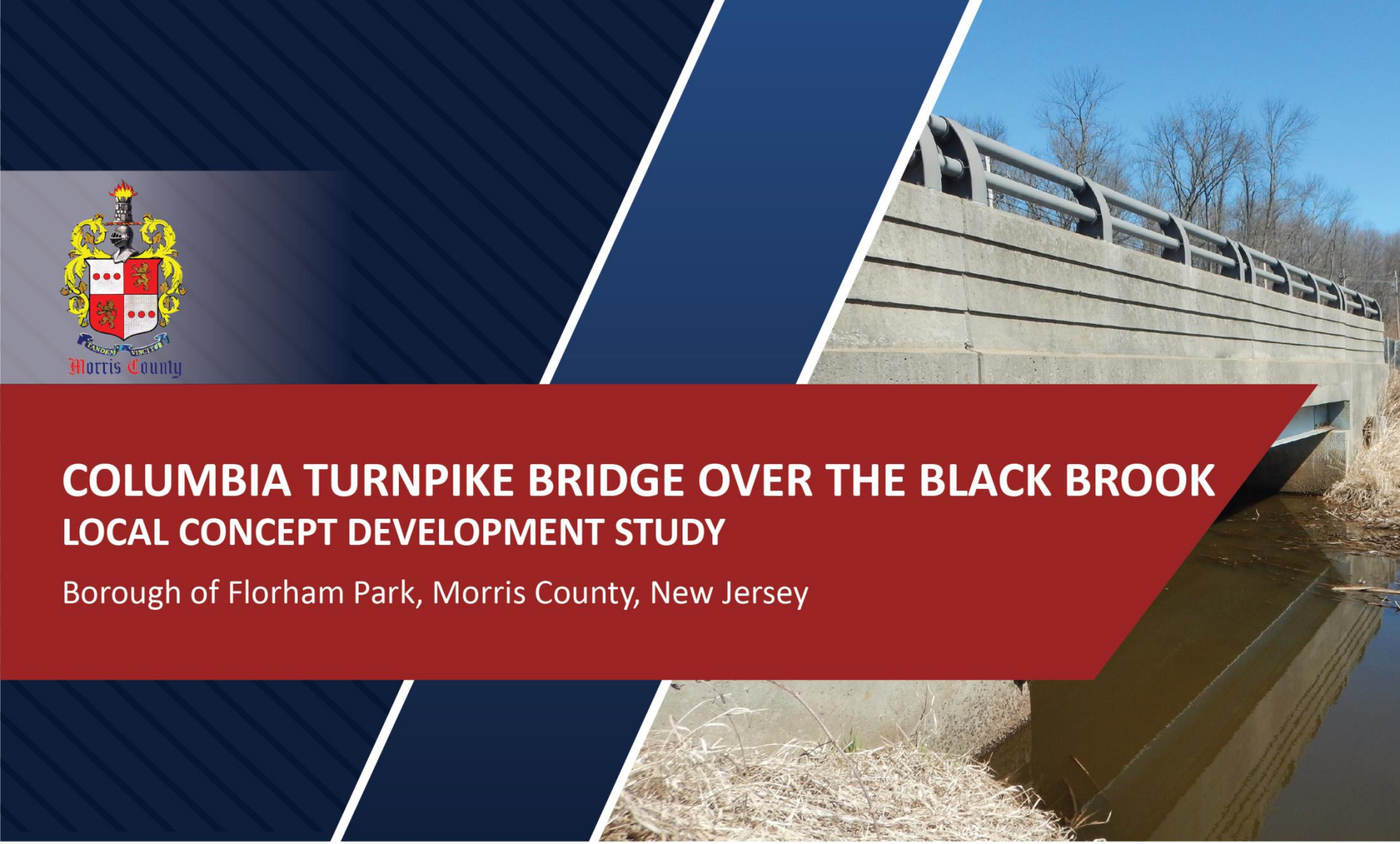


COLUMBIA TURNPIKE BRIDGE OVER THE BLACK BROOK

LOCAL CONCEPT DEVELOPMENT STUDY

Borough of Florham Park, Morris County, New Jersey

LOCAL OFFICIALS BRIEFING #3

December 12, 2018

NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

PROJECT TEAM

Morris County

DEPARTMENT OF TRANSPORTATION
THE STATE OF NEW JERSEY

NJTPA
NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY

U.S. Department of Transportation
Federal Highway
Administration

McCORMICK
TAYLOR

AmerCom Corp.
Consulting Engineers

RGA

TranSystems

STOKES
Creative Group, Inc.

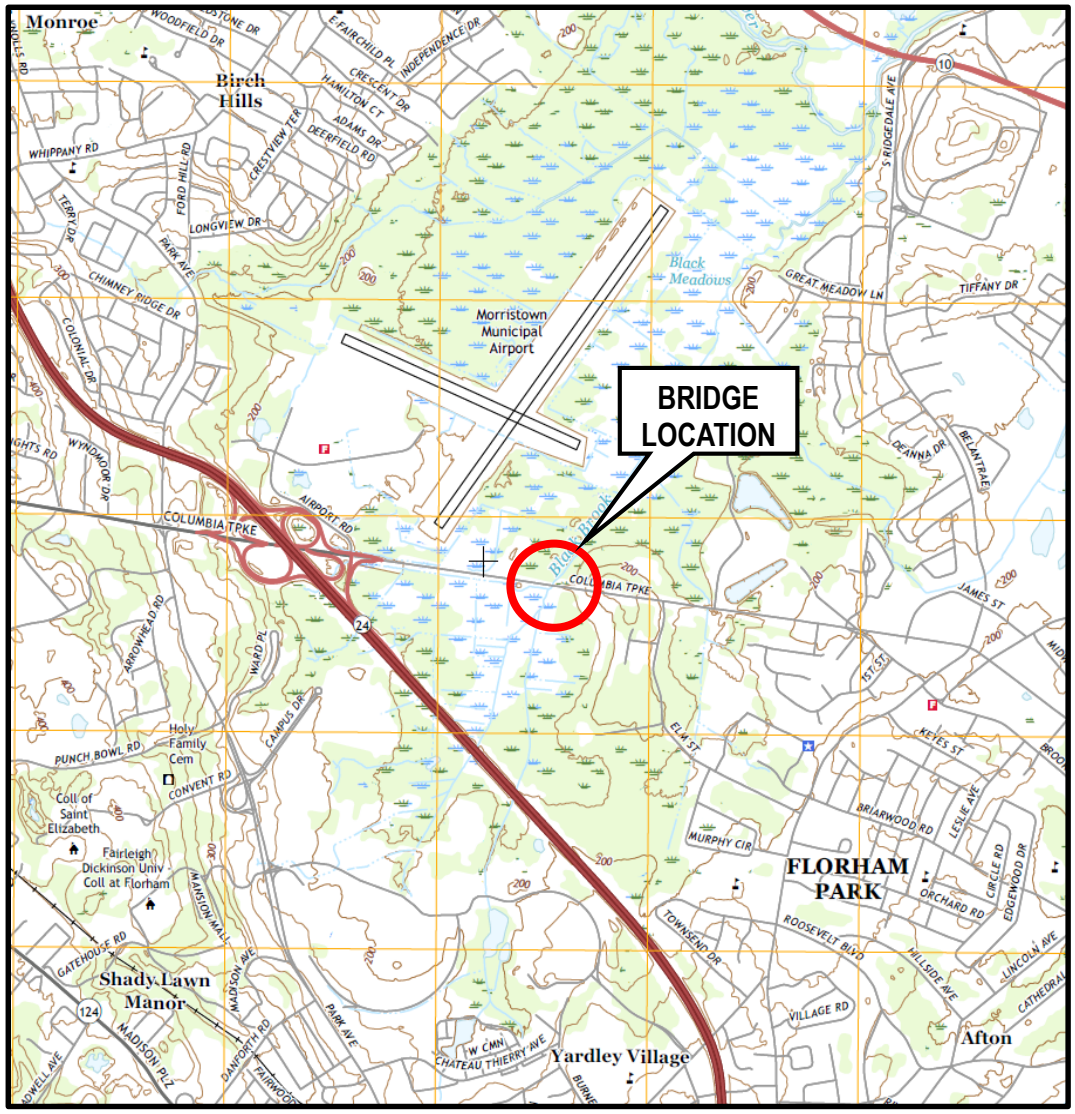
MEETING PURPOSE

- Provide a brief summary of the Local Capital Project Delivery Process
- Provide the status of the study efforts to date
- Present the Project Purpose & Need and Goals and Objectives for the project
- Briefly discuss the improvement concepts developed for the Columbia Turnpike Bridge
- Present the Preliminary Preferred Alternative (PPA)

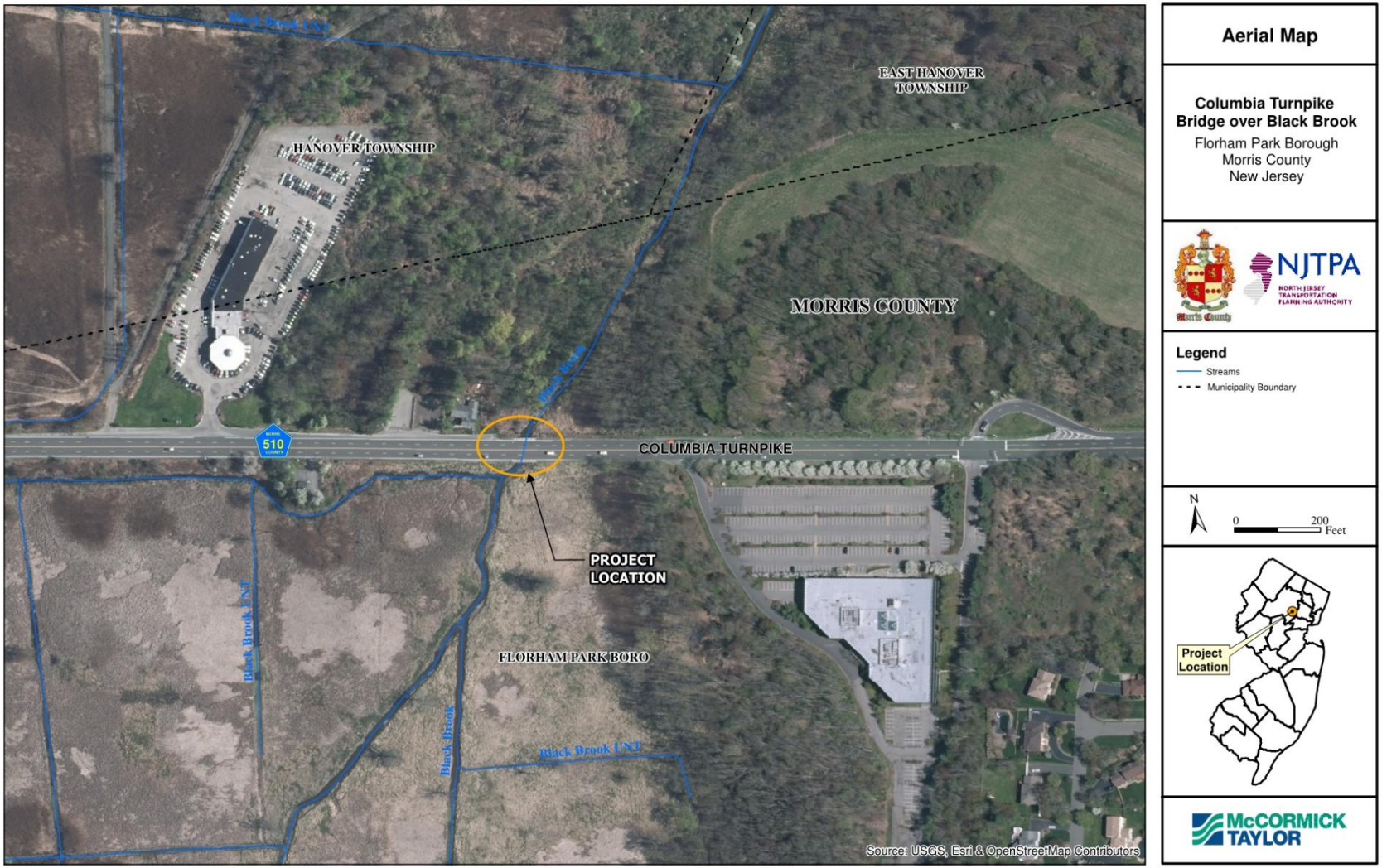
PROJECT OVERVIEW AND BACKGROUND

- Columbia Turnpike Bridge is located in Florham Park Borough, Morris County
- Bridge was built in 1929
- Bridge is in need of rehabilitation or replacement
- NJTPA and Morris County - Local Concept Development Study was initiated in November 2017
- Local Capital Project Delivery Program provides the opportunity to advance this project with public input and agency collaboration

