

# **APPENDIX A**

## **ENGINEERING REPORT**

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# **APPENDIX A.1**

## **Below Deck Infrastructure Matrix**

# Sunnyside Yard Master Plan

PROJECT: Sunnyside Yard Master Plan  
LEAD: HNTB  
DATE: 29 June 2018 – Rev. 1 11/02/2018  
SUBJECT: Below Deck Infrastructure Matrix

The Sunnyside Yard Master Plan Below Deck Infrastructure Matrix provides the first step in a series of analyses to determine the potential deck coverage opportunity to support an overbuild development at Sunnyside Yard. The matrix documents limitations, constraints, opportunities, and parameters, setting the stage for an integrated design process between the below-deck and overbuild design teams.

The intent of the Below Deck Infrastructure Matrix is to review infrastructure, existing or planned, that must be accommodated below or within an overbuild structure (the “Improvements”), in order to record opportunities, limitations, and potential for flexibility. Planned projects reviewed in this matrix are the Amtrak Sunnyside Yard Master Plan, the Amtrak High Speed Rail Facility, the MTA East Side Access (ESA) project, and the LIRR Mid-Day Storage Yard. Updated information has been requested and is expected from Amtrak regarding their proposed Master Plan improvements, and from the MTA regarding ESA and Mid-Day Storage Yard improvements. The matrix also identifies current data limitations and the impact of those limitations.

Flexibility is documented in the matrix via color coding:

- Red - “Not Flexible”: Element cannot be moved for the foreseeable future. Must be accommodated below, within, or above the overbuild deck without disrupting the location and use of the improvements. A description of why the element cannot be moved within the foreseeable future is included in the “notes” column.
- Yellow - “Moderately Flexible”: Element has the potential to move or be altered to facilitate overbuild construction, but such accommodation poses challenges/impacts to the rest of the Yard. A description of this moderate potential flexibility is included in the “notes” column.
- Green - “Flexible”: Element can be moved or altered to facilitate overbuild construction. A description of this flexibility is included in the “notes” column.

The matrix is separated into nine zones of analysis based on an area’s function within the yard. A diagram of those zones is available in Attachment 1 to this memo. Attachments 2 and 3 provide further diagrams in support of the matrix analyses.

The matrix also begins to assess geotechnical and environmental conditions around improvements (where known) along with information on required utility relocation/impacts (where known) and identifies where information is lacking.

The following is a brief summary of the findings by zone:

- **Zone 1 LIRR Mid-Day Storage Yard/MTA Owned**
  - Current Use: Construction and staging area for ESA
  - Proposed/Future Use: “Mid-day Storage Yard” providing maintenance and 24 storage tracks for LIRR trains.
  - Key Considerations: The new Mid-Day storage yard will be completed prior to any potential Yard overbuild construction activities. Most infrastructure will not be able to be modified except for lighting structures which can be relocated to avoid overbuild foundations.
  
- **Zone 2 Amtrak HSR Facility**
  - Current Use: Existing HSR Facility
  - Proposed/Future Use: Expanded HSR Facility
  - Key Considerations: Until the new HSR Facility is built the area will provide laydown space for deck construction; most utilities will be flexible except storm and sewer lines. Subsurface tunnels, and building and track infrastructure occupying most of the zone will provide the greatest limitations in determining locations for overbuild supports.
  
- **Zone 3 Amtrak/NJ Transit Off-Peak Storage**
  - Current Use: Amtrak/NJ Transit off-peak storage
  - Proposed/Future Use: Amtrak/NJ Transit off-peak storage (reconfigured)
  - Key Considerations: Overbuild and track reconfiguration will happen in tandem to prevent constructability concerns. Area will be fully occupied by track infrastructure; however, Q Tower and other facilities will be relocated providing some opportunity. Tunnels also run beneath this zone.
  
- **Zone 4 Amtrak S&I Facilities and Storage**
  - Current Use: Service and Inspection Facilities
  - Proposed/Future Use: Service and Inspection plus 10 new storage tracks
  - Key Considerations: Tracks, signals, and tunnels provide the greatest limitations; however, the facilities can incorporate overbuild structural elements.
  
- **Zone 5 Amtrak Maintenance Facilities**
  - Current Use: 4 repair tracks, commissary, substation, maintenance shed
  - Proposed/Future Use: 10 tracks serving maintenance facility, 3 storage tracks, conventional repair shop, new commissary building, focus building.
  - Key Considerations: The maintenance facility is fixed as it occupies the full width of Zone 5; the other facilities may have flexibility regarding their locations as long as the functionality is maintained. OCS can be incorporated onto the deck to provide flexibility, while signal and track have limited flexibility.

- **Zone 6 Amtrak MoW Yard**
  - Current Use: Loop tracks; substation, storage, ESA contractor area, parking
  - Proposed/Future Use: Electrified MoW tracks, engineering/MoW/Production shop, security gate.
  - Key Considerations: Future use may be less fully utilized by track, providing some flexibility for the relocation of the rail. OCS can be incorporated onto the deck to provide flexibility. The loop tracks are not able to be relocated.
  
- **Zone 7 Amtrak/LIRR Mainline**
  - Current Use: Under reconfiguration for ESA, substations, tower, signal room
  - Proposed/Future Use: Mainline tracks and facilities per ESA, final configuration not available at this time
  - Key Considerations: The Mainline is likely the busiest rail interlocking in North America. Changes to the track alignments to support the ESA project will be challenging as it will likely cause a ripple affect requiring changes to adjacent tracks and up and down the line. The proposed overbuild will likely need to accommodate the Mainline track alignments. Once conflicts are identified with the overbuild structure, specific changes to the Mainline tracks and facilities can be evaluated.
  
- **Zone 8 Loop Tracks**
  - Current Use: Loop tracks diverging from Mainline to bring trains to various facilities, car wash, substation
  - Proposed/Future Use: New car wash, new substation, loop tracks
  - Key Considerations: Loop tracks are in constant use and will have limited flexibility; other tracks in the zone will have some flexibility. Tunnel, power, and signal components will have limited flexibility. OCS height can be reduced.
  
- **Zone 9 GM Facility**
  - Current Use: GM Service Facility
  - Proposed/Future Use: GM Service Facility
  - Key Considerations: If this property was acquired it could provide additional contractor laydown area from which to stage the deck construction and to provide structural support for the overhead deck.

Following this analysis, the consultant team will begin to explore proposed changes to the Amtrak Master Plan in tandem with the Deck Coverage Evaluation. The intent was for this matrix to continue to evolve as more information is available and as more analyses are conducted.

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## **Acronyms:**

- CIH – Central Instrument House
- ESA – East Side Access
- ET- Electric Traction
- GM – General Motors
- HSR – High Speed Rail
- HSRF – High Speed Rail Facility
- LIRR – Long Island Rail Road
- MTA - Metropolitan Transportation Authority
- NJT – New Jersey Transit
- OCS- Overhead Contact System
- RTU – Remote Terminal Unit
- S&I – Service and Inspection
- SSY – Sunnyside Yard
- SUB – Substation
- TP- Traction Power
- TT – Thornton Tomasetti

NYCEDC Sunnyside Yard Master Plan  
Below Deck Infrastructure Matrix

	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 1: LIRR Mid-day Storage Yard / MTA Owned	a. Track Infrastructure	N/A	24 storage tracks at 12 cars each.	Since the proposed yard configuration is assumed to be an existing condition when overbuild construction would start, the constructability of the required subsurface foundations becomes significantly more difficult.	Construction of the overbuild foundations in the yard will take multiple tracks out of service at a time and will be coordinated with LIRR Operations. As work begins on the foundation near the inner yard tracks, contractor access will need to be designed to not require removing the outer tracks from service.	LIRR force account will be required for removal and reinstallation of all track and third rail components to support construction of the subsurface foundations.	Zone1 (LIRR Mid-day storage yard/MTA owned) not included in NYSDEC State Superfund Site #241006. Availability of previous studies unknown. There are likely contaminants present given proximity to and similar use to Amtrak SSY.	Will LIRR, as per the Mid-Day Storage memo 6/27/17, agree to modified yard operations to accommodate 4' wide foundation walls? Need official horizontal and vertical track geometry from the LIRR in CAD.	No	Not Flexible	The new Mid-Day storage yard will be completed prior to any overbuild construction activities. The yard fully occupies the limits of the MTA owned property. It is assumed that if modifications are possible they would be minimal in nature, meaning very slight shifts in the track geometry that would not amount in any material increase in the footprint available for overbuild foundation elements. Providing any additional footprint area would likely require the removal of certain tracks, which is assumed to not be possible.
	b. Third rail	Third rail	Third rail	The third rail follows track alignment and will be installed or relocated with the track.	The third rail follows track alignment and will be installed or relocated with the track.	LIRR Force account will be required to relocate third rail components.		Third rail layout, sectionalizing switch locations in CAD.	No	Not Flexible	The third rail is tied to the track layout and is only as flexible as the track design permits. Additionally the third rail sits within the 8.5' clearance requirement so is not anticipated to be in conflict with overbuild structural elements. Conduits and cables that feed the third rail are assumed to be able to be relocated if they are found to be in conflict with overbuild structural elements.
	c. Traction Power (TP)	- 3 New Substations - 3rd Rail - TP duct banks	- 3 New Substations - 3rd Rail - TP duct banks	Traction power feeder and jumper cables will have to be moved with track and third rail; depending on track sectionalization, adjustments may have to be made.	Maintain sufficient tracks with third rail power to accommodate train operations.	LIRR force account will relocate third rail feeder and jumper cables.		Third rail layout, sectionalizing switch locations in CAD.	No	Flexible	Traction power cables installed in duct banks can be relocated to avoid overbuild structural elements.
	d. Distribution Power	- 60 new lighting structures (cross catenary structures and beam structures at the launch shaft area) (see Attachment 3.7) - Power duct banks to feed lights and facilities.	- 60 new lighting structures (cross catenary structures and beam structures at the launch shaft area) - Power duct banks to feed lights and facilities.	Duct banks may need to be temporarily and/or permanently rerouted depending on their locations.	Contractor would be able to relocate the lights to the deck or wall as required.	Contractor would be able to relocate the lights to the deck or wall as required.		Location and erection diagrams for the lighting structures. Location and distribution of the third rail power feeds, duct banks, and substations.	No	Flexible	Future structures supporting lights: 54 cross catenary structures and 6 rigid structures in the launch shaft area with a max. height of 36ft from the rails. Lights can be relocated to the deck or the walls and cross cat structures removed.
	e. Signal	N/A	The new signal system is anticipated to be comprised of typical signal cable conduit systems, signal CIH houses, and local cabinets, as well as low dwarf signals which fit easily in tight clearances.	Depending on the location of the proposed cable/conduit routing and signal huts/cabinets, the location of cables/conduits may need to be temporarily and/or permanently rerouted in order to maintain critical yard operations. Rerouting of cables/conduits is significantly less expensive than relocating signal cabinets/huts.	The signal system will need to remain fully operational throughout construction. It is anticipated that this will be achievable by temporarily and/or permanently rerouting signal system elements.	All work would be performed by LIRR force account unless special labor agreements were developed for a contractor to install signal foundations and run conduit/duct banks. All final signal installations and connections will be made by LIRR force account.		The location of all proposed signal system elements in CAD.	No	Not Flexible	The location of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the locations of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf signals are anticipated to be used which can sit within the 8.5' horizontal clearance. It is assumed that signal cables and conduits are able to be relocated if they are found to be in conflict with the overbuild structural elements. The relocation of signal cabinets/huts/sheds may be possible if nearby real estate is available within the MTA property, or possibly above deck.

