

The Port Authority of NY & NJ

Design Criteria and Coordination Requirements for Empire State Development Jacob Javits Expansion

June 2016

This document contains the Port Authority of NY and NJ design criteria and coordination requirements to be followed during the implementation of the Javits Center Expansion project.

DESIGN CRITERIA REQUIREMENTS**STRUCTURAL AND GEOTECHNICAL DESIGN REQUIREMENTS:****1. General (Permanent Structures):**

- A. The effect of all temporary and permanent construction loads (including crane loads) on the existing Lincoln Tunnel (LT) Ventilation Buildings, including the NY North and Center Tube Land Ventilation buildings, and the NY South Tube Land Ventilation building, shall be analyzed based on the following codes:
- i. New York City Building code, with latest supplements
 - ii. ACI 318 Building Code Requirements for Reinforced Concrete
 - iii. ACSE 7 Minimum Design Loads for Buildings and other Structures
 - iv. ASCE 24 Flood Resistant Design and Construction
 - v. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"
 - vi. AISC Specifications and Design Manuals
- B. The effect of all temporary and permanent construction loads (including crane loads) on the existing North, Center and South Tubes of the Lincoln Tunnel shall be analyzed based on the following codes:
- i. Federal Highway Administration, Technical Manual for Design and Construction of Road Tunnels - Civil Elements, FHWA-NHI-10-034, 2009
 - ii. AASHTO LRFD Bridge Design Specifications
- Any analysis shall be based on the original contract documents from the construction of the Lincoln Tunnel North Tube, Center Tube (formerly South Tube) and Lincoln Tunnel South Tube facilities.
- C. Evaluate the influence of the proposed Jacob Javits convention center building (including loads) on the Lincoln tunnel North, South and Center Tubes, as well as the Ventilation buildings. The following interaction between the Jacob Javits building and the LT tubes & vent buildings shall be evaluated:
- i. Impact of excavation. Excavation may sometimes remove overburden weight adjacent to or above the tunnel and induce stress changes in the tunnel lining.
 - ii. Additional loading on tunnels & ventilation buildings including all vertical and lateral loads imparted to the tunnel structures, and ventilation buildings from deep foundations and spread footing and mat foundations
 - iii. Any proposed combination of the above at different stages of construction.

Ensure impact to the existing Lincoln Tunnel Tubes (North, Center, South) and the Lincoln Tunnel NY South and NY North and Center Land Ventilation buildings and other miscellaneous Port Authority structures is kept to a minimum.

- D. Perform static (Dead load-DL, Superimposed Dead Load-SDL, Live Load-LL, Rain Load-R, Snow Load-S), wind (W) and seismic analysis (E) as per New York City Building code requirements on the Jacob Javits convention building that takes into the account the impact of the following variables and ensure that stress from the resultant loads on the vent building foundation walls, ground and tunnel structures are within allowable limits:
- i. Depth and lateral location of tunnels, ventilation buildings relative to Jacob Javits building and building foundations.
 - ii. Magnitude and distribution of building/foundation loads.
 - iii. Sequence of application of building/foundation loads
 - iv. Geotechnical data including groundwater elevation
 - v. Excavation details (depth, breadth etc.) and earth retaining system details (if applicable)
- E. Risk/Occupancy Category Criteria:
- i. Lincoln Tunnel tubes are classified as "critical" structures as per NYSDOT, AASHTO and PANYNJ specifications.
 - ii. Although the Jacobs Javit Convention Center and Javits Transformer Buildings could be classified as Category III (Risk/Occupancy) for performing building design; considering the impact the building foundations have on the "critical" Lincoln tunnel tubes, the following requirements shall be met:
 - a. The buildings foundation loads must be calculated/upgraded to a Category IV (with the equivalent appropriate importance factors for wind, snow and seismic loads and combinations) for analyzing the effect of vertical and lateral foundation loads on the tunnels.
 - iii. Calculations shall be submitted to PANYNJ demonstrating that the increase in stresses from the Jacobs Javit Convention Center and Javits Transformer Building foundation loads (vertical and lateral) is within tunnel structures allowable limits.