PROJECT LOCATION MAP



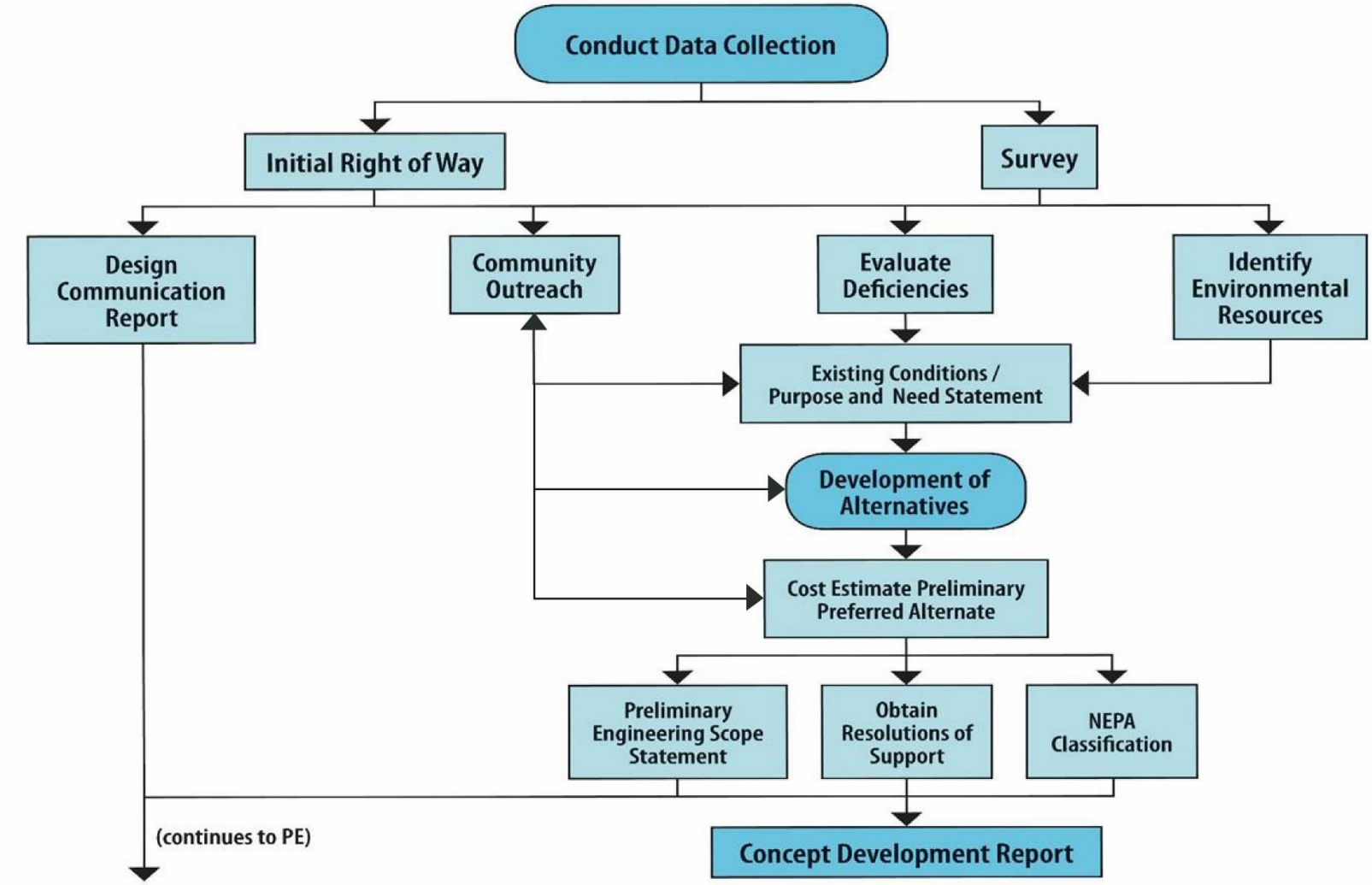
AERIAL MAP


Black Brook UNT
EAST HANOVER TOWNSHIP
HANOVER TOWNSHIP
MORRIS COUNTY
Black Brook
510
COLUMBIA TURNPIKE
PROJECT LOCATION
Black Brook UNT
FLORHAM PARK BORO
Black Brook
Black Brook UNT
Source: USGS, Esri & OpenStreetMap Contributors
Aerial Map
Columbia Turnpike
Bridge over Black Brook
Florham Park Borough
Morris County
New Jersey
NJTPA
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY
Legend
Streams
Municipality Boundary
N
0
200
Feet
Project Location
McCORMICK TAYLOR

LOCAL CAPITAL PROJECT DELIVERY PROCESS

Local Concept Development	Local Preliminary Engineering	Final Design/Right of Way Acquisition	Construction
• Data Collection	• Continue Public Outreach Efforts	• Continue Public Outreach Efforts	• Continue Public Outreach Efforts
• Initiate Public Outreach Efforts	• Preliminary Design	• Final Design	• Complete Construction
• Purpose and Need Statement	• Preliminary ROW Documents	• Final ROW Documents and ROW Acquisition	• As-Built Plans
• Alternatives Development and Analysis	• Preliminary Engineering Plans	• Final Contract Plans and PS&E Package	• Close-Out Documentation
• Select Preliminary Preferred Alternative	• Preliminary Construction Cost Estimate and Schedule	• Final Utility Relocation Schemes	
• NEPA Classification	• Approved Design Exception Report	• Secure Environmental Permits	
• Local Concept Development Report	• Approved NEPA Environmental Document	• Environmental Reevaluation	
	• Local Preliminary Engineering Report		

LOCAL CONCEPT DEVELOPMENT PROCESS



COLUMBIA TURNPIKE BRIDGE DATA

- Year Built: 1929 (widened in 1960)
- Bridge Type: Single Span Bridge with concrete encased steel beams and rolled steel multi-stringers
- Overall Bridge Length = 35 feet
- Bridge Roadway Width = 45’-7”
- Posted Speed Limit = 50 MPH
- 2 lanes in each direction, no outside shoulders
- 4’-11” Sidewalks in each direction
- 2018 AADT = 33,840 vehicles per day

EXISTING BRIDGE CONDITION

- The bridge is in overall fair condition due to the condition of the superstructure
- Superstructure is in fair condition (rating of 5 out of 10) due to localized section loss and rusting at the beam ends, heavy rust staining and spalls, rust laminations, and diaphragms with section losses and holes
- The bridge is functionally obsolete based on the substandard bridge roadway width
- Sufficiency Rating is 57.5 out of 100 (17^{th} Cycle)

EXISTING BRIDGE CONDITION

Under deck – Original Section (1920)

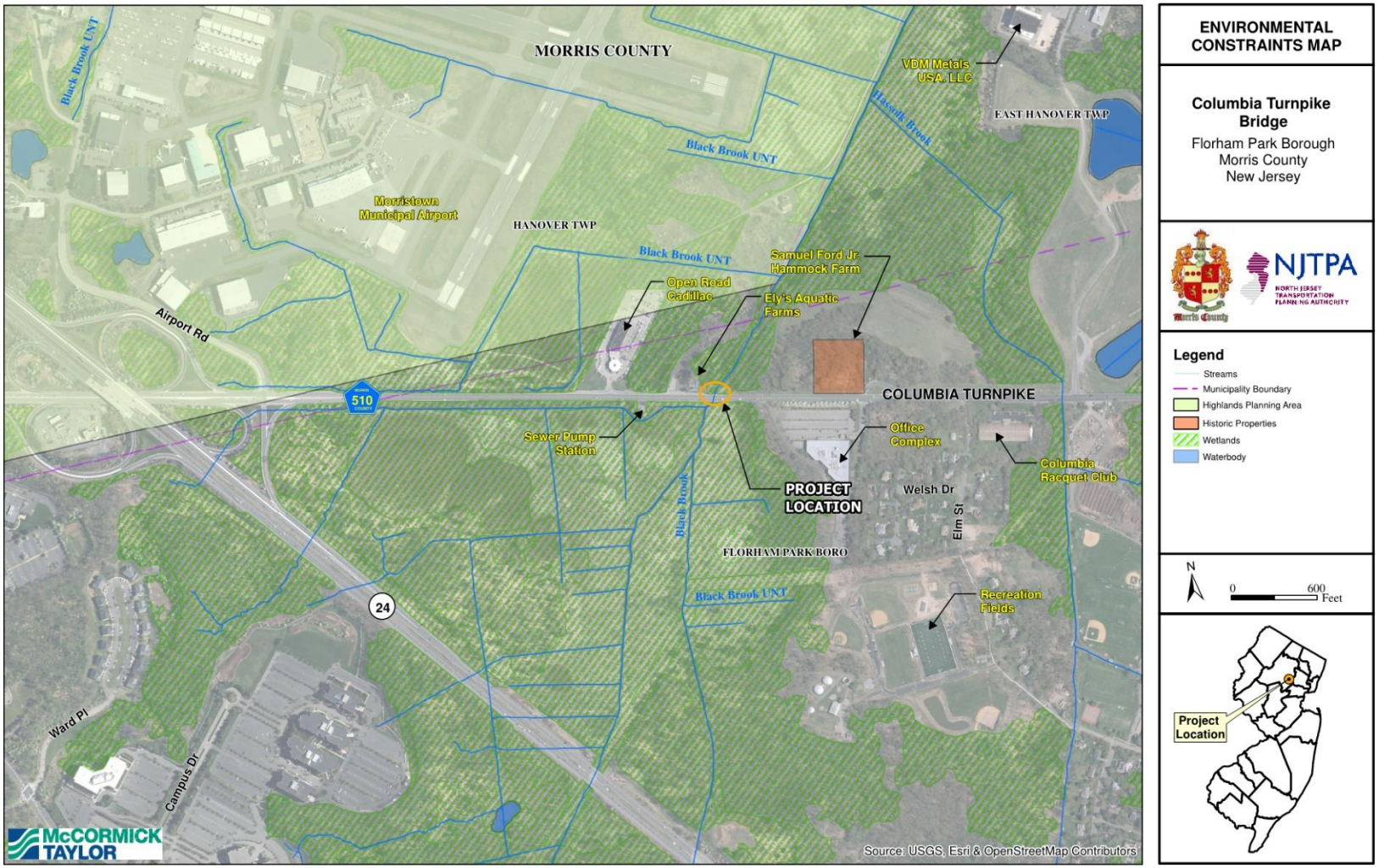
Under deck – Widened Section (1960)

EXISTING BRIDGE CONDITION

Abutment bearing seats

East Abutment - Northeast corner

ENVIRONMENTAL CONSTRAINTS MAP



SITE CONSTRAINTS

Sewer Pump Station located west of the bridge

Ely's Aquatic Farm located just west of the bridge

SITE CONSTRAINTS

Office complex located east of the bridge

Morristown Airport located west of project limits

PROJECT STATUS

- November 2017 – LCD Study initiated
- Spring 2018 – Data Collection completed
- Spring 2018 – Held Local Officials Briefing #1 and Public Information Center #1
- June 2018 – Project Purpose and Need Statement finalized
- Summer 2018 – Developed Conceptual Alternatives
- August 30, 2018 – Local Officials Briefing #2
- September 11, 2018 – Stakeholders Meeting and Public Information Center #2
- December 12, 2018 – Local Officials Briefing #3 and Public Information Center #3

PURPOSE AND NEED

- The purpose of this project is to address the deficiencies and improve safety and traffic operations through the rehabilitation or replacement of the Columbia Turnpike Bridge over Black Brook and to provide an upgraded structure that meets current standards and maintains a safe means of transportation across the Black Brook for all users.

PURPOSE AND NEED

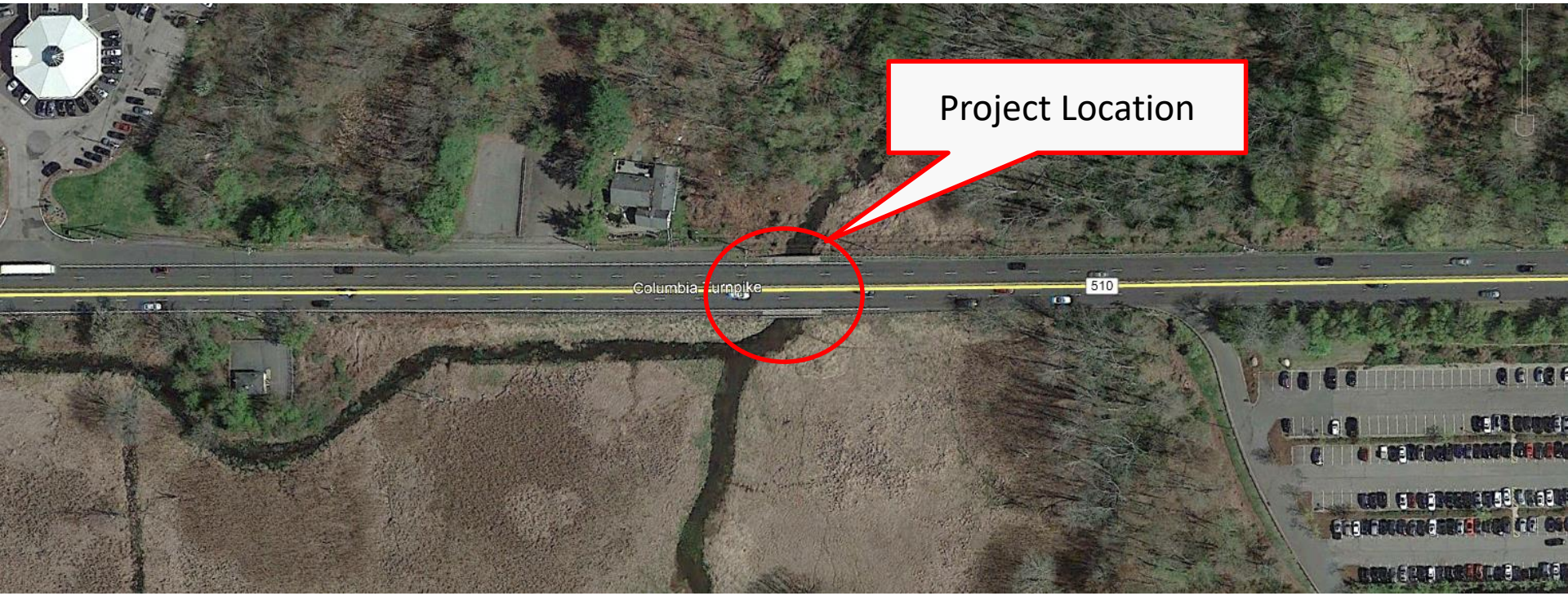
- The Columbia Turnpike Bridge over Black Brook supports a vital regional transportation network link for the driving public, schools, and businesses through the Borough of Florham Park connecting to Route 24, I-287, Morristown Municipal Airport (MMU), Fairleigh Dickinson University, the Town of Morristown, the Garden State Parkway, the Oranges and Newark.
- The bridge is Functionally Obsolete due to the substandard roadway/shoulder widths and is in overall fair condition due to the condition rating of the superstructure. The superstructure condition is fair with a rating of 5 out of 10, and the substructure is in satisfactory condition. The bridge currently has a Sufficiency Rating of 57.5.