NYCEDC Sunnyside Yard Master Plan  
Below Deck Infrastructure Matrix

	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 1: LIRR Mid-day Storage Yard / MTA Owned	f. Facilities/Structures	N/A	The site includes 3 small buildings: toilet servicing building, storage building, and a cart storage and charging building. Additionally the site includes an elevated personnel access bridge that crosses the yard with stairs that touchdown to access ways between the platforms. Additionally, there are two recently constructed buildings to the north of the yard that extend slightly into the air rights of the yard. The buildings were constructed as part of the ESA project: a yard services building and a tunnel ventilation facility.	Constructability of the overbuild foundations may be complicated if they are found to be in conflict with the structural elements of the personnel bridge. The buildings are not anticipated to present additional constructability challenges.	The functionality of all buildings and the personnel bridge must be maintained throughout construction. It is not anticipated to be a problem.	There are no force account implications due to the existing facilities.	Zone 1 (LIRR Mid-day storage yard/MTA owned) not included in NYSDEC Superfund Site #241006. Availability of previous studies unknown. There are likely contaminants present given proximity to and similar use to Amtrak SSY.	Proposed site plan in CAD.	No	Not Flexible	It is currently assumed that existing conditions encountered at the start of the overbuild construction will have to be restored. Reconstruction within or above the deck should be considered for elements that extend into the air rights, such as the personnel walkway. It is potentially feasible to relocate the building functions without restoring the buildings themselves; this possibility will be evaluated moving forward.
	g. Utilities	N/A	The proposed future utility layout is unknown.	Any number of utilities may need to be relocated and/or protected due to the overbuild. Future existing utility locations are unknown and therefor cannot be evaluated.	Utilities supporting operations must be maintained.	Force account support for protection of contractors will be required for the relocation of non-railroad systems.		Proposed utility plan in CAD.	No	Moderately flexible	The relocation of non-railroad system utilities is assumed to somewhat flexible depending on the type of utility, the location, and the impact that relocating would have on yard operations. Once we receive the proposed design for all utilities we will be able to evaluate each specific utility to determine if there is a conflict with overbuild structural elements and in turn their respective flexibility to be relocated.
	h. Subsurface structures	N/A	Tunnels cross under the yard: the ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	The location of the tunnels may require relief structures or impact the available footprint of overbuild structural elements.	Operations through the existing tunnels must be maintained.	LIRR force account will be required to protect contractors for any deck related work.		Existing tunnels or future tunnel locations in CAD.	No	Not Flexible	Relocation of subsurface tunnels will not be possible. The use of possible relief structures should be explored.
	i. Construction access/laydown	N/A	Vehicle access to the yard will exist, but access to specific points within the yard is not known. It is likely that gaining access to these points for construction equipment will require some outages to adjacent tracks. The MTA-owned property will be fully utilized, which will require the contractor to find a laydown area offsite.	Major constructability concerns arise from not constructing the yard in tandem with the elements required to support the overbuild. Removing previously constructed elements within in a fully operational yard significantly increases the difficulty and reduces available work windows to perform the overbuild work.	Construction of the overbuild foundations will require taking multiple tracks out of service at a time, impacting railroad operations.	LIRR force account will be required to protect contractors for any deck related work.		Proposed site access. Once we have a complete site plan, including access, we will have a better sense of what can be utilized by the contractor in order to minimize impacts to yard operations.	No	Not Flexible	Access to points within the yard for construction equipment will be limited; it is anticipated that the majority of construction equipment would enter on hirail vehicles. Because yard operations will fully occupy the MTA owned property there will be little to no area available for contractor laydown and it should be assumed that laydown will be offsite, possibly other locations within SSY or even previously constructed deck if completed.
	j. Vehicle access	N/A	Unknown	Whatever vehicle access will exist in the future will need to be maintained during and after construction is complete.	Whatever vehicle access will exist in the future will need to be maintained during and after construction is complete.	N/A		Proposed site access. Once we have a complete site plan, including access, we will have a better sense of what can be utilized by the contractor in order to minimize impacts to yard operations.	No	Moderately flexible	Vehicle access to the yard must be maintained at all times. It may be possible to modify the location of access roads in the yard to accommodate overbuild structural elements, but such modifications are assumed to be very limited due to the lack of unused real estate within the site.



NYCEDC Sunnyside Yard Master Plan  
Below Deck Infrastructure Matrix

Zone Elements	Constructability/ Staging Considerations		Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes		
	Type	Existing								Future	
Zone 2: Amtrak HSR Facility	a. Track Infrastructure	- 5 ready tracks @12 cars min each - 2 HSR shop tracks	- 5 ready tracks @12 cars min each - 6 HSR shop tracks	Laydown/staging area available north of existing facility. The construction of the overbuild foundations would happen in tandem with the track reconfiguration	Staging must be coordinated with Amtrak to ensure critical HSRF operations are maintained.	Amtrak force account would be required for all final track installation and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 2 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Division (ROD) from NYSDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 2 overlaps with OU-1, OU-2, OU-3, OU-4, OU-5, and OU-6. - OU-1, OU-2, and OU-6 have undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-3, OU-4, and OU-5 have ongoing remedial action. OU-1: Soil above groundwater in footprint of HSRF OU-2: Soil above groundwater in area adjacent to HSRF OU-3: Soil above groundwater in NE of site with separate-phase petroleum hydrocarbons (SPH) OU-4: Soil above groundwater in the remainder of the site OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Confirmation is needed that the design we are using is current.	To be determined during design development in coordination with TT.	Not Flexible	The reconfigured HSRF will fully occupy Zone 2, so the available footprint is limited: while it may be possible to shift the available footprint for overbuild structures, it is unlikely that the footprint can be increased. It is assumed that overbuild activities will happen in tandem with the construction of the HSRF and tracks. It is assumed that the HSRF will be constructed with 6 new tracks; if fewer than 6 are constructed, flexibility for overbuild structures increases. The Amtrak Sunnyside Yard Master Plan calls for potentially installing a Service & Inspection facility for NJT; if this happens the flexibility decreases.
	b. Catenary	3 electrified tracks (North Runner, Hump and Lead 6) on cross catenary structures (see Attachment 3.6)	2 New electrified tracks (RT4 & RT5)	OCS wires supported on shared multi-pole cross catenary structures spanning the Amtrak HSR facility tracks and the ladder tracks (bowl). Any OCS removal or relocation would affect the adjacent wires and would have to be coordinated with Amtrak. The columns of these existing structures can be up to 60ft tall and support not only OCS wires but traction feeders, signal power cables, cross-track feeders and switch disconnectors at the top of the poles. Sectionalizing issues to electrically isolate wires.	OCS transfers or relocations would have to be designed to maintain services critical to operations. Each electrified track cannot be de-energized separately due to the lack of sectionalizing switches and section insulators. More detailed analysis and design is required as the supports span additional tracks.	Amtrak will have to obtain clearance from Union for a contractor to be able to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractor working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request Force Account ET Protection.	Existing OCS and ancillary cable supported on each structure. Structure erection diagrams for each OCS structure.	To be determined during design development in coordination with TT.	Moderately flexible	- Large cross-catenary structures (which consist of a body span and a head span wire) supporting multiple OCS wires at every span with columns up to 60ft tall. - Most of these structures span on multiple columns across the entire storage yard from the North Runner track all the way to the north or even the south of the Mainline. Removing one section of the cross catenary will affect the whole structure since the very high mechanical tension of the head span and body span wires require the columns to support these big termination loads using guy anchors and bigger column sections. The existing middle poles are not designed to take these loads. - The location of every OCS wire supported on the cross-catenary structure depends on the other wires supported on the same span. Removing or relocation any OCS wire will affect the other wires on the same span and the cross catenary wires will have to be reprofiled. Some cross catenary structures are supporting 20+ OCS wires. - Existing OCS span length 200ft (length between two consecutive OCS wire supports). System height (distance between messenger and contact wire at the supports) variable at every structure. Some of the existing structures have the messenger wire supported at 30ft from top of rail. - Request from Amtrak to allow a min contact wire height of 18 ft. and max messenger wire height of 21 ft. Existing contact wire height varies between 18' and 21'. Minimum contact wire needed for the railroad equipment is 15'-5". - Deck height of 26' 9" to allow for auxiliary OCS facilities (cross track feeders, sectionalizing switches, etc.). Existing wires, columns, switches and cross track feeders are currently installed well over this elevation and will have to be relocated carefully staged. Additional and interim supports will be necessary. - 3ft minimum clearance of any structure to OCS wires. - 12 KV feeders from Substation can be underground in duct bank or relocated aerially. - Signal power feeders can be underground. - Amtrak will consider alternative means of using deck columns to support OCS cross spans/beams. - Need to identify pairs of tracks that can be shifted to start making room for columns. Or TT needs to look at existing layout and advise areas that would work. - Sectionalizing should be provided so that each track can be de-energized separately.	
	c. Power	Existing duct banks for traction power	New duct banks, cable and conduit runs for new disconnectors, switch heaters, CIH and RTU house.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak Force account will be required to perform all the traction power work without special agreement with their union.	Existing traction power duct banks, and cable and conduit runs.	To be determined during design development in coordination with TT.	Flexible	New duct banks, cable and conduit runs for new disconnectors, switch heaters, CIH and RTU house can be designed to work with the location of the future proposed piles.	
	d. Signal	Existing dwarf or mast signals	The new signal system will maintain the use of dwarf or mast signals.	Signal work would be performed in tandem with the track reconfiguration; signal huts, and cable and conduit runs would impact constructability above and beyond what is required for the track reconfiguration.	There are no operational considerations above and beyond what is required for maintaining operation due to the track reconfiguration	Amtrak would need a special agreement with their union to allow contractors to install signal foundations and run conduit/duct banks as required. All final signal installations and connections will be made by Amtrak force account.	Proposed signal and conduit layout in CAD.	To be determined during design development in coordination with TT.	Not Flexible	The locations of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the locations of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf/mast signals are anticipated to be used which can sit within the 8.5' horizontal clearance. Locating the signal cables and conduits is assumed to be flexible enough to not be in conflict with the overbuild structural elements. The location of signal cabinets/huts/sheds will be moderately flexible in terms of avoiding conflicts with overbuild structural elements if nearby real estate is available, or possibly above deck.	
	e. Facilities/Structures	2 Track HSR Facility, Boiler House (Building 7), Track & Structures Building (Building 8), Track & Structures Storage (Building 8a).	6 Track HSR facility with potential NJT S&I Facility	Laydown/staging area is available north of existing facility within Zone 2. The construction of the overbuild foundations and supporting elements would be designed to be integral with the facility design.	Construction of the Phase 1 HSRF does not present major operational concerns as it is constructed adjacent to the existing facility with little to no impact to current operations.	Force account work would include final installation of the rail systems (track, OCS, signal)	Proposed facility layout in CAD.	To be determined during design development in coordination with TT.	Moderately flexible	It is assumed that the location of all proposed facilities will be moderately flexible in terms of slight shifts to accommodate the overbuild structural elements as well as integrating the overbuild structure with the facilities themselves. Overbuild structural elements may be able to be designed to be integral to the facility building; certain personnel functionality that was previously designed into the facility can be moved above deck.	