2. Temporary Structures and Foundation Installation Loads:

- A. The earth retaining systems (for supporting any excavation) shall be adequate to secure the retained earth and prevent any earth movements which may have detrimental effects to the nearby existing Lincoln Tunnel Tube structures and Ventilation buildings.
- B. Earth retaining systems shall retain the vertical sides during excavation.
- C. The design of the earth retaining systems shall be based on the site specific geotechnical investigation.
- D. Earth retaining systems (including tie-back walls) must meet right-of-way (ROW) easement requirements, account for the presence of existing foundations that support Lincoln Tunnel tubes, ventilation buildings and other Lincoln Tunnel facility structures.
- E. Temporary and permanent deep foundations shall be installed such that installation loads applied to the tunnel structures and ventilation buildings during construction are maintained within allowable stresses. All deep foundations within an influence zone defined by a 45-degree line extending from the edge of the tunnels or ventilation

building foundation shall either be drilled or installed through a preaugered hole through the influence zone such that the load transfer zone (bond zone, friction zone, or end bearing level) is below the influence line.

- F. Any analysis shall be based on the original contract documents from the construction of the Lincoln Tunnel North Tube, Center Tube (formerly South Tube) and Lincoln Tunnel South Tube facilities.

3. Ground Water:

- A. Site specific ground water conditions and flow shall be considered to determine hydrostatic pressure loading components on the tunnel/retaining walls and slabs. Effects of water passages, seepage, or asymmetric water pressure on the side walls of the tunnel structures, if present, shall be provided and considered by the design.

4. Tunnel and Ventilation Building Surveys:

A. Location Survey:

- i. Prior to the start of construction, perform a geometric location survey of the north, south, and center tubes of the Lincoln Tunnel, and the NY South and NY North and Center Land ventilation buildings, for a minimum distance of 100-ft beyond the limits of construction which will impact these structures.
- ii. Develop a survey control plan to show the subsurface locations of these structures at the ground surface during construction. Include details for how the survey control plan will be used during construction to prevent interferences with all deep foundation elements for the new building structures and from temporary support of excavation structures with the tunnels and ventilation buildings. After the limits of the permanent and temporary deep foundation elements and the tunnels and ventilation buildings have been located at the ground surface, include requirements for probes to be drilled a minimum of 10-ft below the invert of the tunnels and ventilation buildings to ensure there will be no interference between the deep foundations and the structures. The probes shall be done in such a way that if they encounter the tunnels or ventilation buildings, the probes will not damage the structures.

B. Condition Survey:

- i. Prior to the start of construction, perform a condition survey, including photos, of the north, south, and center tubes of the Lincoln Tunnel, and the NY South and NY North and Center Land ventilation buildings for a minimum distance of 100-ft beyond the limits of construction which may impact these structures.
- ii. Present the results in a summary report format which can be referenced during construction and post construction to determine if new temporary or permanent construction has had any detrimental impact to these structures.

5. Additional Requirements:

The Jacob Javits convention Center renovation and expansion shall comply with the following requirements:

- A. Provide a minimum of 30 feet access all-around the Lincoln Tunnel NY South and NY North and Center Land Ventilation buildings perimeter for Port Authority Maintenance, Inspection and Emergency Evacuation personnel and equipment.
- B. Provide access to the ventilation building from adjacent NYC streets/avenues for Port Authority personnel and equipment at all times.
- C. Impact of active existing utilities must be resolved with stakeholders. Utilities that service Port Authority facilities must be maintained at all times.
- D. New utilities must meet right-of-way (ROW) easement requirements
- E. All ground level manholes and utility access points that service and provide access to Lincoln Tunnel facilities shall be maintained at all times, and remain accessible to the Port Authority personnel.
- F. Settlements and ground movements resulting from changes in the state-of-stress within the groundmass, supporting buildings/caisson (building foundation) shall be evaluated at all stages to assess potential risk to these structures and preventive measures shall be undertaken.
- G. Building foundation (caisson) construction must be sequenced to avoid load imbalance on the Lincoln Tunnel Tube construction.
- H. Noise and vibration associated with Jacob Javit building/foundation/caisson construction shall meet NYC Building Code requirements.