GOALS AND OBJECTIVES

- Address bridge structural deficiencies
- Upgrade bridge and approach roadway conditions to meet AASHTO and NJDOT safety standards, including new parapets and guide rail
- Minimize environmental, social and economic impacts in the project area
- Minimize impacts to the Black Brook
- Minimize impacts to existing utilities including water, gas electrical, telephone and fiber optic lines
- Minimize disruptions to traffic operations during construction
- Maintain access to adjacent business at all times during construction
- Minimize the use of detours; if detours are required, utilize the state and county roadway network to the greatest extent feasible
- Provide bicycle and pedestrian compatibility to the approach roadways

EXISTING BRIDGE SITE

N



CRITICAL DESIGN PARAMETERS FOR ALTERNATIVES

- **STRUCTURAL LIFE CYCLE**
  - Strong durability, cost effective, and minimal maintenance
- **HYDROLOGY & HYDRAULICS**
  - No flood water increases greater than 0.04’
- **STAGING**
  - Maintain current traffic capacity on Columbia Turnpike
  - Keeping four lanes open
- **ROADWAY GEOMETRY**
  - Address substandard geometries
  - Wider bridge to include outside shoulder
- **ENVIRONMENTAL/UTILITY IMPACTS**
  - Wetland impacts to the south and northeast to avoid.
  - Significant utility impacts to avoid to the North. 26” Gas distribution main and 36” Water main that both CANNOT be disconnected nor relocated even temporarily.

ALTERNATIVES DEVELOPED

ALTERNATIVES CATEGORIES

- No Build
- Bridge Rehabilitation
- Replace In-Kind
- Alternatives 1A to 1D – New Bridge on Existing Alignment
- Alternatives 2A to 2D – New Bridge on Alignment shift to the South
- Alternatives 3A to 3D – New Bridge on Alignment shift to the North
- Alternatives 4B to 4D – New Bridge on Minor Alignment shift to the South

ALTERNATIVES SUPERSTRUCTURE TYPES

- A – Prestressed NEXT Beams
- B – Steel Beams
- C – Prestressed Concrete Spread Box Beams
- D – Prestressed Concrete Adjacent Box Beams

ALTERNATIVES DESIGN CONSIDERATIONS

DESIGN FACTORS AND IMPLICATIONS

1. **Staged Construction**
   - More stages = Longer project duration, constructability challenges
   - Less stages = More durability, less cost, and less maintenance
2. **Roadway Alignment Shifts**
   - Greater alignment shift = Less stages, longer project limits on roadway, more environmental, utility, and property impacts
   - Less alignment shift = More stages, shorter project limits on roadway, less environmental, utility, and property impacts
   - Greater alignment shift to south = Increased roadway retaining walls lengths into wetlands
3. **Hydraulics**
   - Greater span opening = Increased flood water surface elevations downstream
   - Matching span opening = No increased flood water surface elevations downstream
4. **Superstructure Types**
   - Thicker deck and adjacent beams = Less susceptible to concrete deck cracking
   - Spread beam superstructure types = More constructible with staging
   - Wider ABC superstructure types = Less constructible with staging

COMPLETED ALTERNATIVES MATRIX

COLUMBIA TURNPIKE BRIDGE OVER THE BLACK BROOK
LOCAL CONCEPT DEVELOPMENT STUDY
Borough of Florham Park, Morris County, New Jersey

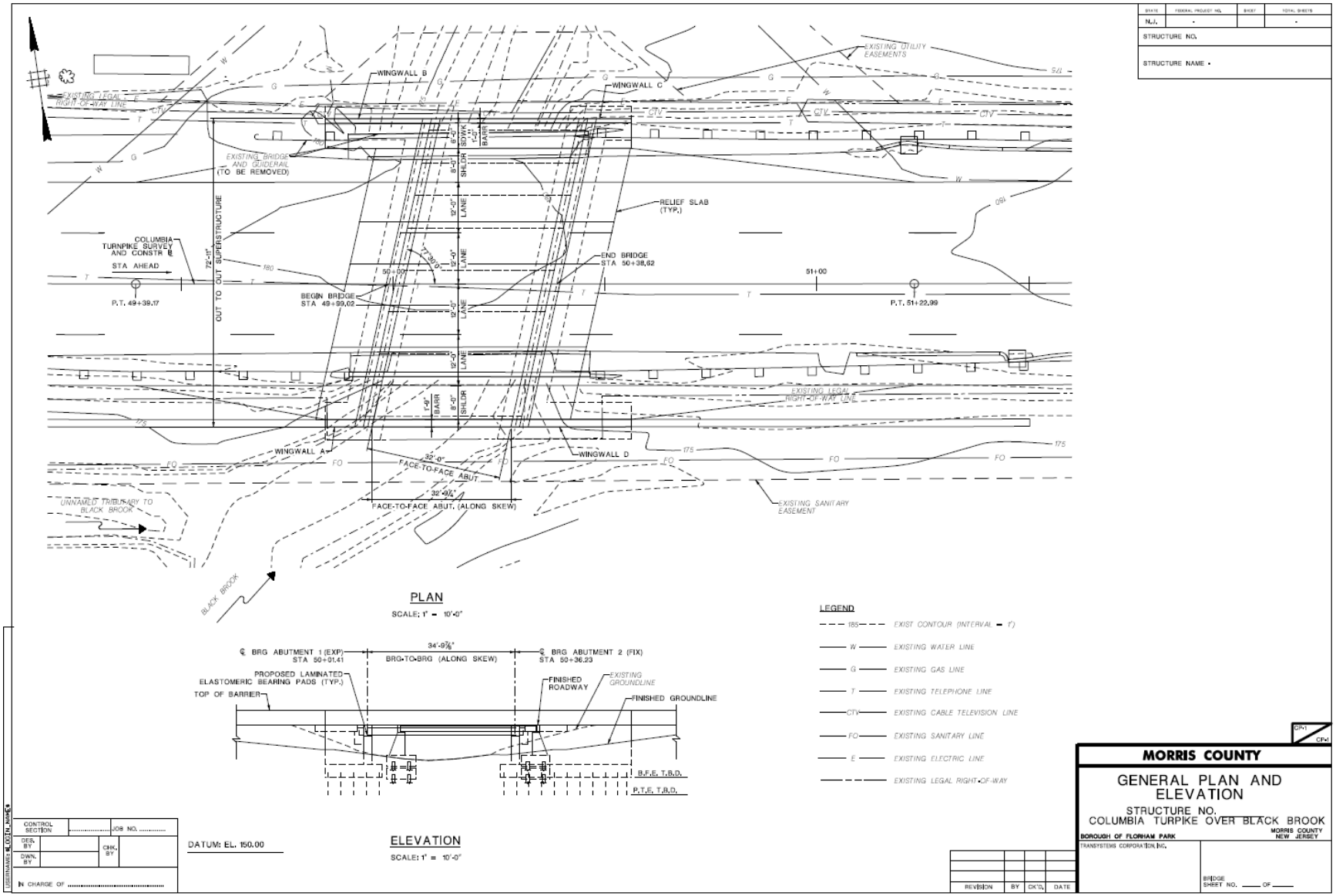
	No Build	Bridge Rehabilitation	Replace In-Kind	Staging Concept 1 New Bridge on Existing Alignment				Staging Concept 2 New Bridge on Alignment shifted to South				Staging Concept 3 New Bridge on Alignment shift to North				Staging Concept 4 New Bridge on Minor Alignment shift to South		
Alternative Labeling: Staging Concept - Superstructure Type **Prestressed NEXT Beams - A** **Steel Beams - B** **Prestressed Concrete Spread Box Beams - C** **Prestressed Concrete Adjacent Box Beams - D**				**Alternate 1-A**	**Alternate 1-B**	**Alternate 1-C**	**Alternate 1-D**	**Alternate 2-A**	**Alternate 2-B**	**Alternate 2-C**	**Alternate 2-D**	**Alternate 3-A**	**Alternate 3-B**	**Alternate 3-C**	**Alternate 3-D**	**Alternate 4-B**	**Alternate 4-C**	**Preliminary Preferred Alternative** **Alternate 4-D**
Superstructure Types	Concrete encased multi-stringer w/ Steel Stringer Widening	Concrete encased multi-stringer w/ Steel Stringer Widening	Steel Multigirder	Prestressed NEXT Beams	Steel Beams	Prestressed Concrete Spread Box Beams	Prestressed Concrete Adjacent Box Beams	Prestressed NEXT Beams	Steel Beams	Prestressed Concrete Spread Box Beams	Prestressed Concrete Adjacent Box Beams	Prestressed NEXT Beams	Steel Beams	Prestressed Concrete Spread Box Beams	Prestressed Concrete Adjacent Box Beams	Steel Beams	Prestressed Concrete Spread Box Beams	Prestressed Concrete Adjacent Box Beams
Criteria																		
Meets Project Purpose and Need	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maintenance and Protection of Traffic																		
Number of lanes provided during construction	4	2	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Is Detour Required?/Length of detour	No	Yes, Partial	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Roadway																		
Controlling Substandard Design Elements Remaining	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Improves Lane Widths	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improves Shoulder Widths	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improves Stopping Sight Distances at MP 15.38	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Profile Raise at the Bridge	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Traffic Operations & Bicycle/Pedestrian																		
Accommodates design year traffic volumes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bicycle/Pedestrian compatibility provided with connectivity to approach roadways	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sidewalks provided	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Construction Duration																		
Duration (Months)	-	9	15	22	22	22	22	22	19	19	19	22	19	19	19	22	22	22
Stages Required	-	2	1	5	5	5	5	4	3	3	3	4	3	3	3	5	5	5
Right of Way Impacts																		
Required ROW (Acres)	-	0	0	0.09	0.09	0.09	0.09	0.27	0.27	0.27	0.27	0.18	0.18	0.18	0.18	0.13	0.13	0.13
Number of Temporary construction easements	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of partial property acquistions	-	0	0	3	3	3	3	1	1	1	1	2	2	2	2	3	3	3
Number of entire property acquistions	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Access																		
# of Access Impacts to adjacent properties during construction	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
# of Permanent Access Impacts to adjacent properties	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Structural Design																		
Accelerated Bridge Construction Methodologies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No
Bridge opening meets design year storm (H&H)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seismic Design addressed	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bridge Approach Safety Upgraded	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
75 yr. Bridge Life Cycle	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wildlife Passage Compatible	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental Impacts																		
Green Acres & Section 4(f)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Total Wetlands Impacts (acres)	0	0	0.10	0.20	0.20	0.20	0.20	0.40	0.40	0.40	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Threatened and Endangered Species Habitat	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Floodplain (acres)	0	1.1	1.1	1.16	1.16	1.16	1.16	1.81	1.81	1.81	1.81	1.70	1.70	1.70	1.70	1.25	1.25	1.25
Riparian Zone (acres)	0	0	0.1	0.15	0.15	0.15	0.15	0.27	0.27	0.27	0.27	0.14	0.14	0.14	0.14	0.17	0.17	0.17
Historic Resources (# of sites)	No	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Hazardous Waste/Contaminated Sites	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Seasonal restrictions	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utilities																		
Anticipated relocations	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Costs																		
Construction Costs	$ -	$ 437,875	$ 875,750	$ 2,342,474	$ 2,422,474	$ 2,342,474	$ 2,422,474	$ 2,827,792	$ 2,907,792	$ 2,827,792	$ 2,907,792	$ 2,584,680	$ 2,664,680	$ 2,584,680	$ 2,664,680	$ 2,408,638	$ 2,328,638	$ 2,408,638
Estimated Utility Relocation Cost	$ -	$ 250,000	$ 250,000	$ 2,775,000	$ 2,775,000	$ 2,775,000	$ 2,775,000	$ 1,250,000	$ 1,250,000	$ 1,250,000	$ 1,250,000	$ 2,775,000	$ 2,775,000	$ 2,775,000	$ 2,775,000	$ 1,275,000	$ 1,275,000	$ 1,275,000
Estimated Right of Way Cost	$ -	$ -	$ -	$ 7,585	$ 7,585	$ 7,585	$ 7,585	$ 11,909	$ 11,909	$ 11,909	$ 11,909	$ 16,697	$ 16,697	$ 16,697	$ 16,697	$ 5,888	$ 5,888	$ 5,888
Life Cycle Cost (Present Value)	$ -	$ 246,138	$ 246,138	$ 154,397	$ 246,138	$ 154,397	$ 154,397	$ 154,397	$ 246,138	$ 154,397	$ 154,397	$ 154,397	$ 246,138	$ 154,397	$ 154,397	$ 246,138	$ 154,397	$ 154,397
Detour Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Project Cost	**$0.00**	**$934,013.00**	**$1,371,888.00**	**$5,279,456.00**	**$5,451,197.00**	**$5,279,456.00**	**$5,359,456.00**	**$4,244,098.00**	**$4,415,839.00**	**$4,244,098.00**	**$4,324,098.00**	**$5,530,774.00**	**$5,702,515.00**	**$5,530,774.00**	**$5,610,774.00**	**$3,935,664.00**	**$3,763,923.00**	**$3,843,923.00**