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	Type	Existing	Future								
Zone 2: Amtrak HSR Facility	f. Utilities	Sanitary, water, fire line, oil line, as well as various utilities servicing the existing HSRF.	Relocated utilities, as well as proposed utilities required to serve the new HSRF.	Utility relocations are required as part of the implementation of the Amtrak Master plan, therefore present no constructability issues specific to what is required to support the overbuild. All utility relocations would happen in tandem with the track reconfiguration and overbuild structure construction.	Utility relocation must be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak force account will be required to protect any contractor forces.	Zone 2 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYSDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 2 overlaps with OU-1, OU-2, OU-3, OU-4, OU-5, and OU-6. - OU-1, OU-2, and OU-6 have undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-3, OU-4, and OU-5 have ongoing remedial action.	Proposed utility layout in CAD.	No	Moderately flexible	Most utilities should be fairly flexible in terms of being able to be relocated. Larger utilities that are gravity driven, such as larger sanitary and storm sewer lines, will be difficult to relocate and will likely require some sort of protection or relief structure in order to support overbuild structural elements.
	g. Subsurface structures	The ESA tunnels	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	The location of the tunnels may require relief structures and/or may impact available footprint of overbuild structural elements.	Operations through the existing tunnels must be maintained.	No force account required.	OU-1: Soil above groundwater in footprint of HSRF OU-2: Soil above groundwater in area adjacent to HSRF OU-3: Soil above groundwater in NE of site with separate-phase petroleum hydrocarbons (SPH) OU-4: Soil above groundwater in the remainder of the site OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Existing ESA tunnel layout and proposed Queens Super Express layout in CAD.	No	Not Flexible	Relocation of subsurface tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Space is available north of the existing HSRF. Access to the site is existing.	N/A	N/A	Laydown area must be thoughtful of maintaining current operations at the existing HSRF.	N/A		N/A	No	Flexible	The area within Zone 2 immediately north of the existing HSRF will be available for contractor laydown until the new HSRF are constructed. Once construction begins in this area, laydown areas will need to be found outside of Zone 2, perhaps in Zone 6, offsite, or even on previously constructed deck. The existing access to the site will remain available for contractor access.
	i. Vehicle access	Vehicle access to the HSRF location is existing.	Parking and vehicle access is maintained with the proposed design.	Contractor access must maintain existing access to the existing HSRF.	Contractor cannot impede existing operations of the existing HSRF.	N/A		Proposed site plan showing vehicle access in CAD.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track site plan are identified.		Moderately flexible

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Zone Elements	Constructability/ Staging Considerations		Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes		
	Type	Existing								Future	
Zone 3: Amtrak/NJT Transit Off Peak Storage	a. Track Infrastructure	Within Zone 3 there are 29 tracks that can accommodate approx. 12 car storage.	Within Zone 3 there are 27 tracks that can accommodate approx. 12 car storage.	The reconfiguration of the "bowl" tracks is anticipated to align with the Amtrak master plan: the removal of 5 tracks to be replaced with the construction of 4 new tracks. The construction of the overbuild structural elements are assumed to be constructed in tandem with the track reconfiguration, resulting in minimal additional constructability complications above and beyond what is required by Amtrak's master plan.	Construction staging would have to accommodate minimal operational requirements in the yard	All track removals, and final track installation and surfacing would be performed by Amtrak force account.	Zone 3 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process. - Zone 3 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-4 and OU-5 have ongoing remedial action OU-4: Soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Confirmation is needed that the current layout for the bowl tracks conforms to the latest Amtrak Master Plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Not Flexible	The reconfigured bowl tracks will fully occupy Zone 3, so the available footprint is limited: while some reconfiguration may be possible to shift the available footprint for overbuild structures, it is unlikely that the footprint can be increased. It is assumed that overbuild activities will happen in tandem with the construction of the reconfigured bowl tracks.
	b. Catenary	All ladder tracks electrified; wires supported on cross catenary structures (see Attachment 3.6)	New tracks will also be electrified	OCS wires supported on shared multi-pole cross catenary structures spanning the Amtrak HSR facility tracks and the ladder tracks (bowls). Any OCS removal or relocation will affect the adjacent wires and would have to be coordinated with Amtrak. The columns of these existing structures can be up to 60ft tall and support not only OCS wires but traction feeders, signal power cables, cross-track feeders, and switch disconnectors at the top of the poles. Sectionalizing issues to electrically isolate wires.	OCS transfers or relocations would have to be designed to maintain services critical to operations. Each electrified track cannot be de-energized separately due to the lack of sectionalizing switches and section insulators. More detailed analysis and design is required.	Amtrak would need a special agreement with their union to allow contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractors working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will require force account ET protection.	Existing OCS and ancillary cable supported on each structure. Structure erection diagrams for each OCS structure.	To be determined during design development in coordination with TT.	Moderately flexible	- Large cross-catenary structures (which consist of a body span and a head span wire) supporting multiple OCS wires at every span with columns up to 60ft tall. - Most of these structures span on multiple columns across the entire storage yard from the North Runner track all the way to the south of the mainline. Removing one section of the cross catenary will affect the whole structure since the very high mechanical tension of the head span and body span wires require the columns to support these big termination loads using guy anchors and bigger column sections. The existing middle poles are not designed to take these loads. - The location of every OCS wire supported on the cross-catenary structure depends on the other wires supported on the same span and the cross catenary wires will have to be reprofiled. Some cross catenary structures are supporting 20+ OCS wires. - Existing OCS span length 200ft (length between two consecutive OCS wire supports). System height (distance between messenger and contact wire at the supports) variable at every structure. Some of the existing structures have the messenger wire supported at 30ft from top of rail. - Request from Amtrak to allow a min contact wire height of 18 ft. and Max Messenger wire height of 21 ft. Existing contact wire height varies between 18' and 21'. Minimum contact wire needed for the railroad equipment is 15'-5". - Deck height of 26' 9" to allow for auxiliary OCS facilities (cross track feeders, sectionalizing switches, etc.). Existing wires, columns, switches and cross track feeders are currently installed well over this elevation and will have to be relocated carefully staged. Additional and interim supports will be necessary. - 3ft minimum clearance of any structure to OCS wires. - 12 KV feeders from Substation can be underground in duct bank. - Signal power feeders can be underground. - Amtrak will consider alternative means of using deck columns to support OCS cross spans/beams. - Need to identify pairs of tracks that can be shifted to start making room for columns. Or TT needs to look at existing layout and advise areas that would work. - Sectionalizing should be provided so that each track can be de-energized separately.	
	c. Power	Existing duct banks for traction power	New traction power duct banks, cable and conduit runs for new disconnectors, switch heaters.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak force account will perform all traction power work unless special agreement is obtained.	Level of Amtrak protection/construction forces available to perform the work.	To be determined during design development in coordination with TT.	Flexible	Existing and new traction power duct banks, cable and conduit runs carrying feeds for existing and new motor operated disconnectors, switch heaters, CIH and RTU houses, etc. can be designed to work with the location of the future proposed piles.	
	d. Signal	Existing dwarf/mast signals; no signal bridges.	The new signal system will maintain the use of dwarf/mast signals; no signal bridges.	Signal work would be performed in tandem with the track reconfiguration with no significant constructability concerns above and beyond what is required for the track reconfiguration.	There are no operational considerations above and beyond what is required for maintaining operations due to the track reconfiguration	Amtrak would need a special agreement with their union to allow contractor to be able to install signal foundations and run conduit/duct banks as required. All final signal installations and connections will be made by Amtrak force account.	Level of Amtrak protection/construction forces available to perform the work.	To be determined during design development in coordination with TT.	Not Flexible	The location of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the location of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf/mast signals are anticipated to be used which can sit within the 8.5' horizontal clearance. Locating the signal cables and conduits is assumed to be flexible enough to not be in conflict with the overbuild structural elements. The locations of signal cabinets/huts/sheds will be moderately flexible in terms of avoiding conflicts with overbuild structural elements if nearby real estate is available, or possibly above deck.	

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 3: Amtrak/NJT Transit Off Peak Storage	e. Facilities	There are a number of 'sheds' within the zone but the only major facility/building is Q Tower. Amtrak Utility tunnel near Honeywell Street.	No new major facilities are planned for Zone 3.	The reconfigured bowl tracks call for the relocation of Q Tower. This does not present any additional constructability concerns above and beyond what is required for the implementation of the Amtrak Master Plan.	The functionality provided by Q Tower will have to be replaced with a new facility, which will cut into service prior to demolition of the existing facility.	Force account will be required to complete all final signal systems installations.	Zone 3 overlaps with the NYSDEC State Superfund Ste #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 3 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-4 and OU-5 have ongoing remedial action OU-4: Soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Location of the replacement facility for Q Tower.	To be determined; dependent on potential new Q Tower conflicts.	Flexible	The Amtrak Master Plan calls for the relocation of Q Tower, which is the only major facility within Zone 3; need to know if the new location is in conflict with the overbuild structure, and whether the replacement can be incorporated into the overbuild structure. The other facilities in Zone 3 are small sheds and cabinets that are assumed to be relocatable to accommodate overbuild structural elements. Will Amtrak require any special support facilities for maintaining the trains stored in this area in the vehicle access platforms?
	f. Utilities	Sanitary, storm, water, electrical, as well as various utilities servicing the wheel truing and engine repair facility in Zone 4.	Utilities required to service the Amtrak Master Plan.	Utility relocations and protections would happen in tandem with the reconfiguration of the yard tracks and the construction of the overbuild structural elements.	Utilities critical to yard operations must be maintained at all times.	Force account is not required for non railroad system utilities.		Confirmation that the utilities shown in the CAD file SSYExistingUtilities2016.dwg are current, complete, and accurate. Need to know the history/origins of the file.	No	Moderately flexible	Most utilities should be fairly flexible in terms of being able to be relocated. Larger utilities that are gravity driven, such as larger sanitary and storm sewer lines, will be difficult to relocate and will likely require some sort of protection or relief structure in order to support overbuild structural elements.
	g. Subsurface structures	The ESA tunnels.	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required.	Service through the ESA tunnels is expected to be maintained at all times.	N/A		The layout of the existing ESA tunnels and the proposed layout of the future Queens Super Express tunnels, in CAD.	No	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
Zone 3: Amtrak/NJT Transit Off Peak Storage	h. Construction access/laydown	Access to the existing tracks is existing. Possible laydown areas include the area adjacent to the existing HSRF and potential areas in Zones 5 and 6.	Depending on which zones are advanced first, possible laydown areas include Zones 5 and 6 as well as previously constructed deck on adjacent zones. Construction access for work done on inner tracks will have to be coordinated with other ongoing projects to minimize outages to tracks adjacent to work zones.	Access and laydown areas will have to be coordinated with other ongoing projects within the yard. Detailed staging plans will be required to minimize track outages and disruptions to yard operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		N/A	No	Moderately flexible	Laydown areas within Zone 3 are not possible because the zone is fully occupied with rail infrastructure. Laydown area outside of the zone will be highly dependent on what other projects are ongoing within the yard and how they are sequenced. Likely laydown areas include Zone 6, offsite, or previously constructed deck, if available. Access to the outer portions of the work zone will be less complicated than access the inner tracks; access will need to be coordinated with Amtrak during advanced design stages.
	i. Vehicle access	Vehicle access is existing.	The proposed Amtrak Master plan provides for critical vehicle access thorough the yard.	N/A	Vehicle access for construction and yard operations must be maintained at all times.	N/A		N/A	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track site plan are identified.	Moderately flexible	Vehicle access to the yard must be maintained at all times. It may to possible to modify the locations of access roads in the yard to accomodate overbuild structural elements, but such modifications are assumed to be very limited due to the lack of unused real estate within the site.