6. Monitoring:

- A. Minimize ground movements from construction, filling and excavation operations – including dewatering – to prevent any damage to existing adjacent ventilation buildings (NY South and NY North & Center Land ventilation buildings), miscellaneous structures, and the Lincoln tunnel tubes (North, Center and South).
- B. Implement a monitoring program to monitor the following during construction:
 - i. Monitor ground movements/displacements, water levels, noise, vibration, ground and tunnel lining stresses
 - ii. Survey and monitor tunnel profile
 - iii. Limit vibrations to a stop work level of 1-inches per second, with an Alert Level of 0.5-inch per second.

7. Rock Excavation (By Blasting) Requirements

- A. No blasting will be permitted within 20 feet of the tunnel.
- B. Beyond 20 feet of the tunnel, blasting will be allowed, provided, the following requirements are met:
 - i. Blasting will be permitted only with light charges subject to the approval and regulations of the local codes and the Fire Department.
 - ii. Blasting shall begin at the far (north) end and incrementally proceed towards the tunnel at the near (sound) end of the rock excavation (blasting) limits.

- iii. The Contractor shall provide a detailed blasting and monitoring plan, providing for measurements of both particle velocity and displacements at critical locations of the tunnel structure for approval to Port Authority of NY & NJ (PANYNJ). Blasting shall not proceed without prior approval from PANYNJ.
- iv. The monitoring plan shall include threshold (alert) and upset (stop work) levels of both particle velocity and settlement together with an action plan for their implementation.
- v. The Contractor shall secure an approved Seismologist with minimum of five (5) years' experience on a minimum of three (3) projects of similar complexity to install and operate suitable velocity gauges to continuously monitor particle velocity and an independent licensed Surveyor to monitor displacements/settlements.
- vi. The threshold maximum particle velocity above ambient caused by the blasting will be 0.5 inch per second (Alert Level). When the velocity gauge reading reaches alert level implement mitigation measures to avoid damage to existing structures and utilities.
- vii. In no case will particle velocities exceed the upset level of one (1.0") inch per second (Stop Work and Review Level). When the velocity gauge reading reaches stop level halt all construction activities and implement mitigation plan to avoid damage to existing structures and utilities.
- viii. Perform test blasting at a location approved by Port Authority of NY and NJ (PANYNJ).
- ix. Using the blast/vibration monitoring data (i.e., particle velocity and displacement/settlement data) from test blasting, perform scaled distance interpretation of the data and develop a blast plan for production blasting.
- x. Coordinate all blasting work with PANYNJ Lincoln Tunnel facility staff.
- xi. Take necessary measures to protect adjacent structures and facilities during blasting. Install fly rock protection mats prior to blasting.

BLASTING MONITORING CRITERIA SUMMARY

MONITORING FREQUENCY	REPORTING FREQUENCY	ALERT LEVEL	STOP WORK & REVIEW LEVEL
Continuous during test and production blasting	Email transmission within 30 minutes of each blast followed up by daily report	0.5 inch/sec	1.0 inch/sec

8. Wall Penetration Notes

Perform all basement foundation wall penetrations for conduits in conformance with the following notes:

- A. The Lincoln Tunnel NY North & Center and NY South Land ventilation building existing basement walls are reinforced concrete walls.
- B. Locate the rebars in the concrete basement walls (both interior and exterior faces) using non-destructive testing methods such as ground penetrating radar.
- C. Survey the wall for existing wall penetration holes.
- D. Clear spacing between wall penetration holes shall be minimum 6 inches.
- E. Adjust the wall penetration layout to avoid existing wall reinforcement and to meet the minimum clear spacing requirements.
- F. Wall penetrations openings shall be filled with 3 hour rated firestopping material sealants.
- G. Install steel pipe sleeves for all wall penetrations. Install non-shrink grout to fill annular space between pipe sleeves and wall opening/hole, Install watertight/flood proof seals between conduits and pipe sleeves.
- H. Wall penetration layout detail drawings and calculations shall be prepared, signed and sealed by a New York State Licensed Professional Engineer and shall be submitted to the Engineer for review and approval before beginning work.