PRELIMINARY PREFERRED ALTERNATIVE

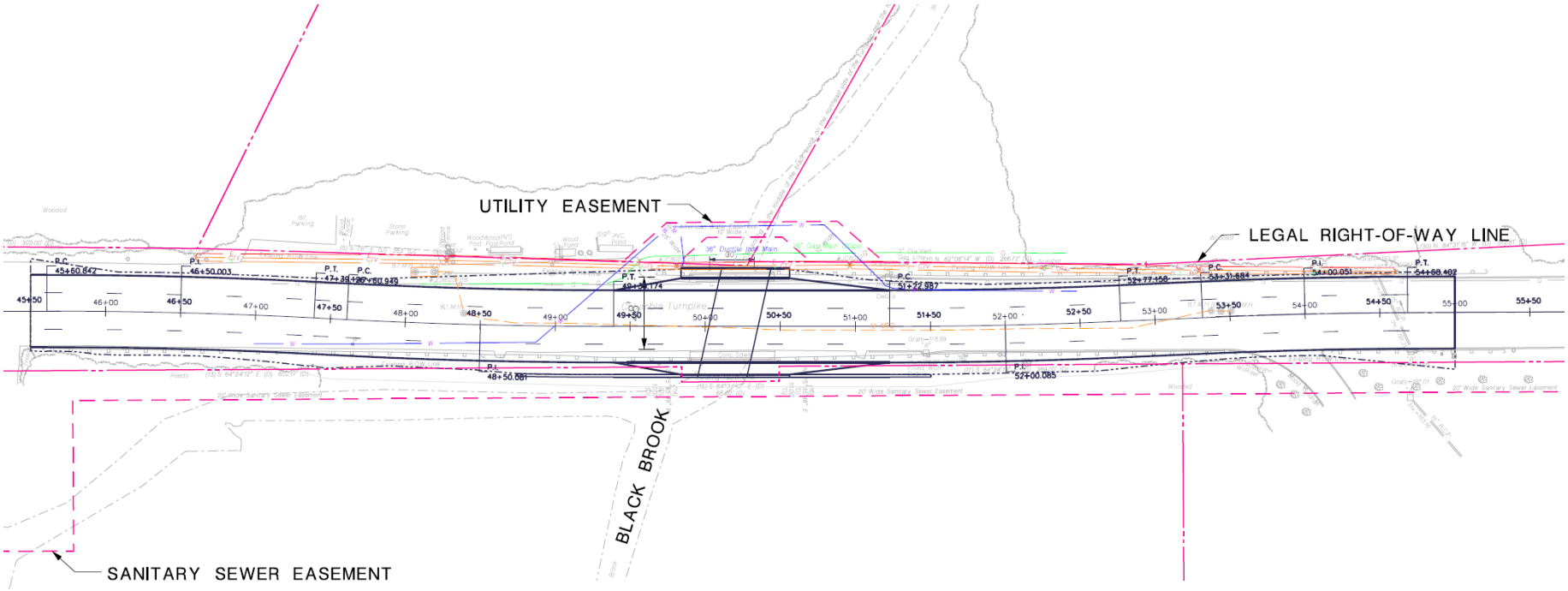
ALTERNATIVE 4D PPA SELECTION SUMMARY

- Maintains 4 lanes during construction and avoids a detour.
- Removes substandard design elements.
- Provides 75 year structural life cycle, is cost effective, and provides lower maintenance over the life of the bridge.
- Minor alignment shift to south creates comparatively shorter project limits on roadway, minimizes impacts to wetlands, avoid significant utility impacts to the north, and minimizes property impacts.
- The superstructure beam types are adjacent box beams and has a thicker deck providing less susceptibility to concrete deck cracking for long term durability. Additional cost for this structural upgrade is less than 2.5% of overall project cost.
- Best addresses hydraulic challenges and avoids stream impacts and relocations. Matches existing span opening and therefore not increasing flood water surface elevations downstream.
- Provides sidewalks and bicycle compatibility
- Built in five (5) stages with a construction duration of approximately 22 months.
- Preliminary cost estimated at $3.85M

PRELIMINARY PREFERRED ALTERNATIVE

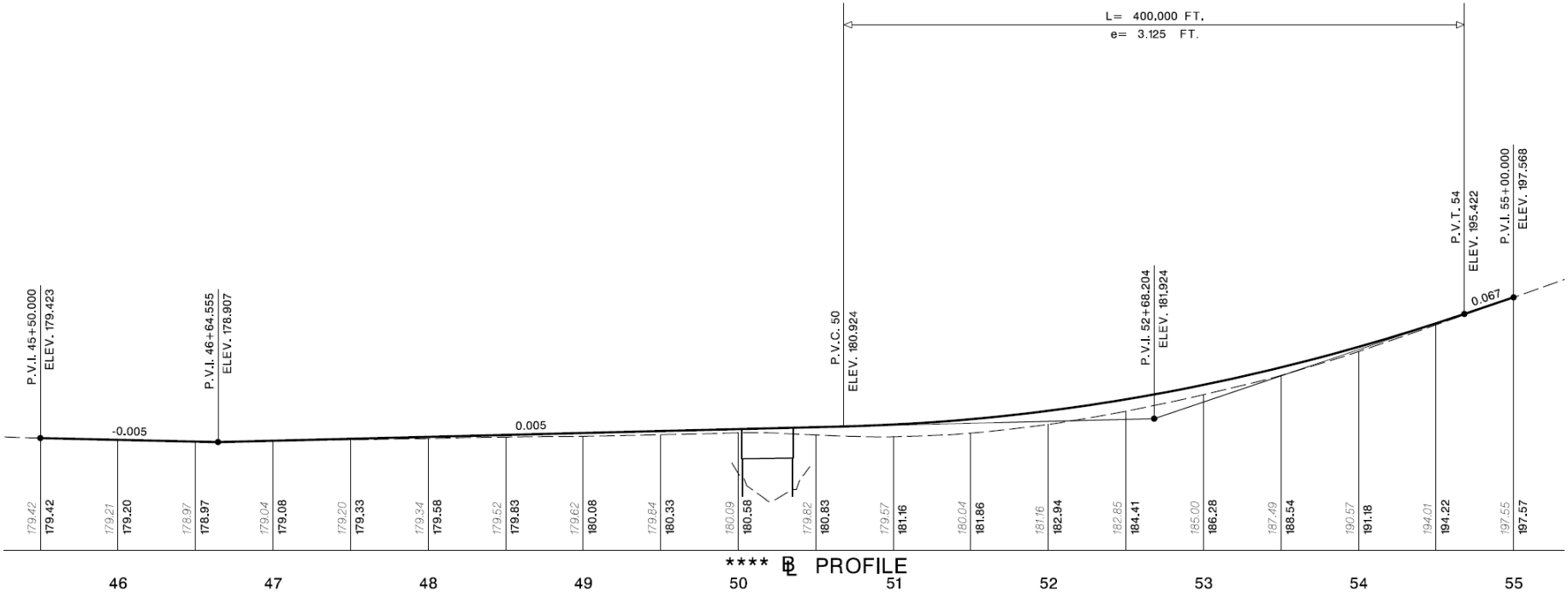


PRELIMINARY PREFERRED ALTERNATIVE



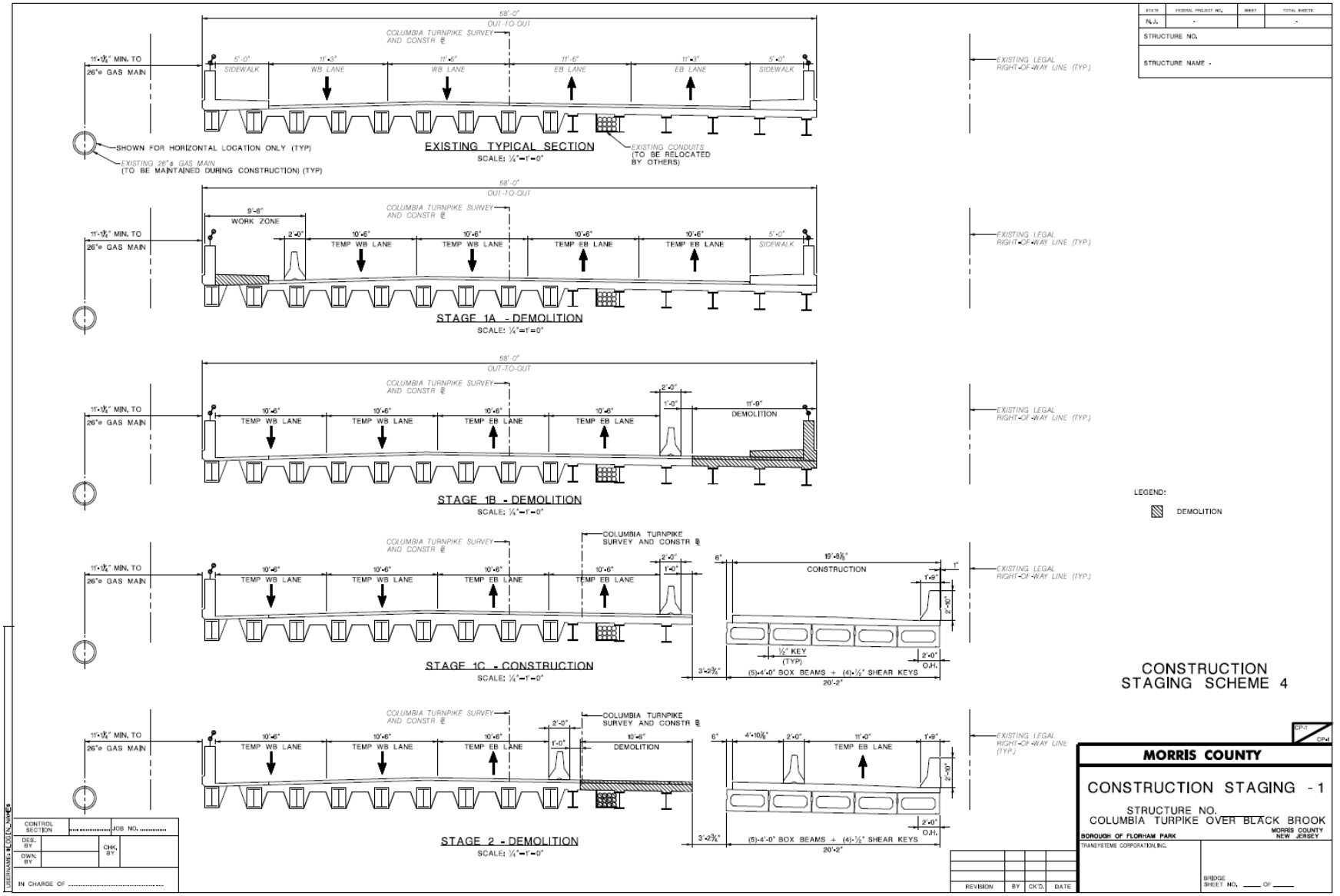
PPA ALIGNMENT – ROADWAY PLAN

PRELIMINARY PREFERRED ALTERNATIVE

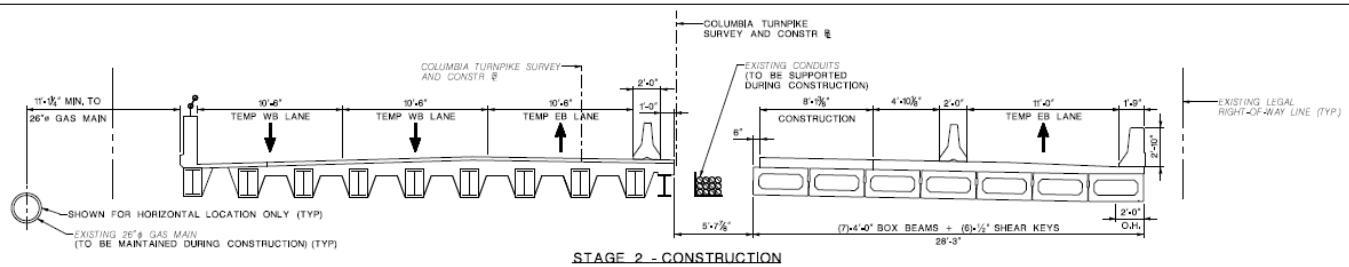


ALTERNATIVES 4 ALIGNMENT – ROADWAY PROFILE

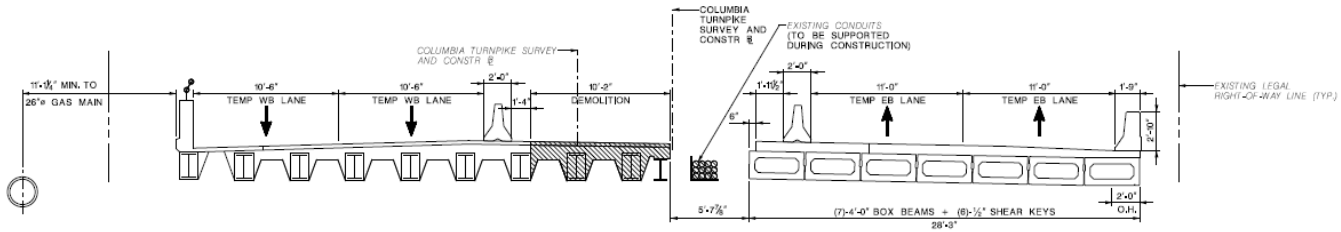
PRELIMINARY PREFERRED ALTERNATIVE



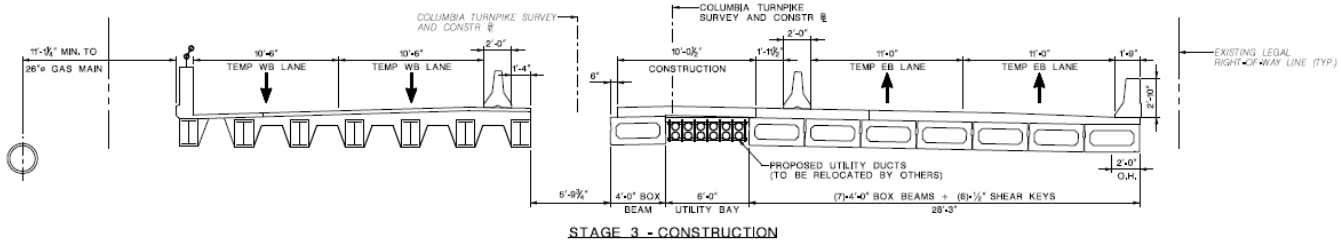
PRELIMINARY PREFERRED ALTERNATIVE



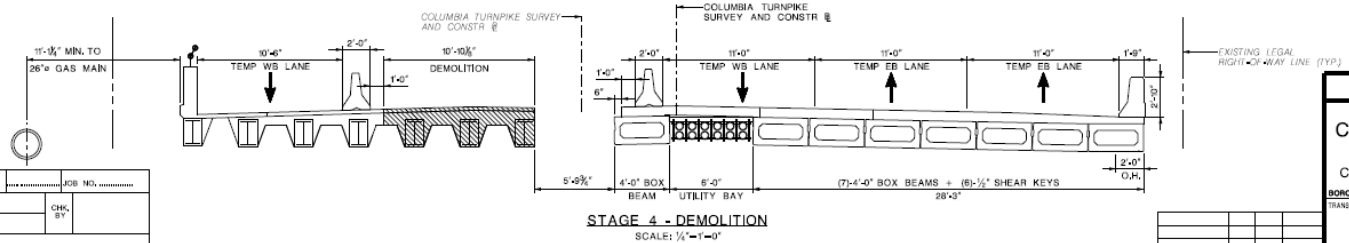
STAGE 2 - CONSTRUCTION
SCALE: ¼"=1'-0"



STAGE 3 - DEMOLITION
SCALE: ¼"=1'-0"



STAGE 3 - CONSTRUCTION
SCALE: ¼"=1'-0"



STAGE 4 - DEMOLITION
SCALE: ¼"=1'-0"

LEGEND:
DEMOLITION

CONSTRUCTION STAGING SCHEME 4

STATE	FEDERAL PROJECT NO.	SHEET	TOTAL SHEETS
N.J.	-		-

STRUCTURE NO.