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 4: Amtrak S&I Facilities and Storage	a. Track Infrastructure	3 tracks for 12 car storage exists, as well as 5 tracks servicing the wheel truing, running repair, and engine house facilities.	3 tracks that service the proposed wheel truing facility and drop table building, as well as 10 new storage tracks.	Construction of the new wheel truing facility and tracks will have to be coordinated with Amtrak to ensure that current operations at the existing facilities are maintained, performed elsewhere, or are replaced by new facilities prior to removing the existing facilities.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Amtrak force account would be required for all final track installations and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 4 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process. - Zone 4 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-4 and OU-5 have ongoing remedial action OU-4: Soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Confirmation that the current layout for the bowl tracks conforms to the latest Amtrak master plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Not Flexible	The reconfigured bowl tracks will fully occupy Zone 5, so the available footprint is limited; while some reconfiguration may be possible to shift the available footprint for overbuild structures, it is unlikely that the footprint itself can be increased. It is assumed that overbuild activities will happen in tandem with the construction of the reconfigured bowl tracks.
	b. Catenary	Tracks accessing the S&I facilities are electrified with wires supported on cross catenary, cantilevers, and portal structures (see Attachments 3.1, 3.2 and 3.6)	S&I tracks plus new tracks	OCS wires supported on shared multi-pole cross catenary structures span the S&I tracks and some of the ladder tracks; some wires are also supported on portal structures. Any OCS removal or relocation will affect the adjacent wires and would have to be coordinated with Amtrak. Sectionalizing issues to electrically isolate wires. Elevation of the structures and feeder cables.	OCS transfers or relocations must be designed to maintain services critical to operations.	Amtrak would need a special agreement with their union to allow the contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractors working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request force account ET protection.		Existing OCS and ancillary cable supported on each structure. Structure erection diagrams for each OCS structure.	To be determined during design development in coordination with TT.	Moderately flexible	<ul style="list-style-type: none"> <li>- Large cross-catenary structures (which consist of a body span and a head span wire) supporting multiple OCS wires at every span with columns up to 60ft tall.</li> <li>- Most of these structures span on multiple columns across the entire storage yard from the North Runner track all the way to the north or even the south of the mainline. Removing one section of the cross catenary will affect the whole structure since the very high mechanical tension of the head span and body span wires require the columns to support these big termination loads using guy anchors and bigger column sections. The existing middle poles are not designed to take these loads.</li> <li>- The location of every OCS wire supported on the cross-catenary structure depends on the other wires supported on the same span. Removing or relocation any OCS wire will affect the other wires on the same span and the cross catenary wires will have to be reprofiled. Some cross catenary structures are supporting 20+ OCS wires.</li> <li>- Existing OCS span length 200ft (length between two consecutive OCS wire supports). System height (distance between messenger and contact wire at the supports) variable at every structure. Some of the existing structures have the messenger wire supported at 30ft from top of rail.</li> <li>- Request from Amtrak to allow a min contact wire height of 18 ft. and Max Messenger wire height of 21 ft. Existing contact wire height varies between 18' and 21'. Minimum contact wire needed for the railroad equipment is 15'-5".</li> <li>- Deck height of 26' 9" to allow for auxiliary OCS facilities (cross track feeders, sectionalizing switches, etc.). Existing wires, columns, switches and cross track feeders are currently installed well over this elevation and will have to be relocated carefully staged. Additional and interim supports will be necessary.</li> <li>- 3ft minimum clearance of any structure to OCS wires.</li> <li>- 12 KV feeders from Substation can be underground in duct bank.</li> <li>- Signal power feeders can be underground.</li> <li>- Amtrak will consider alternative means of using deck columns to support OCS cross spans/beams.</li> <li>- Need to identify pairs of tracks that can be shifted to start making room for columns. Or TT needs to look at existing layout and advise areas that would work.</li> <li>- Sectionalizing should be provided so that each track can be de-energized separately.</li> </ul>
	c. Power	Existing duct banks for traction power. Aerial traction power feeders across the yards installed on top of the existing OCS structures	New traction power duct banks for new disconnectors, switch heaters.	Traction power transfers or relocations must be designed to maintain services critical to operations. More detailed analysis and design is required.	Traction power transfers or relocations must be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak Force account will be required to perform all the traction power work without special agreement with their union.		Level of Amtrak protection/construction forces available to perform the work.	To be determined during design development in coordination with TT.	Flexible	Existing and new traction power duct banks carrying feeds for existing and new motor operated disconnectors, switch heaters, CIH and RTU houses, etc. can be designed to work with the locations of future proposed piles.
	d. Signal	Existing dwarf signals; no signal bridges.	The new signal system will maintain the use of dwarf/mast signals; no signal bridges.	Signal work would be performed in tandem with the track reconfiguration with no significant constructability concerns above and beyond what is required for the track reconfiguration.	There are no operational considerations above and beyond what is required for maintaining operation due to the track reconfiguration	Amtrak would need a special agreement with their union to allow the contractor to install signal foundations and run conduit/duct banks as required. All final signal installations and connections will be made by Amtrak force account.		N/A	To be determined during design development in coordination with TT.	Not Flexible	The location of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the locations of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf/mast signals are anticipated to be used which can sit within the 8.5' horizontal clearance. Locating the signal cables and conduits is assumed to be flexible enough to not be in conflict with the overbuild structural elements. The locations of signal cabinets/huts/sheds will be moderately flexible in terms of avoiding conflicts with overbuild structural elements if nearby real estate is available, or possibly above deck.

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
<b>Zone 4: Amtrak S&amp;I Facilities and Storage</b>	e. Facilities	The wheel truing, running repair, and engine house are existing; there is a small electrical hut. Zone 4 also contains power station and a portion of the commissary building.	Future facilities include a new wheel truing and drop table facility.	Construction of the new wheel truing facility and tracks must be coordinated with Amtrak to ensure that current operations at the existing facilities are maintained, performed elsewhere, or are replaced by new facilities prior to removing the existing facilities.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A	Zone 4 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process. - Zone 4 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6. - OU-4 and OU-5 have ongoing remedial action OU-4: Soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Up-to-date facility layout: it does not appear to match up entirely with the track layout.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Moderately flexible	It is assumed that new facilities will be constructed in tandem with and be incorporated into the overbuild structural elements.
	f. Utilities	Sanitary, storm, water, electrical, as well as various utilities servicing the wheel truing and engine repair facility and the commissary building; there is a power station and electrical hut.	Utilities required to service the Amtrak Master Plan. This design and layout would be advanced in detailed design.	Utility relocations and protections would happen in tandem with the reconfiguration of the yard tracks and the construction of the overbuild structural elements.	Utilities critical to yard operations must be maintained at all times.	Force account is not required for non railroad system utilities.		Confirmation that the utilities shown in the CAD file SSYExistingUtilities2016.dwg are current, complete, and accurate. Need to know the history/origins of the file.	No	Moderately flexible	Most utilities should be fairly flexible in terms of being able to be relocated. Larger utilities that are gravity driven like larger sanitary and storm sewer lines will be difficult to relocate and will likely require some sort of protection or relief structure in order to support overbuild structural elements.
	g. Subsurface structures	The ESA tunnels.	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required.	Service through the ESA tunnels is expected to be maintained at all times.	N/A		The layout of the existing ESA tunnels and the proposed layout of the future Queens Super Express tunnels, in CAD.	No	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Access to the existing tracks is existing. Possible laydown areas include the area adjacent to the existing HSRF and potential areas in Zones 5 and 6.	Depending on which zones are advanced first, possible laydown areas include Zones 5 and 6 as well as previously constructed deck on adjacent zones. Construction access for work done on inner tracks will have to be coordinated with other ongoing projects to minimize outages to tracks adjacent to work zones.	Access and laydown areas will have to be coordinated with other ongoing projects within the yard. Detailed staging plans will be required to minimize track outages and disruptions to yard operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		N/A	No	Moderately flexible	Laydown areas within this zone are not possible as the zone is fully occupied with rail infrastructure. Laydown area outside of the zone will be highly dependent on what other projects are ongoing within the yard and how they are sequenced. Likely laydown areas include Zone 6, offsite, or previously constructed deck, if available. Access will need to be coordinated with Amtrak during advanced design stages.
	i. Vehicle access	Vehicle access is existing.	The proposed Amtrak Master plan provides for critical vehicle access thorough the yard.	N/A	Vehicle access for construction and yard operations must be maintained at all times.	N/A		N/A	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track site plan are identified.	Moderately flexible	Vehicle access to the yard must be maintained at all times. It may be possible to modify the locations of access roads in the yard to accommodate overbuild structural elements, but such modifications are assumed to be very limited due to the lack of unused real estate within the site.