9. Flood Hazard Mitigation

- A. The PANYNJ designs its facilities in coastal floodplains to incorporate potential future sea level rise (in addition to standard freeboard per ASCE 24-14) in adherence to the PA Climate Resilience Guidelines (2015). The PA Design Flood Elevation pertaining to the Lincoln Tunnel NY South land ventilation building is 15.3' NAVD88.
- B. The PA Climate Resilience Guidelines are available via the following link:
<http://www.panynj.gov/business-opportunities/pdf/discipline-guidelines/climate-resilience.pdf>.

MECHANICAL DESIGN REQUIREMENTS

- A. The proposed Javits expansion shall not cause any re-entrainment of exhaust air stream back into the supply air intake. Solutions to remedy any impacts on the continuous operation of the existing tunnel ventilation system during tunnel fire scenarios and normal ventilation scenarios with different wind and outdoor condition shall be provided.
- B. Any proposed arrangement of the Javits expansion shall be located at a minimum of 30 feet away from the existing vent buildings and shall not impose any Code required modifications on the existing vent buildings and the existing ventilation systems serving Lincoln Tunnel.

ELECTRICAL DESIGN REQUIREMENTS:

- A. For all new manholes and splice chambers located within the proposed building extension provide access and space for trucks with cable reels and pulling equipment to accommodate future cable replacement.
- B. Size of manhole shall be determined based on the number and size of cables, wires, and conduits allowed. For areas where a PA-standard manhole is not appropriate, submit a proposed manhole design including all dimensions and design calculations for review.
- C. Between manholes in the medium-voltage power system, the total bending radius for underground duct banks shall not exceed 90 degrees and shall utilize wide sweeps. Maximum distance between manholes and splice chambers shall not exceed 450 ft.
- D. Conduits from manholes, handholes, or ductbanks into buildings or remote equipment locations shall be changed to RGS prior to emerging from below grade.
- E. Underground ductbanks shall utilize FRE conduit 5-inch diameter minimum. Conduits shall be concrete encased minimum 3 inches all around. If ductbank installed under roadway, runway or taxiway, then RGS conduits shall be used. All ductbanks shall have 30-inch cover minimum.
 - i. Ductbanks shall be sloped toward the manholes to provide adequate drainage; no low spots are allowed.
- F. Duct banks of alternate feeders, such as NY and NJ, shall be separated by a minimum of 20 feet and terminated in separate manholes.
- G. For new ducts submit a set of calculations showing the maximum tension placed on the cables during pulling and the maximum allowable tension the cables can withstand. Calculate also, from a pressure standpoint, the force exerted in each elbow or bend during pulling and the radius of each bend. The minimum radius for electrical duct banks is 3 ft. Calculations shall be performed in both directions with resultants indicating either direction of pull is allowable.
- H. Include 20% spare ducts in all duct banks, but no less than 3 conduits.
- I. Specify polymeric flat strap cable for the new installation, and a splice kit for splicing of existing Paper Lead cable with polymeric cable. All splice chambers have to be accessible for inspection and maintenance.
- J. Pull chambers and splice chambers shall be provided inside the building for high-voltage distribution. Size of the pull chambers and splice chambers shall be adequate to perform all required pulling and splicing.
- K. For additional information see attached:
 - i. Ductbank Details
 - ii. Manhole Details

- iii. Okuguard 15 kv Flat Strap Triplexed Cable
- iv. UNDERGROUND CONDUIT SYSTEMS Specification
- v. WIRES, CABLES, SPLICES, TERMINATIONS Specification

SECURITY REQUIREMENTS:

Blast analysis/protection criteria to be provided as a revision to this document through an RFP addendum .

TENANT CONSTRUCTION AND ALTERATION PROCESS (TCAP) REQUIREMENTS:

Follow the link below on Port Authority of NY and NJ website for information on the Tenant Construction and Alteration Process (TCAP) process.

<http://www.panynj.gov/business-opportunities/tcap/>