STRUCTURE NAME -

MORRIS COUNTY

CONSTRUCTION STAGING - 2

STRUCTURE NO.
COLUMBIA TURPIKE OVER BLACK BROOK

BOROUGH OF FLORHAM PARK — MORRIS COUNTY NEW JERSEY

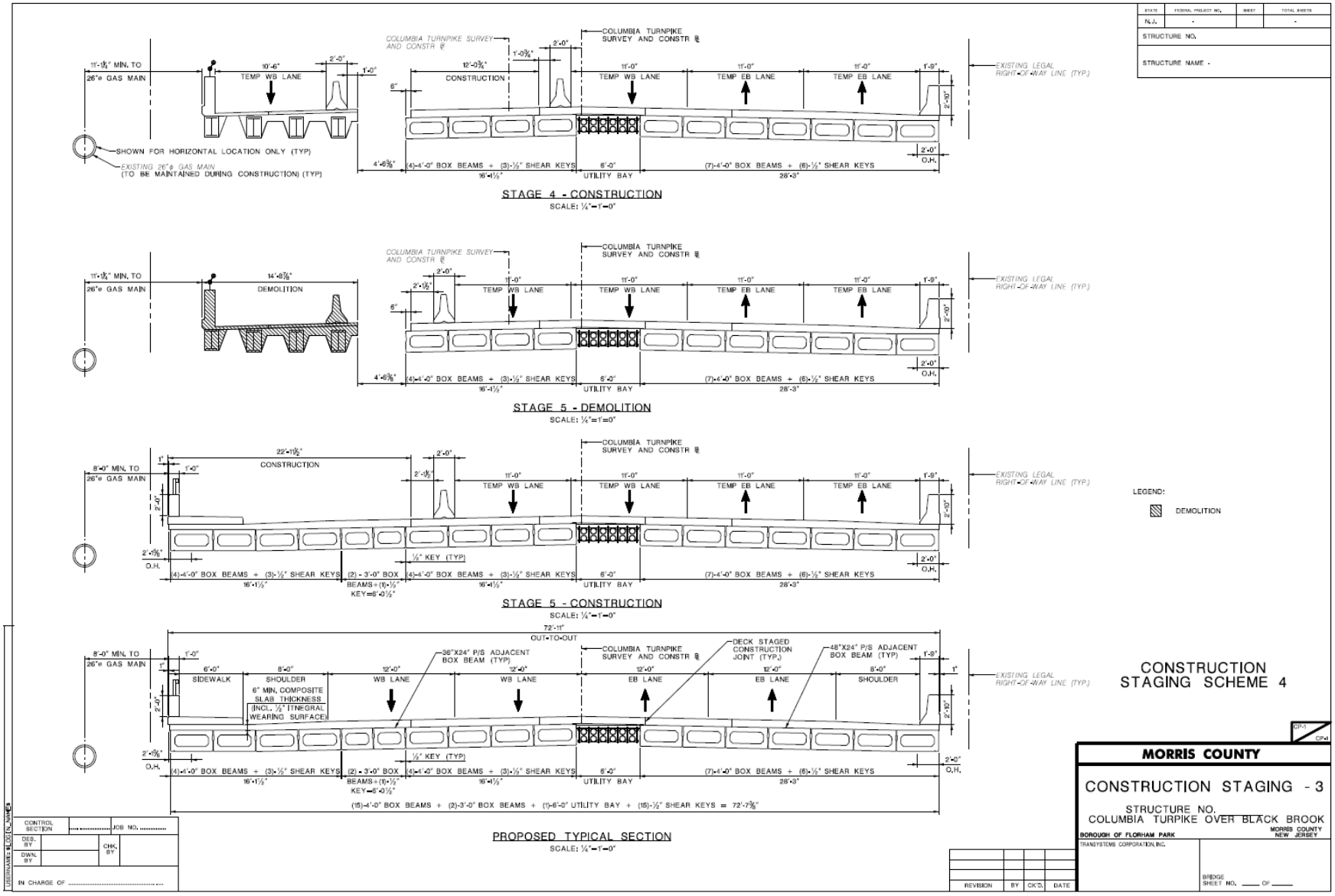
TRANSYSTEMS CORPORATION, INC.

BRIDGE SHEET NO. ___ OF ___

CONTROL SECTION ..... JOB NO. .....
DES. BY
DWN. BY
CHK. BY
IN CHARGE OF .....

REVISION	BY	CK'D.	DATE

PRELIMINARY PREFERRED ALTERNATIVE



PROJECT SCHEDULE

- 18 month completion schedule
- **Major Milestones**
  - Purpose and Need Statement – June 2018
  - Development of Conceptual Alternatives – August 2018
  - Selection of Preliminary Preferred Alternative – December 2018
  - Submission of Draft Local Concept Development Report – March 2019
  - Completion of Local Concept Development Phase – June 2019

COMMUNITY INVOLVEMENT SCHEDULE

Project Introduction and Purpose & Need

- Local Officials Briefing #1 – April 24, 2018
- Public Information Center #1 – May 9, 2018

Obtain Input on Conceptual Alternatives

- Local Officials Briefing #2 – August 30, 2018
- Stakeholders Meeting – September 11, 2018
- Public Information Center #2 – September 11, 2018

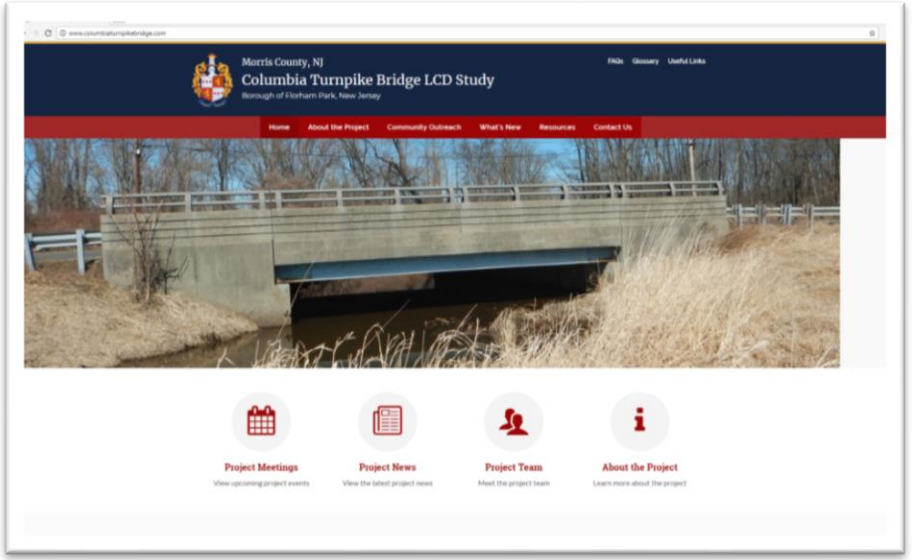
Selection and Presentation of Preliminary Preferred Alternative

- Local Officials Briefing #3 – December 12, 2018
- Public Information Center #3 – December 12, 2018

PROJECT WEBSITE AND SOCIAL MEDIA

- PROJECT WEBSITE
  - http://www.columbiaturnpikebridge.com/
- TWITTER
  - **@Columbia_Bridge**
  - https://twitter.com/Columbia_Bridge
- POWERPOINT PRESENTATION

  will be posted on the project website



PROJECT CONTACT INFORMATION

MEGHAN PACCIONE

Morris County Senior Engineer

mpaccione@co.morris.nj.us

RICHARD BRUNDAGE

NJTPA Project Manager

rbrundage@njtpa.org

Morris County

DEPARTMENT OF TRANSPORTATION
THE STATE OF NEW JERSEY

NJTPA
NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY

THANK YOU

For more information or to contact us:

Visit our website: www.ColumbiaTurnpikeBridge.com

Follow us on Twitter: @Columbia_Bridge

ALTERNATIVES DEVELOPED

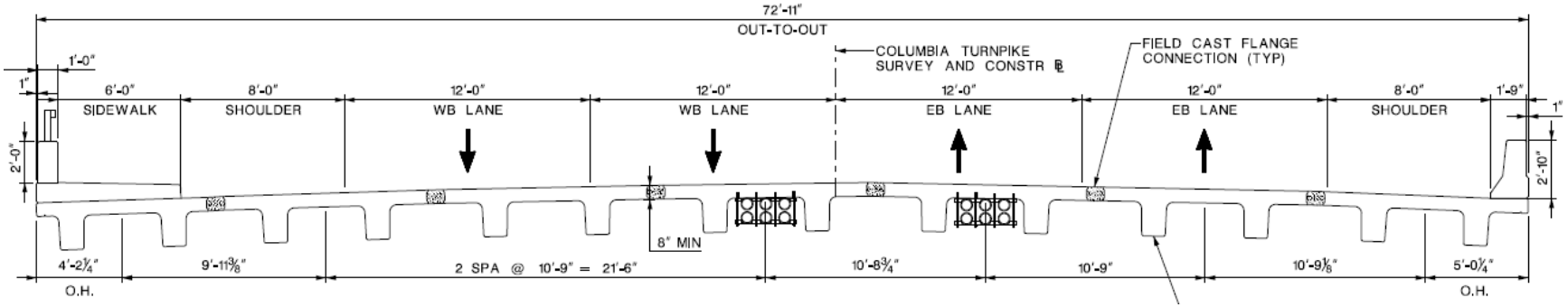
ALTERNATIVES CATEGORIES

- No Build
- Bridge Rehabilitation
- Replace In-Kind
- Alternatives 1A to 1D – New Bridge on Existing Alignment
- Alternatives 2A to 2D – New Bridge on Alignment shift to the South
- Alternatives 3A to 3D – New Bridge on Alignment shift to the North
- Alternatives 4B to 4D – New Bridge on Minor Alignment shift to the South

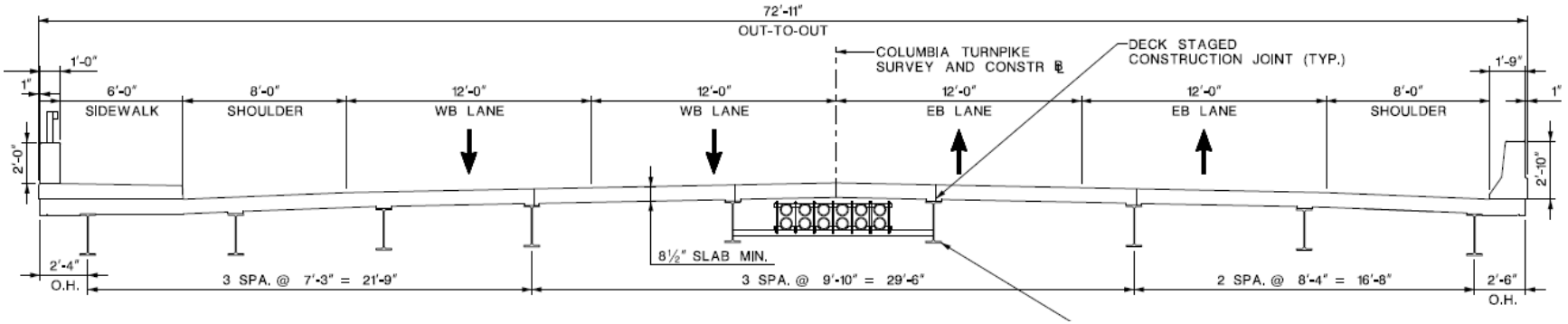
ALTERNATIVES SUPERSTRUCTURE TYPES

- A – Prestressed NEXT Beams
- B – Steel Beams
- C – Prestressed Concrete Spread Box Beams
- D – Prestressed Concrete Adjacent Box Beams