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	Type	Existing	Future								
Zone 5: Amtrak Maintenance Facilities	a. Track Infrastructure	4 stub ended repair tracks	10 tracks serving the maintenance facility; 3 run around/storage tracks.	The area contains certain facilities critical to operations such as the commissary building, a substation, vehicle repair area, and equipment/material storage. The functionality of these elements would need to be relocated and maintained to support normal yard operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Amtrak force account would be required for all final track installation and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 5 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 5 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 and OU-5 have ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	Confirmation that the current layout for the tracks and maintenance facility conforms to the latest Amtrak master plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Not Flexible	Reconfiguration of the tracks is dependent on the maintenance facility layout, which occupies the full width of the zone. Some slight modifications are assumed to be possible within a finite space, which may be helpful in terms of shifting the footprint around to accommodate the overbuild structure but is unlikely to provide additional footprint.
	b. Catenary	No Existing OCS wires over this zone	New future tracks will be electrified	N/A	OCS transfers or relocations must be designed to maintain services critical to operations.	Amtrak would need a special agreement with their union to allow the contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractor working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request Force Account ET Protection.		Layout for the OCS and type of structures proposed in the master plan.	To be determined during design development in coordination with TT.	Flexible	- No electrified tracks in this zone - New design should incorporate the OCS wires to be installed on the deck
	c. Power	OCS cross catenary structures parallel to 39th St. carrying Amtrak signal power	New traction power duct banks for new disconnectors, switch heaters.	N/A	Signal power cable relocations must be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak Force account will be required to perform all the traction power work without special agreement with their union.		Level of Amtrak protection/construction forces available to perform the work.	To be determined during design development in coordination with TT.	Moderately flexible	New duct banks for new disconnectors, switch heaters, CIH and RTU house can be designed to work with the location of the future proposed piles. Existing signal power feeders running aerially parallel to 39th St. bridge will need to be relocated underground. These feeders are running from existing SUB44 to the north and east of Sunnyside Yard limits. The signal power separation between Amtrak and LIRR signal power occurs aerially by 39th St bridge. Relocating these cables underground in new duct bank or micro tunnel would need to be carefully planned and staged in order to save the existing underground obstructions: tunnels A, B/C, D, approach structures, 12kV duct bank.
	d. Signal	Existing dwarf/mast signals; no signal bridges.	The new signal system will maintain the use of dwarf/mast signals; no signal bridges.	Signal work would be performed in tandem with the track reconfiguration with no significant constructability concerns above and beyond what is required for the track reconfiguration.	There are no operational considerations above and beyond what is required for maintaining operations due to the track reconfiguration	The contractor would be able to install signal foundations and run conduit/duct banks as required. All final signal installations and connections will be made by Amtrak force account.		N/A	To be determined during design development in coordination with TT.	Not Flexible	The locations of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the locations of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf signals are anticipated to be used which can sit within the 8.5' horizontal clearance. Locating the signal cables and conduits is assumed to be flexible enough to not be in conflict with the overbuild structural elements. The locations of signal cabinets/huts/sheds will be moderately flexible in terms of avoiding conflicts with overbuild structural elements if nearby real estate is available, or possibly above deck.
	e. Facilities	Commissary, substation, mobile maintenance shed	Conventional repair shop, new commissary building, focus building.	The new commissary building would have to be constructed prior to demolition of the existing facilities. All other elements critical to yard operations would have to be relocated to ensure critical yard operations are maintained.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Force account is not required for new facility construction.		Track configuration and building outline do not match: need confirmation that we are using the latest track alignment and building outline.	To be determined during design development in coordination with TT.	Moderately flexible	It is assumed that the design and construction of the maintenance facility will be integrated into the overbuild structural elements and will be constructed in tandem. The location of the maintenance facility is fixed and occupies the full width of Zone 5, but the other new facilities do seem to have more flexibility regarding their locations, as long as the functionality that is provided in the Amtrak master plan is maintained.
	f. Utilities	Sanitary, storm, water, electrical, as well as various utilities servicing the commissary.	Utilities required to service the Amtrak Master Plan.	Utility relocations and protections would happen in tandem with the reconfiguration of the yard tracks and the construction of the overbuild structural elements.	Utilities critical to yard operations must be maintained at all times.	Force account is not required for non railroad system utilities.		Confirmation that the utilities shown in the CAD file SSYExistingUtilities2016.dwg are current, complete, and accurate. Need to know the history/origins of the file.	No	Moderately flexible	Most utilities should be fairly flexible in terms of being able to be relocated. Larger utilities that are gravity driven, such as larger sanitary and storm sewer lines, will be difficult to relocate and will likely require some sort of protection or relief structure in order to support overbuild structural elements.

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
<b>Zone 5: Amtrak Maintenance Facilities</b>	g. Subsurface structures	The ESA tunnels.	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required.	Service through the ESA tunnels is expected to be maintained at all times.	N/A	<p>Zone 5 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process.</p> <p>- Zone 5 overlaps with OU-4, OU-5, and OU-6</p> <p>- OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6</p> <p>- OU-4 and OU-5 have ongoing remedial action</p> <p>OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF</p> <p>OU-5: Sewer system beneath the site</p> <p>OU-6: Groundwater and soil vapor</p>	The layout of the existing ESA tunnels and the proposed layout of the future Queens Super Express tunnels, in CAD.	No	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Construction access and laydown area can be located in Zone 5 and adjacent Zone 6.	Once the Amtrak Master Plan is implemented, vehicle access will remain but laydown area will no longer be feasible as construction progresses and the final reconfiguration fully utilizes Zone 5. Laydown areas would have to shift to Zone 6, previously constructed deck, or offsite.	Storage areas currently used within Zone 5 by the railroad would have to be relocated.	Contractor access and laydown area would have to be coordinated with Amtrak to ensure there is no conflict with critical yard operations.	N/A		N/A	No	Moderately flexible	Access exists in both the existing and proposed conditions. Construction access and laydown area can likely be located in Zone 5 until the Amtrak master plan is implemented and the final reconfiguration fully utilized Zone 5, in adjacent Zone 6 where there is an area for ESA contractor use, on previously constructed deck, or offsite.
	i. Vehicle access	Vehicle access is existing.	The proposed Amtrak Master plan provides for critical vehicle access thorough the yard.	N/A	Vehicle access for construction and yard operations must be maintained at all times.	N/A		N/A	N/A	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track site plan are identified.	Moderately flexible



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Zone Elements	Constructability/ Staging Considerations		Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes		
	Type	Existing								Future	
Zone 6: Amtrak MoW Yard	a. Track Infrastructure	3 loop tracks at eastern limits of SSY.	MoW yard tracks and private rail car tracks	There are no significant constructability concerns. Coordination with Amtrak is required to ensure the contractor does not interfere with normal yard operations. It is assumed that all track reconfigurations and building construction would happen in tandem with construction of the overbuild structural elements.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Amtrak force account would be required for all final track installation and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 6 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 6 overlaps with OU-4 and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 has ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-6: Groundwater and soil vapor	Confirmation that the current layout for the tracks and facilities conform to the latest Amtrak master plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Not Flexible	Amtrak has stated that there is no flexibility for the relocation of the rail infrastructure elements. The loop tracks are not able to be relocated.
	b. Catenary	No existing OCS.	New future tracks electrified	There are no significant constructability concerns.	OCS transfers or relocations must be designed to maintain services critical to operations.	Amtrak would need a special agreement with their union to allow the contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractor working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request Force Account ET Protection.		Layout for the OCS and type of structures proposed in the master plan.	To be determined during design development in coordination with TT.	Flexible	- No electrified tracks in this zone - New design should incorporate the OCS wires to be installed on the deck
	c. Power	Frequency converter and traction power substation. Underground power cables from existing SUB#44 in 12kV duct bank/micro tunnel (across the track). Aerial Amtrak and LIRR signal power cables on monopoles.	New duct banks for new disconnectors, switch heaters.	Overbuild structural elements may be limited in order to not conflict with the existing or future substation or power ductbanks.	Traction power transfers or relocations must be designed to maintain services critical to operations. More detailed analysis and design is required.	Amtrak Force account will be required to perform all the traction power work without special agreement with their union.		Level of Amtrak protection/construction forces available to perform the work.	To be determined during design development in coordination with TT.	Not Flexible	SUB44 and Static Frequency Converter station are feeding all catenary and signal power systems in the yard: any modification would be critical to operations.
	d. Signal	No existing signals in this area.	The new signal system will use dwarf signals; no signal bridges.	Signal work would be performed in tandem with the track reconfiguration with no significant constructability concerns above and beyond what is required for the track reconfiguration.	There are no operational considerations above and beyond what is required for maintaining operations due to the track reconfiguration	The contractor would be able to install signal foundations and run conduit/duct banks as required. All final signal installations and connections will be made by Amtrak force account. Some labor clearance may be required.		N/A	To be determined during design development in coordination with TT.	Not Flexible	The locations of actual signals will be tied into the track alignment which is not considered to be flexible, so therefore neither are the signal locations. It should be noted that the locations of the signals themselves are not anticipated to be in conflict with overbuild elements as low dwarf signals are anticipated to be used which can sit within the 8.5' horizontal clearance. Locating the signal cables and conduits is assumed to be flexible enough to not be in conflict with the overbuild structural elements. The locations of signal cabinets/huts/sheds will be moderately flexible in terms of avoiding conflicts with overbuild structural elements if nearby real estate is available, or possibly above deck.
	e. Facilities	Substation, storage, ESA contractor area, parking.	Engineering/MoW/ Production shop, security gate.	Existing facilities impacted by construction would need to be relocated in close coordination with Amtrak to maintain critical yard operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		Confirmation that the current layout for the tracks and facilities conform to the latest Amtrak master plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track layout are identified.	Moderately flexible	It is assumed that the design and construction of the maintenance facility will be integrated into the overbuild structural elements, and will be constructed in tandem. The locations of new facilities appear to have some flexibility regarding their locations, as long as the functionality that is provided in the Amtrak master plan is maintained.

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 6: Amtrak MoW Yard	f. Utilities	Sanitary, storm, water, electrical, as well as the substation.	Utilities required to service the Amtrak Master Plan. This design and layout would be advanced in detailed design.	Utility relocations and protections would happen in tandem with the reconfiguration of the yard tracks and the construction of the overbuild structural elements.	Utilities critical to yard operations must be maintained at all times.	Force account is not required for non railroad system utilities.	Zone 6 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process. - Zone 6 overlaps with OU-4 and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 has ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-6: Groundwater and soil vapor	Confirmation that the utilities shown in the CAD file SSYExistingUtilities2016.dwg are current, complete, and accurate. Need to know the history/origins of the file.	No	Moderately flexible	Most utilities should be fairly flexible in terms of being able to be relocated. Larger utilities that are gravity driven, such as larger sanitary and storm sewer lines, will be difficult to relocate and will likely require some sort of protection or relief structure in order to support overbuild structural elements.
	g. Subsurface structures	The ESA tunnels.	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required.	Service through the ESA tunnels is expected to be maintained at all times.	N/A		The layout of the existing ESA tunnels and the proposed layout of the future Queens Super Express tunnels, in CAD.	No	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Currently there is an ESA contractor area being used for laydown.	It is assumed that the ESA contractor area will be available for overbuild and master plan reconfiguration activities.	Existing facilities impacted by construction would need to be relocated in close coordination with Amtrak to maintain critical yard operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		When does ESA contractor area become available?	No	Moderately flexible	Access is available in both the existing and proposed conditions. There appears to be some real estate available within Zone 6 for laydown area or even in Zone 5. Zone 6 contains the ESA contractor use area; if Amtrak master plan and overbuild activities take place after the completion of the ESA project this space is anticipated to be available.
	i. Vehicle access	Vehicle access is existing.	The proposed Amtrak Master plan provides for critical vehicle access thorough the yard.	N/A	N/A	N/A		Final site plan showing access as per the Amtrak Master plan.	This cannot be determined until design of the overbuild structure has been advanced and problems with the proposed track site plan are identified.	Moderately flexible	Vehicle access to the yard must be maintained at all times. It may be possible to modify the locations of access roads in the yard to accommodate overbuild structural elements, but such modifications are assumed to be very limited due to the lack of unused real estate within the site.