ALTERNATIVES DEVELOPED

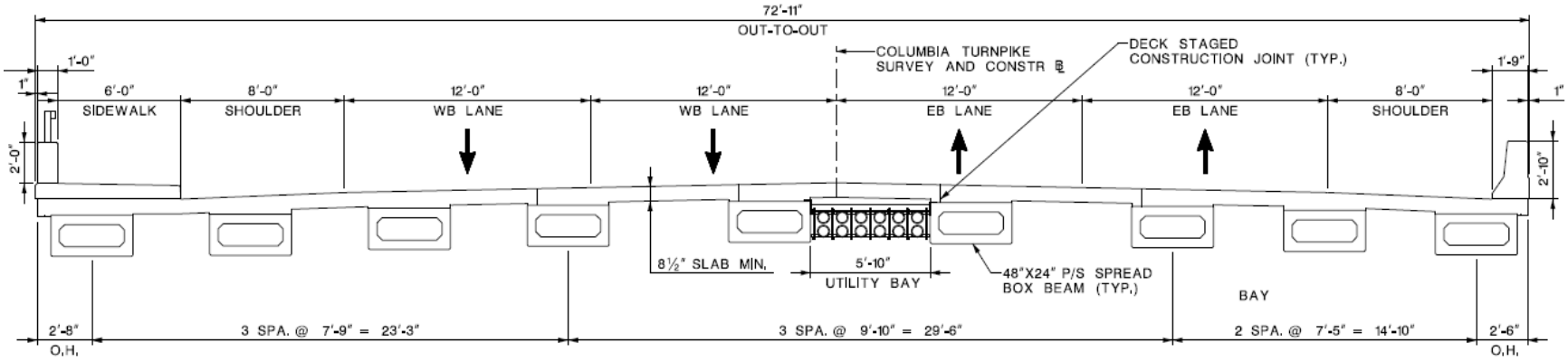


STRUCTURE TYPE A - PRESTRESSED NEXT BEAMS

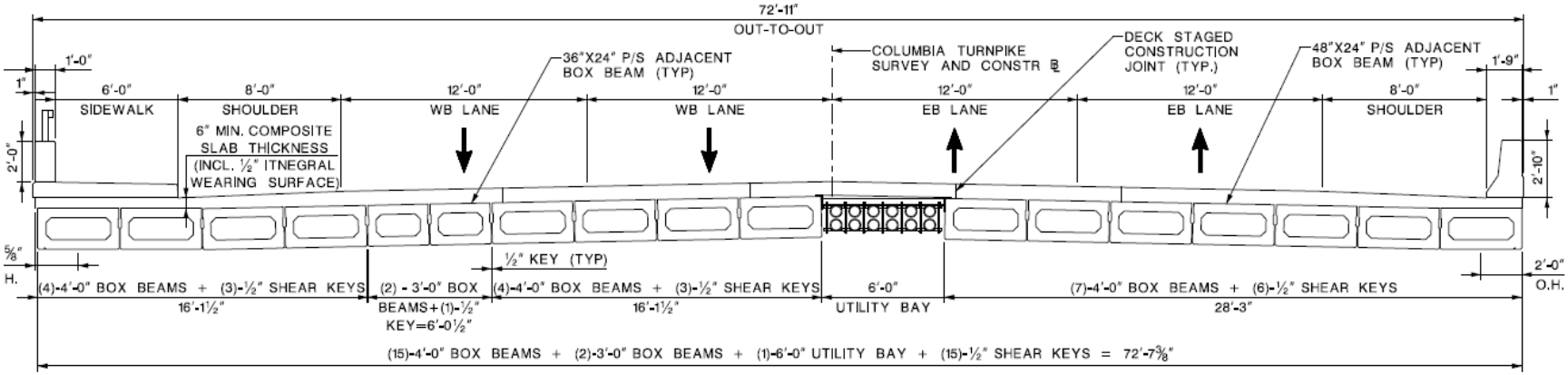


STRUCTURE TYPE B - STEEL BEAMS

ALTERNATIVES DEVELOPED



STRUCTURE TYPE C - PRESTRESSED SPREAD BOX BEAMS



STRUCTURE TYPE D - PRESTRESSED ADJACENT BOX BEAMS

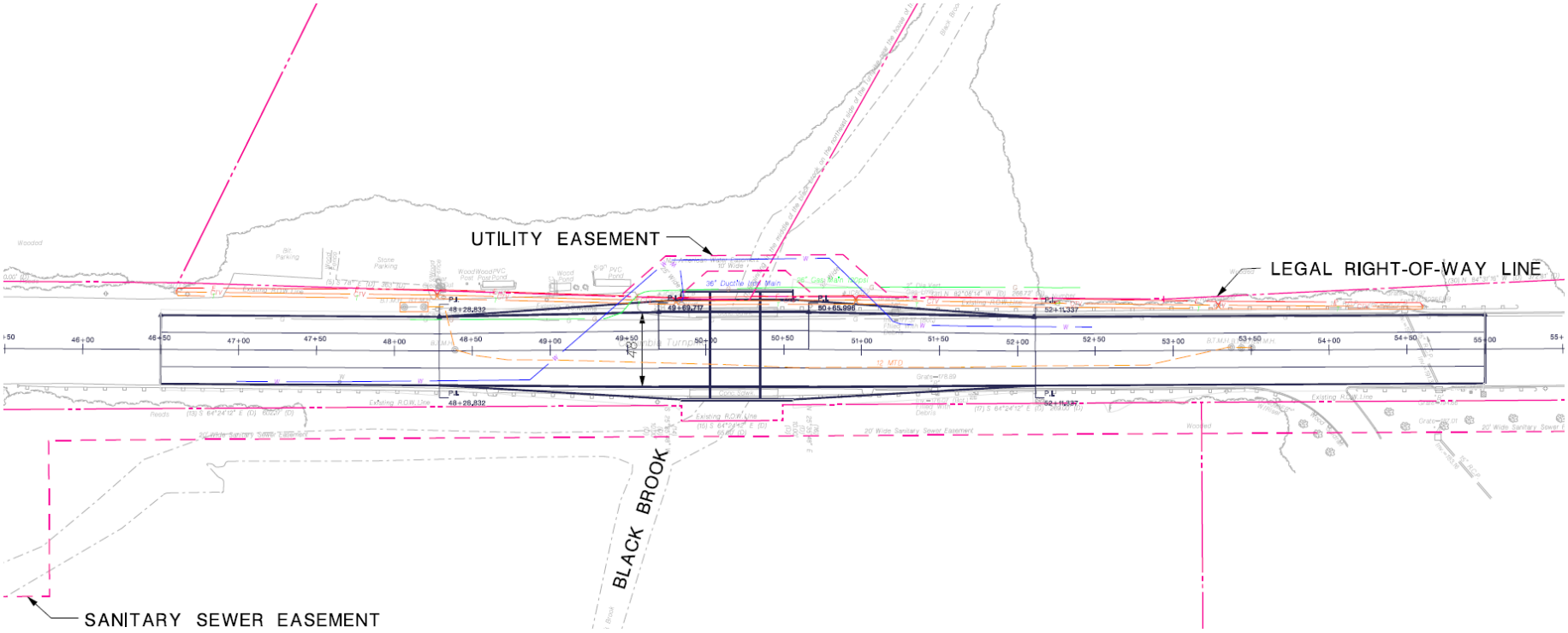
ALTERNATIVES DEVELOPED

DESIGN FACTORS AND IMPLICATIONS

1. **Staged Construction**
   - More stages = Longer project duration, constructability challenges
   - Less stages = More durability, less cost, and less maintenance
2. **Roadway Alignment Shifts**
   - Greater alignment shift = Less stages, longer project limits on roadway, more environmental, utility, and property impacts
   - Less alignment shift = More stages, shorter project limits on roadway, less environmental, utility, and property impacts
   - Greater alignment shift to south = Increased roadway retaining walls lengths into wetlands
3. **Hydraulics**
   - Greater span opening = Increased flood water surface elevations downstream
   - Matching span opening = No increased flood water surface elevations downstream
4. **Superstructure Types**
   - Thicker deck and adjacent beams = Less susceptible to concrete deck cracking
   - Spread beam superstructure types = More constructible with staging
   - Wider ABC superstructure types = Less constructible with staging