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Zone Elements	Constructability/ Staging Considerations		Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes		
	Type	Existing								Future	
Zone 7: Amtrak/LIRR Mainline	a. Track Infrastructure	The Mainline is currently being reconfigured as part of the ESA project.	Final track layout for ESA project.	The final ESA track configuration is anticipated to be completed prior to any overbuild construction over the Mainline. Track outages along the Mainline are extremely difficult to achieve making construction over the Mainline time consuming and extremely challenging.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Amtrak force account would be required for all final track installation and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 7 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 7 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 and OU-5 have ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	The Mainline in this area contains what is likely the busiest rail interlocking in North America. Changes to the track alignments to support the ESA project will be challenging because any small change will likely have a ripple affect requiring changes to adjacent tracks and up and down the line. Track outages will be limited and difficult to get. To the extent possible the overbuild will likely need to accommodate the Mainline track alignments. Once conflicts are identified with the overbuild structure, specific changes to the Mainline can be evaluated.
	b. Catenary	- Mainline (7), crossovers and turnout tracks electrified with OCS wires and/or 3rd Rail - OCS wires supported on portal, cross catenary, or cantilever structures (see Attachments 3.1, 3.2 and 3.6) - Utility bridges (AUC) (see Attachment 3.5) - LIRR HP1/HP2 cable crossing - Signal bridges (see Attachment 3.3) - Signal power monopoles for signal power separation between Amtrak and LIRR (see Attachment 3.4)	New electrified tracks (third rail and OCS), sectionalizing, grounding, bonding, feeder and return cable modifications (East Side Access)	Very limited track outages to relocate wires. Limited space between tracks. Maintain Mainline operations. Tall walls for the decks will be necessary. Aerial feeders and signal power cables running on top of the existing structures (45' to 70' from top of rail). Signal bridges are >30ft tall	OCS transfers or relocations must be designed to maintain services critical to operations.	Amtrak would need a special agreement with their union to allow the contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractor working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request force account ET protection.		OCS layout plans, erection diagrams and profiles.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	OCS wires supported on different types of structures (portals, cross catenary, cantilever, pull-offs) at different elevations. Messenger wire elevations range between 16"-6" at the proximity of the bridges where the overhead clearance is very low to 28'-0" so the structures can be spaced further away. Reducing the height of the catenary wires will require more intermediate supports (OCS structures) with very little real estate available. Very limited track outages to install new structures and to replace and reprofile existing Mainline wires. Operations will be substantially affected. Catenary structures and signal power towers are 45ft and 70ft tall respectively from top of rail. These structures are installed at higher elevation (around 15ft) than the yard structures. Relocate signal bridges will affect operations.
	c. Power	- Existing power substation SUB44. - Power cables from static frequency converter to SUB44 and new GO2 substation in 12k duct bank. - Power cables from SUB44 to the tunnels into Penn Station in 12kV duct bank. - 60Hz – 13.2 kV feeders from the 39th and Skillman AC substation for all the yard power that runs along the yard run track to Honeywell Ave. - Aerial traction power and signal power cables supported on OCS structures and monopoles - Existing traction power duct banks for snowmelters, disconnectors - 3rd rail	Final track layout for ESA project.	Very limited track outages necessary to relocate power cables installed in large duct banks and micro tunnels (across the tracks). Limited space between tracks. Maintain Mainline operations.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	N/A		Layout plans	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	SUB44 and Static Frequency Converter station are feeding all catenary and signal power systems in the yard and any modification would be critical to operations. Signal power (Amtrak and LIRR) running aerially on tall monopoles will need to be relocated underground. They run aerially from existing SUB44 to the north and east of Sunnyside Yard limits. The signal power separation between Amtrak and LIRR signal power occurs aerially by 39th St bridge. Relocating these cables underground in new duct bank or micro tunnel would need to be carefully planned and staged in order to save the existing underground obstructions: tunnels A, B/C, D, approach structures, 12kV duct bank. Very limited outages and critical to operation. SUB44 is obsolete and there is a need to replace it together with the power cables from Substation 44 to Penn Station (43). There are real estate constraints to relocating this substation in Sunnyside Yard. 12kV power cables running in the tunnel from Penn Station to SUB44 and the Static Frequency Converter Station installed in large duct banks and micro tunnels running south to the Mainline may affect the construction of new piers. Relocating these duct banks would drastically affect operations. Overbuild elements will need to be designed around the existing conditions. Difficult to reconfigure the footprint available for overbuild elements.
	d. Signal	Signal Bridges, dwarf signals, mast signals	Signal Bridges, dwarf signals, mast signals	Replacement of the signal bridges is challenging: requires significant track outages while new signal bridges are brought on line prior to removing existing signal bridges; line of sight to old and new bridges must be maintained.	There are no operational consideration above and beyond what is described in the constructability/staging column.	The contractor would be able to install some signal foundations and duct banks as required. All final cable trough, signal installations, and connections will be made by Amtrak force account. Some labor clearance may be required.		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	The signal system along the Mainline utilizes signal bridges that cross the entire Mainline. The use of low dwarf signals will be prohibited for most routes. Relocating the signals to the underside of the deck or a new lower portal structure presents a number of challenges as the new signals would need to be constructed and tested prior to removal of the existing signals, which would potentially result in line of sight conflicts to the new or old signals.

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	Zone Elements			Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes
	Type	Existing	Future								
Zone 7: Amtrak/LIRR Mainline	e. Facilities	F Tower, Substation SUB44, old signal room, paralleling station	Final facility layout as designed and constructed by the ESA project. The final site plan for all rail infrastructure is unknown.	Modifications to the newly reconfigured and constructed Mainline will be challenging: required track outages of the extremely busy Mainline are difficult to achieve.	There are no operational consideration above and beyond what is described in the constructability/staging column.	N/A	Zone 7 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 7 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 and OU-5 have ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	Proposed new facilities that are being constructed as part of the ESA project are currently unknown; while it is assumed that relocation of the new or existing facilities is unlikely, the possibility can be explored on a facility by facility basis as design of the overbuild is advanced. The relocation of certain facility functions above deck will be explored.
	f. Utilities	Pile supported storm sewer, sanitary sewer, electrical, air lines, lighting	Future existing conditions after the ESA project is complete are unknown.	N/A	N/A	N/A		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Moderately flexible	Modifications to the non-railroad system utilities may be possible. Changes to utilities that do not require track outages will be significantly easier to achieve.
	g. Subsurface structures	The ESA tunnels	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required, or it may be necessary to avoid locating structural elements above the tunnels altogether.	Construction activities that take place in close proximity to the tunnels may potentially require short term outages of the tunnels.	N/A		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Virtually nonexistent	Virtually nonexistent	Laydown and staging areas will be required to be off site.	N/A	N/A		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	A laydown area the size required to support overbuild construction activities within Zone 7 is unlikely. Laydown areas will be required offsite. Access for construction equipment will likely require the use hirail equipment.
	i. Vehicle access	Access exists to the perimeter of the site with hirail access required to points within the Mainline.	Access exists to the perimeter of the site with hirail access required to points within the Mainline.	Getting hirail access to various points within the yard will require short term use of the Mainline tracks, requiring close coordination with Amtrak and LIRR in order to maintain operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Hirail equipment driven on main line tracks would potentially require force account support in the form of a pilot or work gang and foreman.		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	It is likely that access to the site require the use of hirail equipment; other site access modifications are unlikely.

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	Zone Elements		Constructability/ Staging Considerations	Operational Considerations	Force Account Considerations	Environmental Considerations	Unknowns	Change to Amtrak Master Plan (Yes/No)	Assessed Flexibility Ranking	Notes	
	Type	Existing									Future
Zone 8: Loop Tracks	a. Track Infrastructure	Tracks diverge from the Mainline to provide access to the car wash facility and the loop tracks.	Tracks diverge from the Mainline to provide access to a new car wash facility and the loop tracks.	Reconfiguration of the loop tracks will be difficult as they are in near constant use.	The loop tracks are critical elements of the yard operations and are in near constant use. Any track outages along the loop tracks would have significant impacts to yard operations.	Force account would be required for all final track installation and surfacing. Contractor would be able to perform a bulk of the civil/track bed work.	Zone 8 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCEDC, containing the results of remedial investigations and the remedial method selection process. - Zone 8 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 and OU-5 have ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	The final future conditions of the ESA project.	Potential modifications to the car wash tracks.	Not Flexible	It will be extremely difficult to reconfigure the loop tracks because they are in near constant use, and are adjacent to the ESA tunnel loop track. Tracks not associated with the loop tracks (siding tracks, carwash tracks) will have more flexibility.
	b. Catenary	- 3 loop tracks electrified; Loop1A track to be electrified (East Side Access). - OCS cross catenary, portal and cantilever structures supporting the OCS wires (see Attachments 3.1, 3.2 and 3.6). - Signal bridges (see Attachment 3.3)	Final track layout for ESA project.	Very limited track outages necessary to relocate wires. Limited space between tracks. Maintain Mainline operations. Tall walls for the decks will be necessary Aerial feeders and signal power cables running on top of the existing structures (30' to 70' height). Signal bridges are >30ft tall	OCS transfers or relocations must be designed to maintain services critical to operations.	Amtrak would need a special agreement with their union to allow the contractor to install OCS structures and steel parts. All final wiring installations and connections will be made by Amtrak force account. Contractor working within 15ft, or with the potential to be within 15ft, of any OCS or ancillary wire will request Force Account ET Protection.		OCS layout plans, erection diagrams and profiles (The final future conditions of the ESA project).	No. The Amtrak master plan does not impact the loop tracks.	Moderately flexible	OCS wires are supported on different types of structures (portals, cross catenary, cantilever, pull offs) at different elevations. Messenger wire elevations range between 16"-6" in the proximity of the bridges, where the overhead clearance is very low (28'-0") so the structures can be spaced further away. Catenary structures and signal power towers are 45ft and 70ft tall, respectively, from top of rail. Reducing the height of the catenary wires will require additional intermediate supports (OCS structures). Limited track outages will be required to install new structures and to replace and reprofile existing loop track wires, which will affect operations. Relocation of signal bridges will affect yard operations.
	c. Power	- LIRR HP3/HP4 cable crossings - Signal power monopoles - Power cables from SUB44 to the tunnels into Penn Station in 12kV duct bank - New G02 substation and power cables installed in duct bank and micro tunnels across the tracks. - 3rd rail	Final track layout for ESA project.	Very limited track outages necessary to relocate power cables installed in large duct banks and micro tunnels (across the tracks). Limited space between tracks. Maintain Mainline operations.	Traction power transfers or relocations would have to be designed to maintain services critical to operations. More detailed analysis and design is required.	N/A		The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the loop tracks.	Not Flexible	Modification of the new G02 substation would be critical to operations. Relocating existing duct banks and micro tunnel would require limited outages and affect operations. Overbuild elements will need to be designed around the existing conditions. Difficult to reconfigure the footprint available for overbuild elements.
	d. Signal	Signal bridges, dwarf signals, and mast signals.	Signal bridges, dwarf signals, and mast signals.	Replacement of the signal bridges is challenging: requires significant track outages while new signal bridges are brought on line prior to removing existing signal bridges; line of sight to old and new bridges must be maintained.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Contractor would be able to install some signal foundations and duct banks as required. All final cable trough, signal installations, and connections will be made by Amtrak force account. Some labor clearance may be required.		The final future conditions of the ESA project.	No	Not Flexible	The signal system in Zone 8 is assumed to utilize both low dwarf signals and signal bridges. The use of low dwarf signals to replace the signal bridges is expected to be prohibited by Amtrak. Relocating the signals to the underside of the deck or a new lower portal structure presents a number of challenges as the new signals would need to be constructed and tested prior to removal of the existing signals, which would potentially result in line of sight conflicts to the new or old signals.
	e. Facilities	Car Wash, Substation, unknown buildings	New Car Wash, Substation, unknown buildings	The functionality of all facility operations within Zone 8 must be maintained. Close coordination with Amtrak and LIRR will be required to fully understand these constraints.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		The final future conditions of the ESA project.	Potentially to the car wash if the facility was constructed with overbuild elements integrated into the building.	Not Flexible	Proposed new facilities that are being constructed as part of the ESA project are currently unknown; while it is assumed that relocation of the new or existing facilities is unlikely, the possibility can be explored on a facility by facility basis as design of the overbuild is advanced. The relocation of certain facility functions above deck will be explored. It is assumed that the new car wash building will be integrated with overbuild structural elements.
	f. Utilities	Pile supported storm sewer, sanitary sewer, electrical, air lines, lighting	Future existing conditions after the ESA project is complete are unknown.	Potential relocation/protection of utilities to accommodate overbuild structural elements.	There are no operational considerations above and beyond what is described in the constructability/staging column.	N/A		The final future conditions of the ESA project.	No	Moderately flexible	Modifications to the non railroad system utilities may be possible. Changes to utilities that don't require track outages will be significantly easier to achieve.

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	Type	Existing	Future								
Zone 8: Loop Tracks	g. Subsurface structures	The ESA tunnels	ESA tunnels as well as the future, not to be precluded, Queens Super Express tunnels.	Overbuild structural elements may be limited in order to not conflict with the existing or future tunnels. A relief structure may be required, or it may be necessary to avoid locating structural elements above the tunnels altogether.	Construction activities that take place in close proximity to the tunnels may potentially require short term outages of the tunnels.	N/A	Zone 8 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operable Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCDEC, containing the results of remedial investigations and the remedial method selection process. - Zone 8 overlaps with OU-4, OU-5, and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6	The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	Relocation of existing tunnels will not be possible. The use of possible relief structures should be explored.
	h. Construction access/laydown	Some areas are potentially available for laydown.	Some areas are potentially available for laydown.	Depending on the size of laydown areas required, laydown and staging areas may be required to be off site or on previously constructed deck.	N/A	N/A	OU-4 and OU-5 have ongoing remedial action OU-4: soil above groundwater throughout the site excepting the areas under and around the HSRF OU-5: Sewer system beneath the site OU-6: Groundwater and soil vapor	The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible	A laydown area the size required to support overbuild construction activities within Zone 8 is unlikely. Laydown areas will be required offsite. Access for construction equipment will likely require the use hirail equipment.
	i. Vehicle access	Access exists to the perimeter of the site with hirail access required to points within the Mainline.	Access exists to the perimeter of the site with hirail access required to points within the Mainline.	Getting hirail access to various points within the yard will require short term use of the Mainline tracks, requiring close coordination with Amtrak and LIRR in order to maintain operations.	There are no operational considerations above and beyond what is described in the constructability/staging column.	Hirail equipment driven on main line tracks would potentially require force account support in the form of a pilot or work gang and foreman.			The final future conditions of the ESA project.	No. The Amtrak master plan does not impact the Mainline.	Not Flexible
Zone 9: GM Facility	GM Facility	GM Service Facility	GM Service Facility	If this property were acquired it could provide additional contractor laydown area from which to stage the deck construction.	If the property is not acquired construction activities would need to be coordinated with the property owner to ensure operations at the facility are maintained	N/A	Part of Zone 9 overlaps with the NYSDEC State Superfund Site #241006. The site was divided into six "Operational Units" (OU-#) each of which received its own Record of Decision (ROD) from NYCDEC, containing the results of remedial investigations and the remedial method selection process. - Part of Zone 9 overlaps with OU-4 and OU-6 - OU-6 has undergone remedial measures and there is no currently required further action, although there is an environmental easement associated with OU-6 - OU-4 has ongoing remedial action OU-4: Soil above groundwater throughout the site except the areas under and around the HSRF OU-6: Groundwater and soil vapor	N/A	No	Not Flexible	Coordination with the property owner may improved the flexibility status.

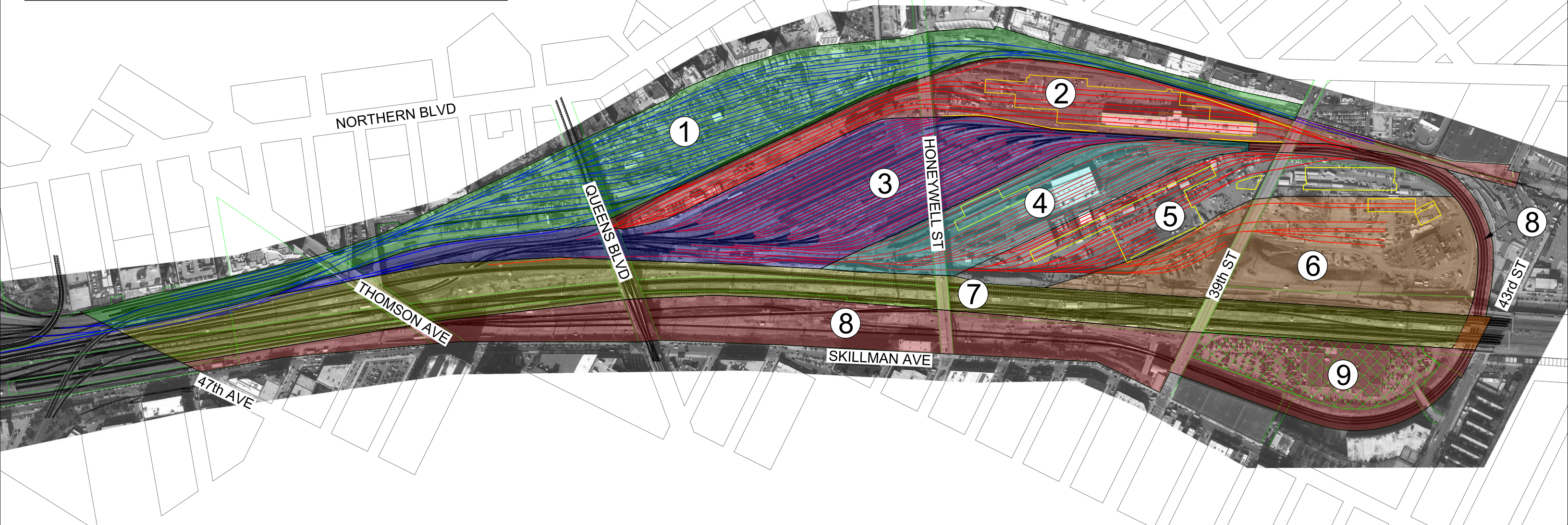
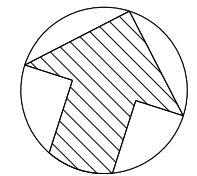
# **APPENDIX A.1.1**

## **Yard Zone Map**

**LEGEND:**

- NEW LIRR MID-DAY STORAGE YARD TRACKS
- NEW AMTRAK MASTER PLAN TRACKS
- NEW AMTRAK MASTER PLAN FACILITIES
- EXISTING TRACKS TO REMAIN

**ZONES**



- ① LIRR STORAGE YARD
- ② AMTRAK HSR FACILITY
- ③ AMTRAK/NJ TRANSIT OFF PEAK STORAGE
- ④ AMTRAK S&I FACILITIES AND STORAGE
- ⑤ AMTRAK MAINTENANCE FACILITIES

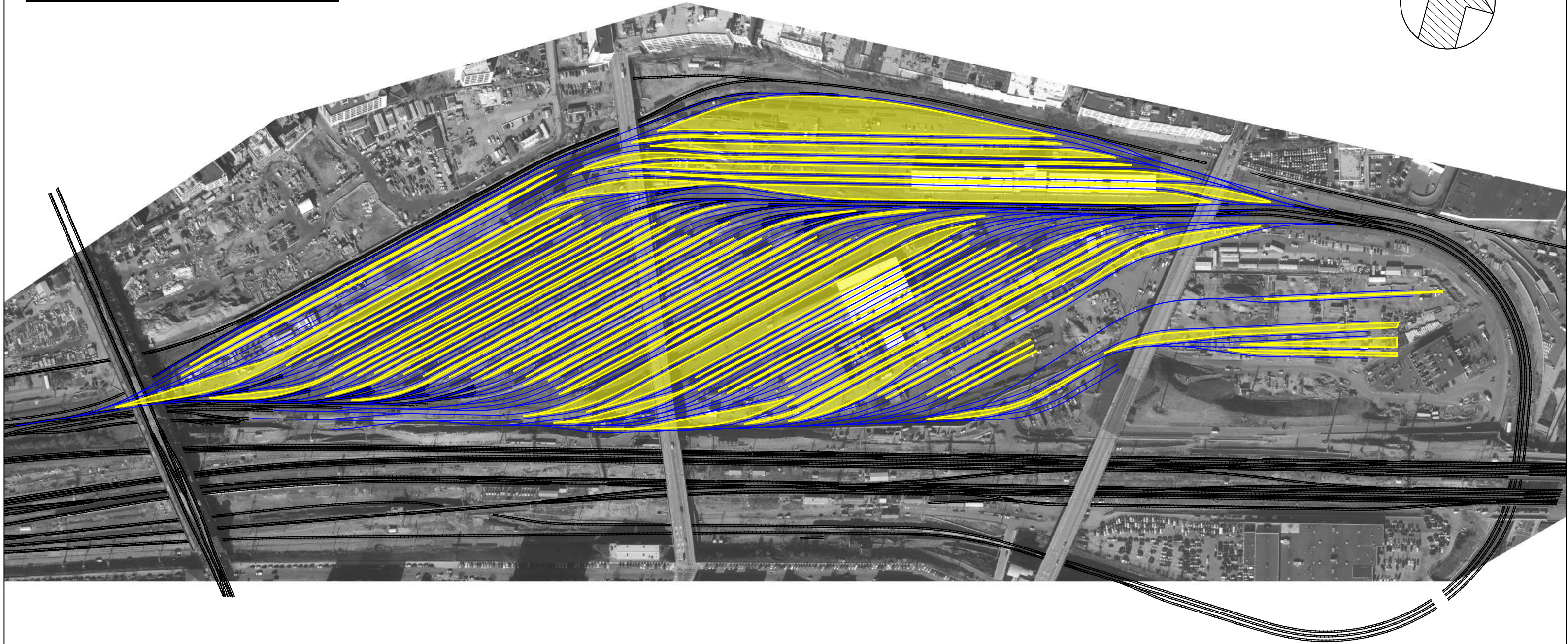
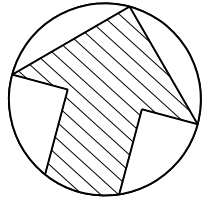
- ⑥ AMTRAK MoW YARD
- ⑦ AMTRAK/LIRR MAINLINE
- ⑧ LOOP TRACKS
- ⑨ GM PROPERTY