ALTERNATIVES 1

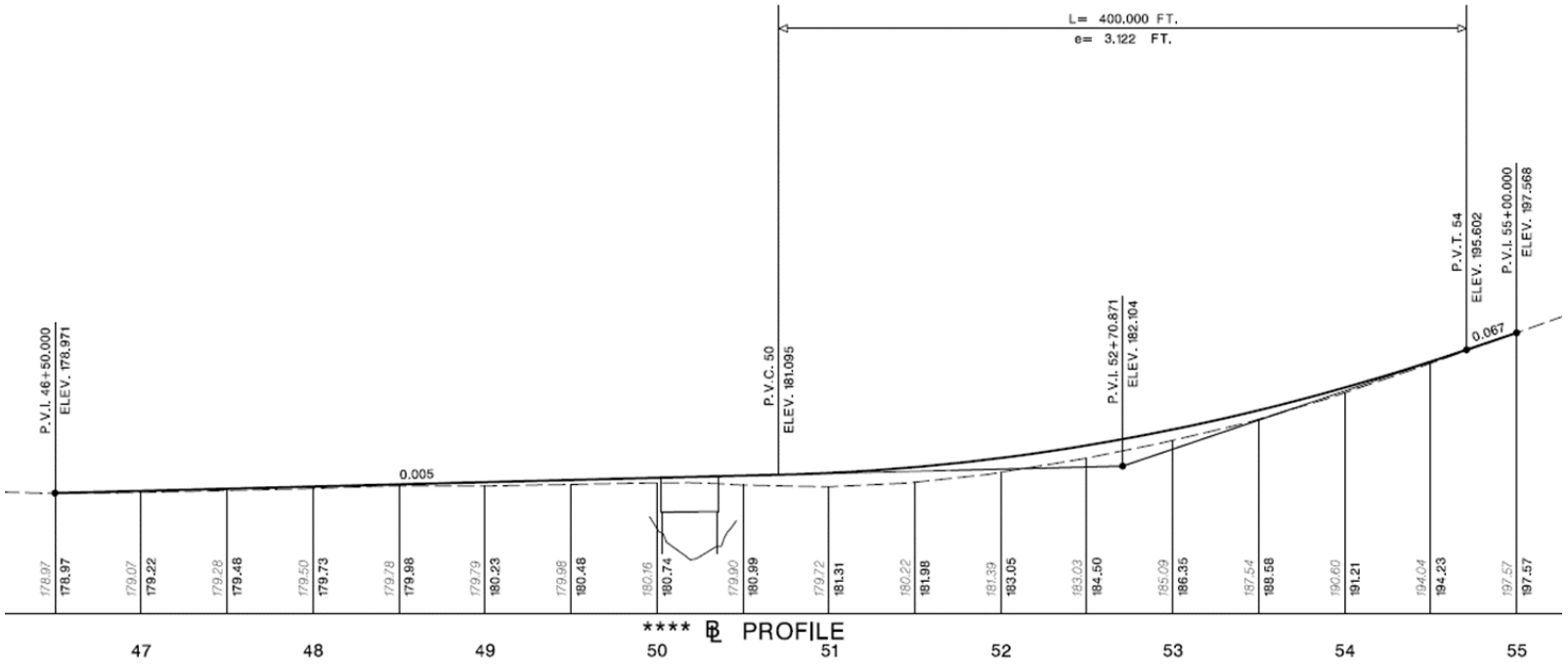
NEW BRIDGE ON EXISTING ALIGNMENT



ALTERNATIVES 1 ALIGNMENT – ROADWAY PLAN

ALTERNATIVES 1

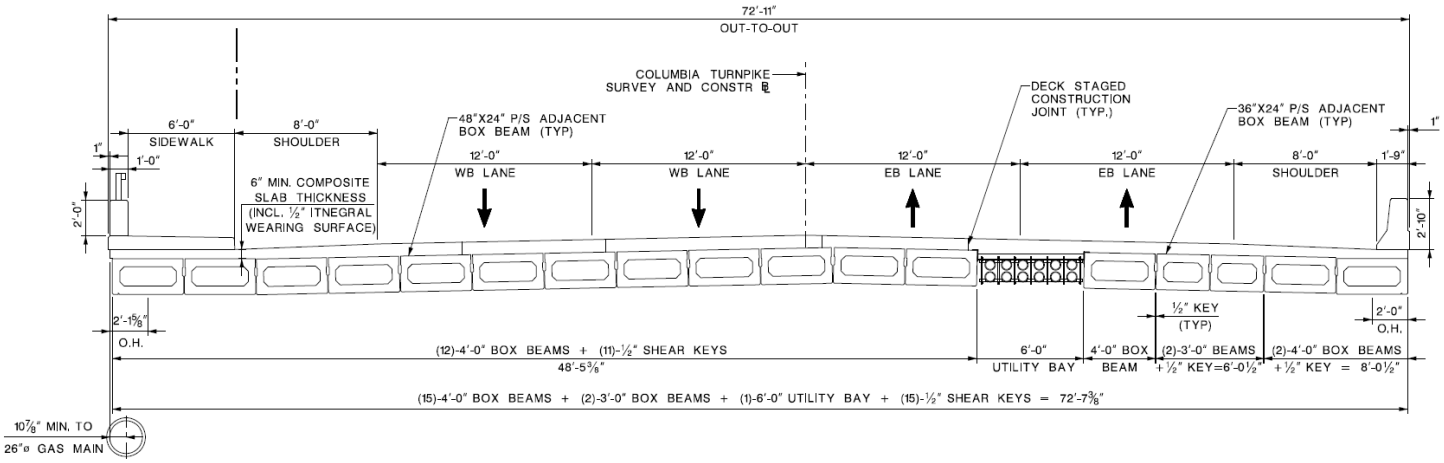
NEW BRIDGE ON EXISTING ALIGNMENT



ALTERNATIVES 1 ALIGNMENT – ROADWAY PROFILE

ALTERNATIVES 1

NEW BRIDGE ON EXISTING ALIGNMENT

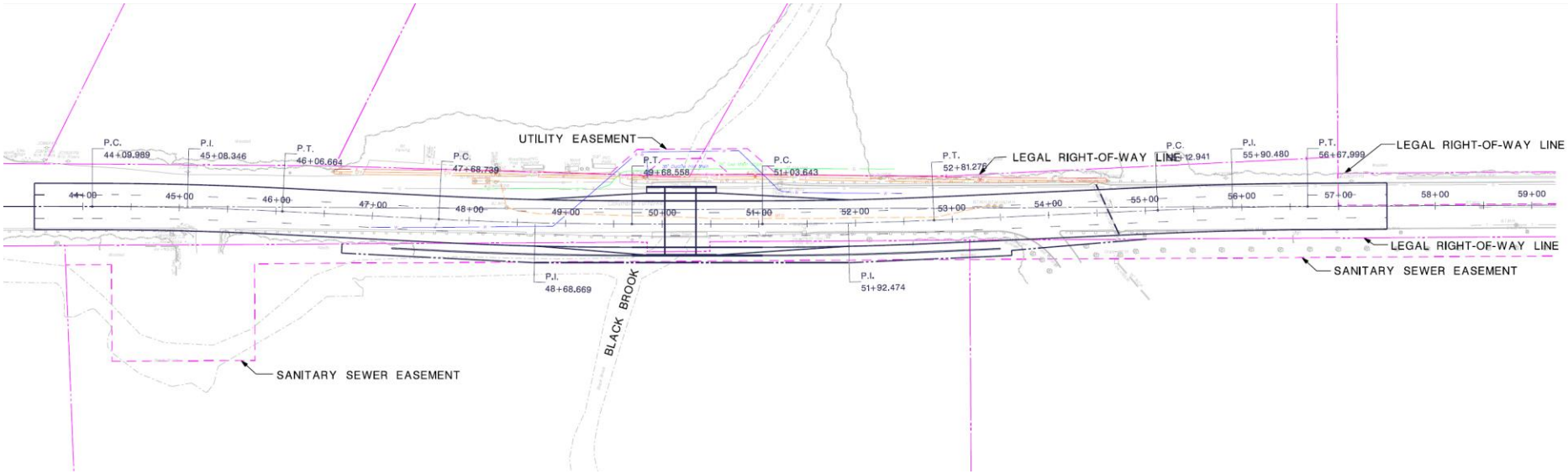


ALTERNATIVES 1 ALIGNMENT - FINAL CONDITION STAGE

TYPICAL SECTION

ALTERNATIVES 2

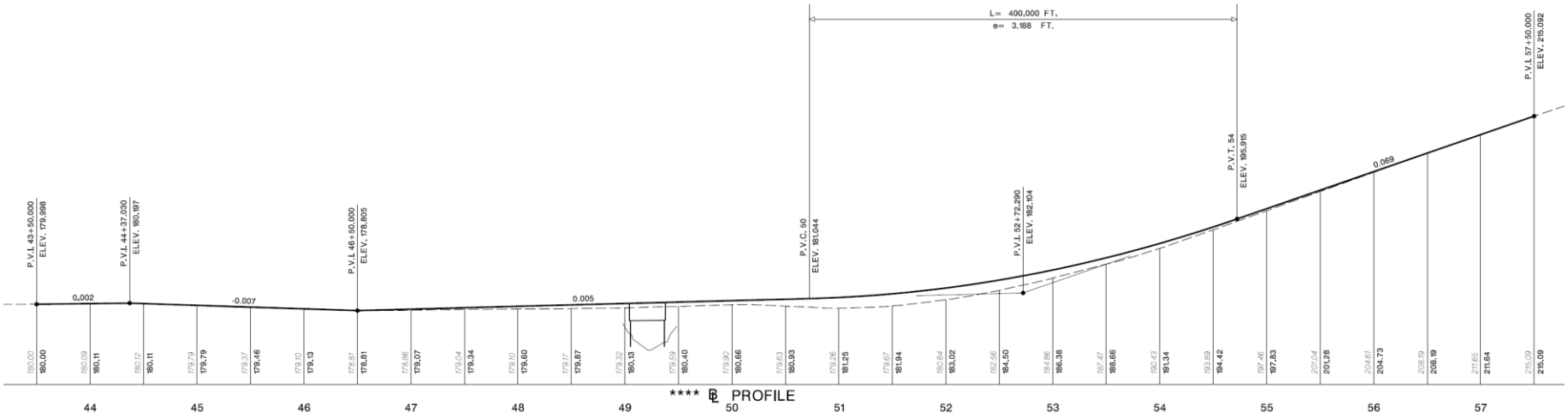
NEW BRIDGE ON ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 2 ALIGNMENT – ROADWAY PLAN

ALTERNATIVES 2

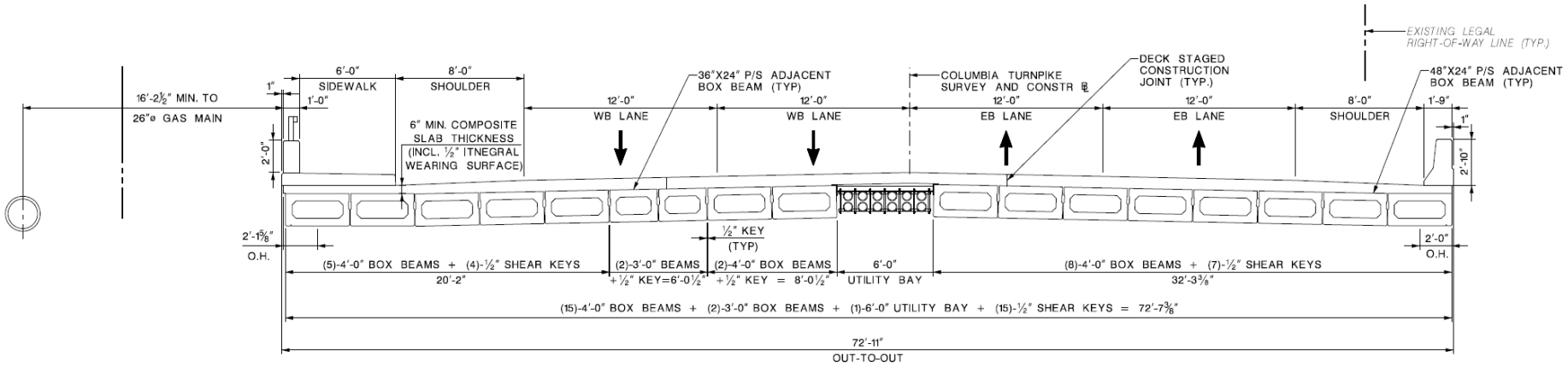
NEW BRIDGE ON ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 2 ALIGNMENT – ROADWAY PROFILE

ALTERNATIVES 2

NEW BRIDGE ON ALIGNMENT SHIFT TO SOUTH

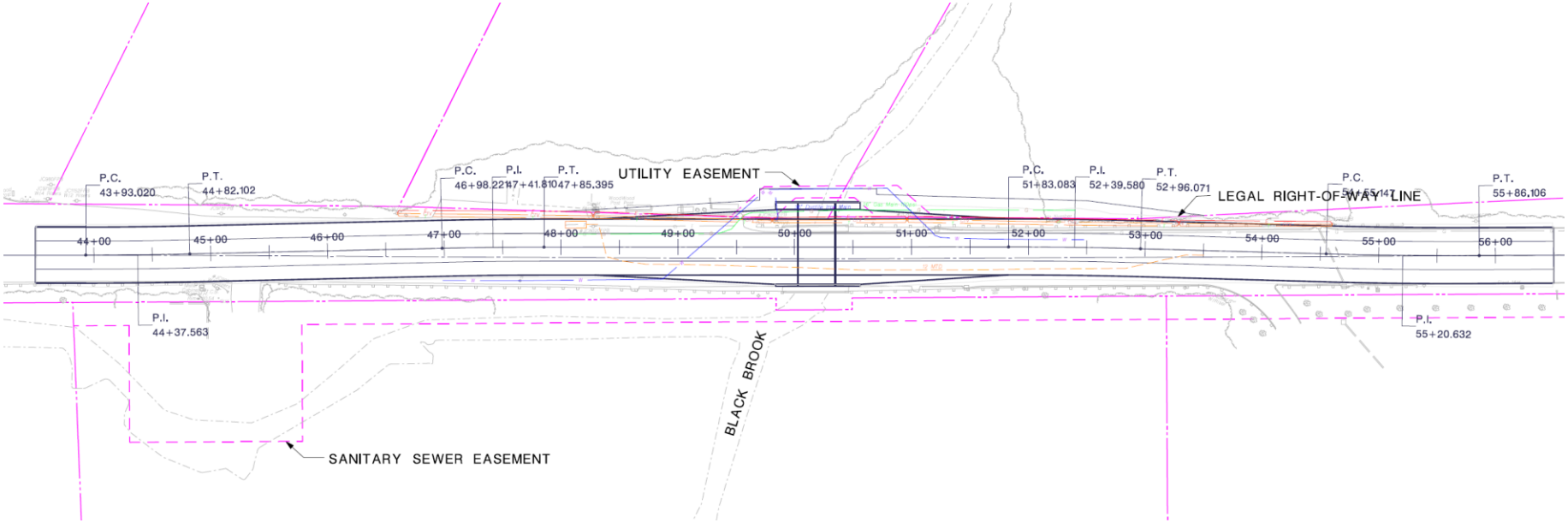


ALTERNATIVES 2 ALIGNMENT - FINAL CONDITION STAGE

TYPICAL SECTION

ALTERNATIVES 3

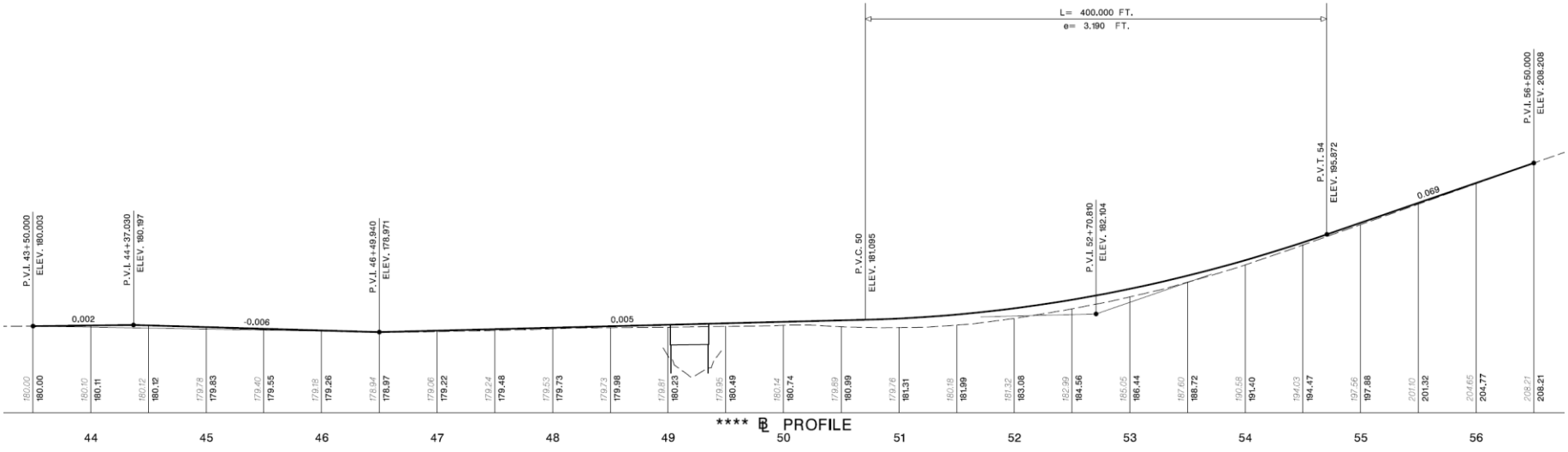
NEW BRIDGE ON ALIGNMENT SHIFT TO NORTH



ALTERNATIVES 3 ALIGNMENT – ROADWAY PLAN

ALTERNATIVES 3

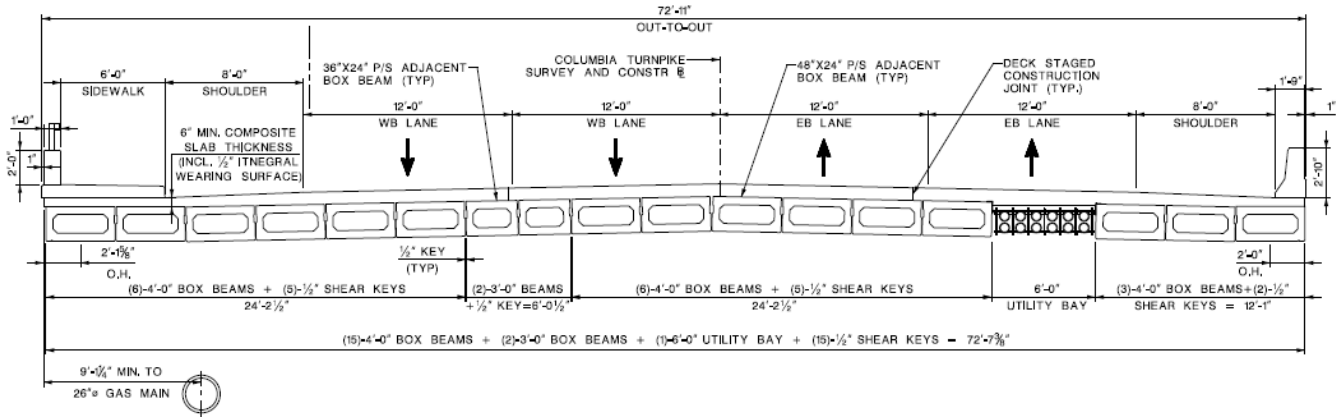
NEW BRIDGE ON ALIGNMENT SHIFT TO NORTH



ALTERNATIVES 3 ALIGNMENT – ROADWAY PROFILE

ALTERNATIVES 3

NEW BRIDGE ON ALIGNMENT SHIFT TO NORTH

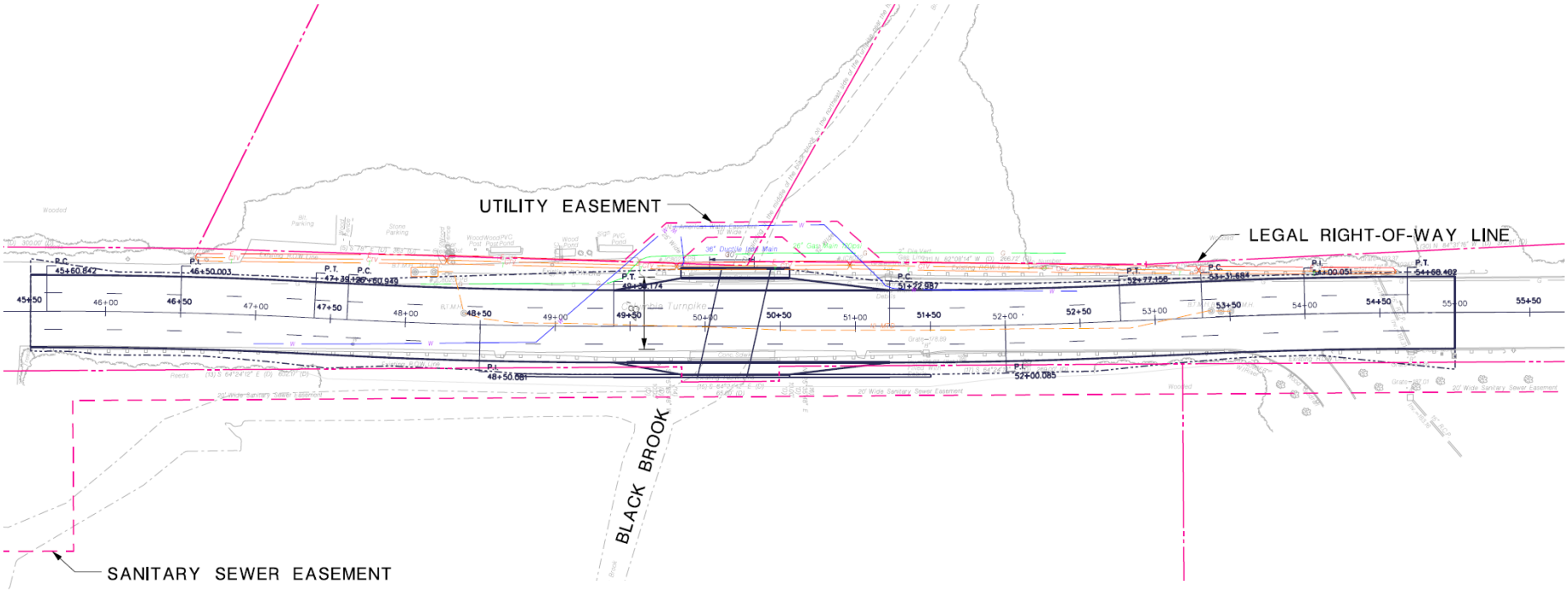


ALTERNATIVES 3 ALIGNMENT - FINAL CONDITION STAGE

TYPICAL SECTION

ALTERNATIVES 4

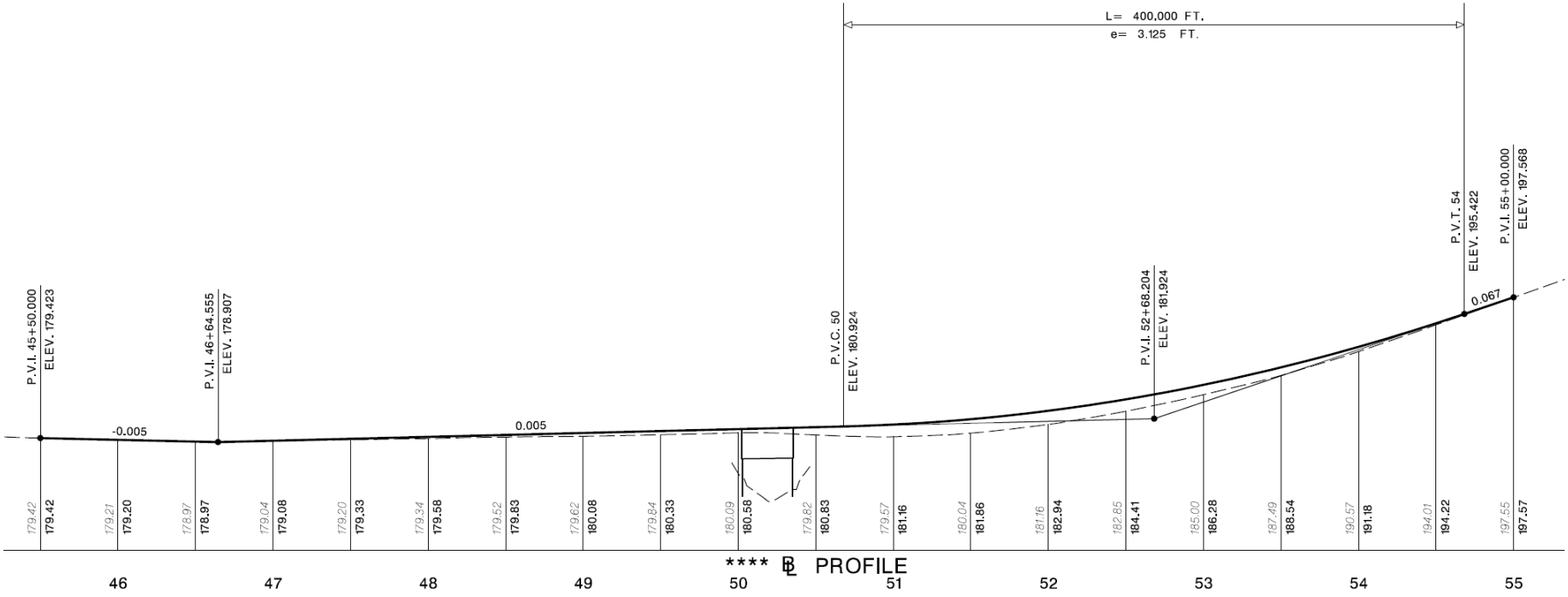
NEW BRIDGE ON MINOR ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 4 ALIGNMENT – ROADWAY PLAN

ALTERNATIVES 4

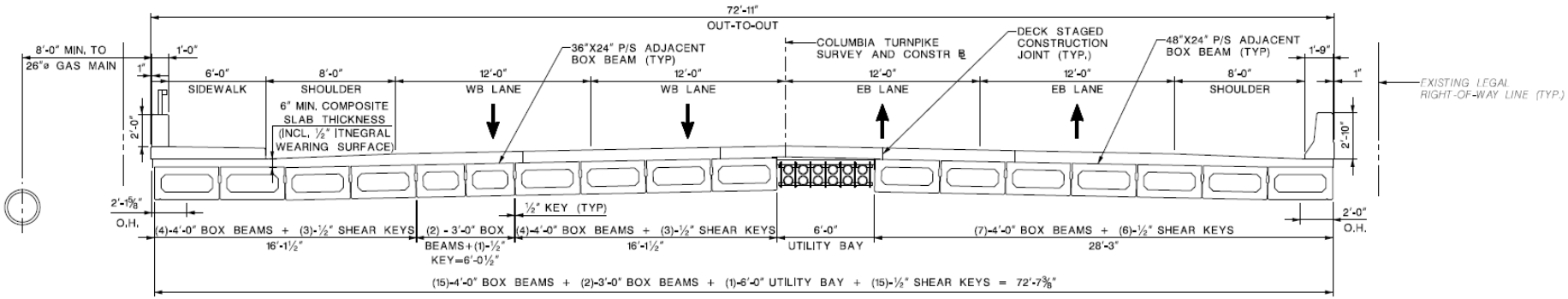
NEW BRIDGE ON MINOR ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 4 ALIGNMENT – ROADWAY PROFILE

ALTERNATIVES 4

NEW BRIDGE ON MINOR ALIGNMENT SHIFT TO SOUTH

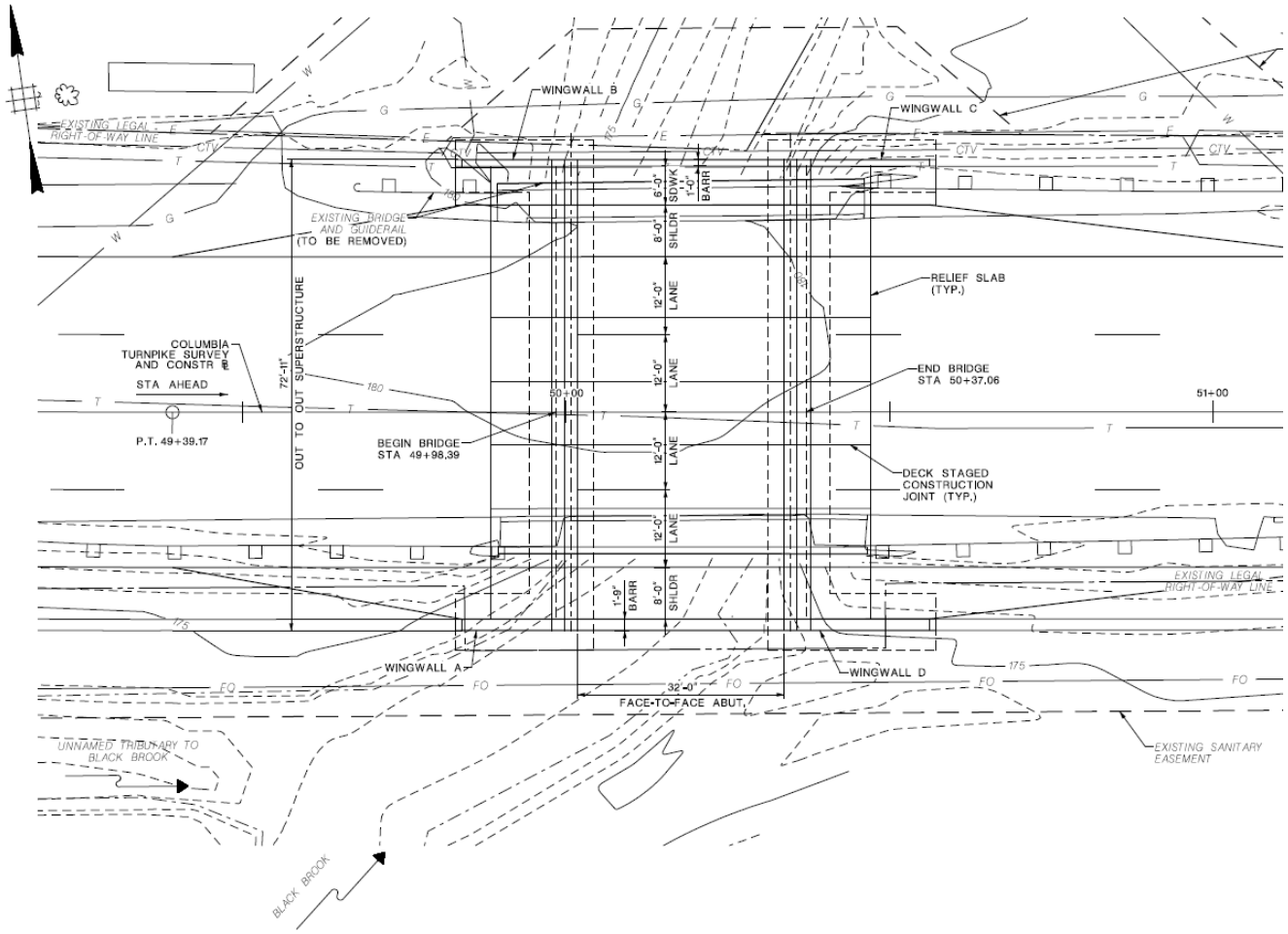


ALTERNATIVES 4 ALIGNMENT - FINAL CONDITION STAGE

TYPICAL SECTION

ALTERNATIVES 4

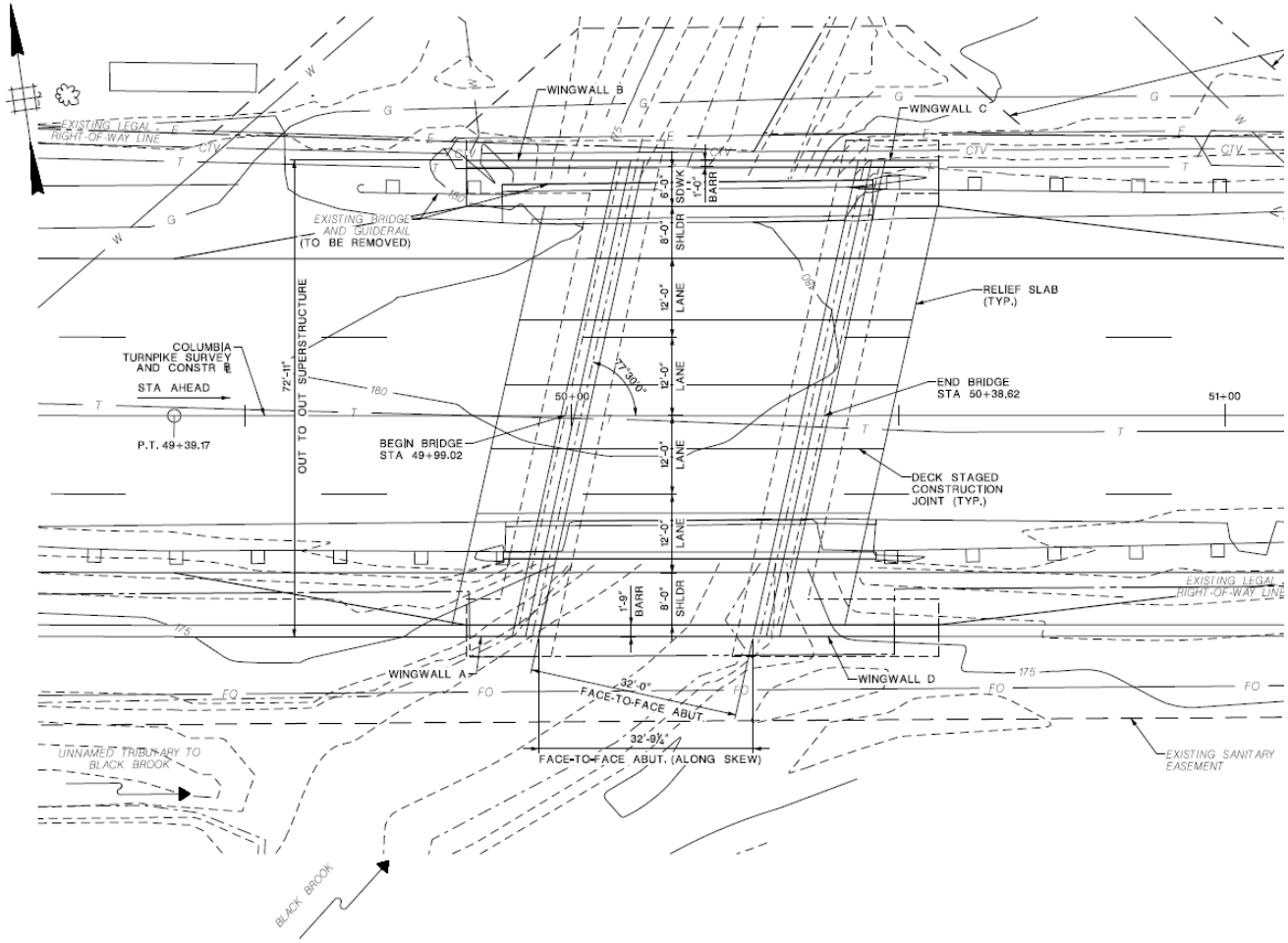
NEW BRIDGE ON MINOR ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 4 – FINAL STAGE PLAN VIEW
WITHOUT SKEW

ALTERNATIVES 4

NEW BRIDGE ON MINOR ALIGNMENT SHIFT TO SOUTH



ALTERNATIVES 4 – FINAL STAGE PLAN VIEW
WITH 12.5 DEGREE SKEW