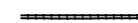


## **APPENDIX A.1.2**

### **8.5' Minimum Track Clearance Footprint**

# CLEARANCE FOOTPRINT



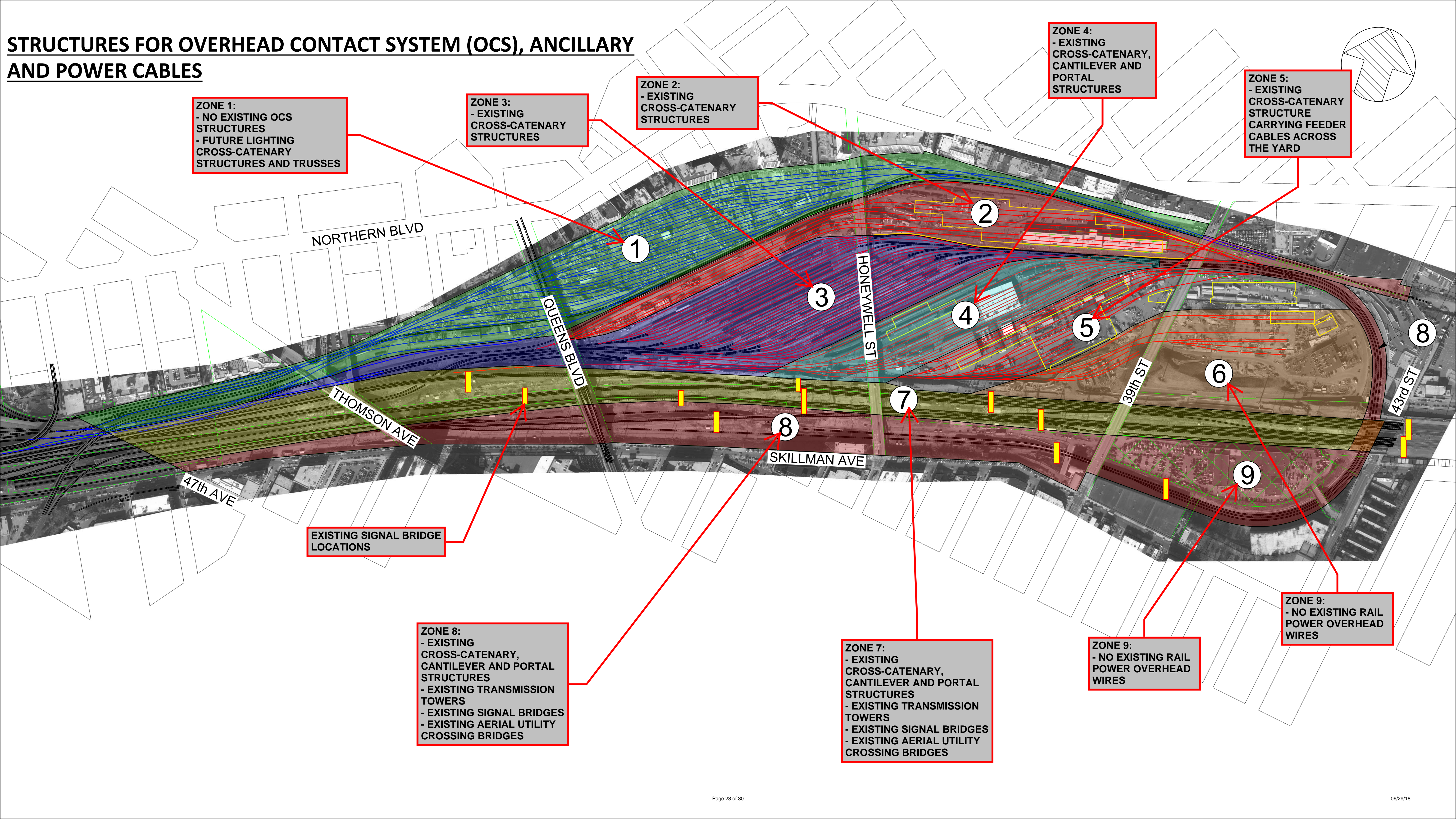
## LEGEND:

-  EXISTING TRACK
-  PROPOSED TRACK – AMTRAK MASTER PLAN
-  8.5' TRACK CLEARANCE FOOTPRINT

## **APPENDIX A.1.3**

# Structures for Overhead OCS, Ancillary and Power Cables

# STRUCTURES FOR OVERHEAD CONTACT SYSTEM (OCS), ANCILLARY AND POWER CABLES



**ZONE 1:**  
 - NO EXISTING OCS STRUCTURES  
 - FUTURE LIGHTING CROSS-CATENARY STRUCTURES AND TRUSSES

**ZONE 3:**  
 - EXISTING CROSS-CATENARY STRUCTURES

**ZONE 2:**  
 - EXISTING CROSS-CATENARY STRUCTURES

**ZONE 4:**  
 - EXISTING CROSS-CATENARY, CANTILEVER AND PORTAL STRUCTURES

**ZONE 5:**  
 - EXISTING CROSS-CATENARY STRUCTURE CARRYING FEEDER CABLES ACROSS THE YARD

**EXISTING SIGNAL BRIDGE LOCATIONS**

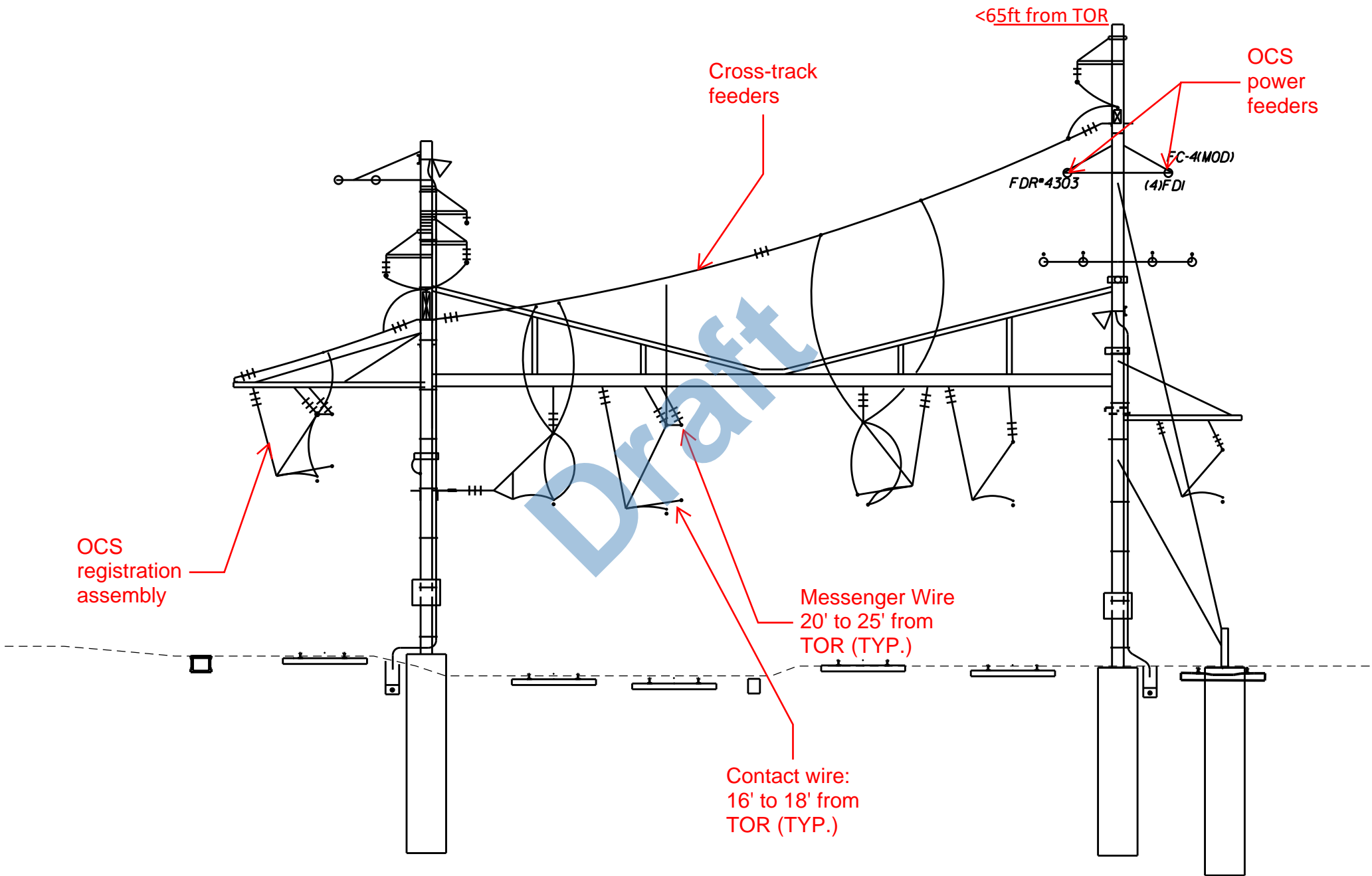
**ZONE 8:**  
 - EXISTING CROSS-CATENARY, CANTILEVER AND PORTAL STRUCTURES  
 - EXISTING TRANSMISSION TOWERS  
 - EXISTING SIGNAL BRIDGES  
 - EXISTING AERIAL UTILITY CROSSING BRIDGES

**ZONE 7:**  
 - EXISTING CROSS-CATENARY, CANTILEVER AND PORTAL STRUCTURES  
 - EXISTING TRANSMISSION TOWERS  
 - EXISTING SIGNAL BRIDGES  
 - EXISTING AERIAL UTILITY CROSSING BRIDGES

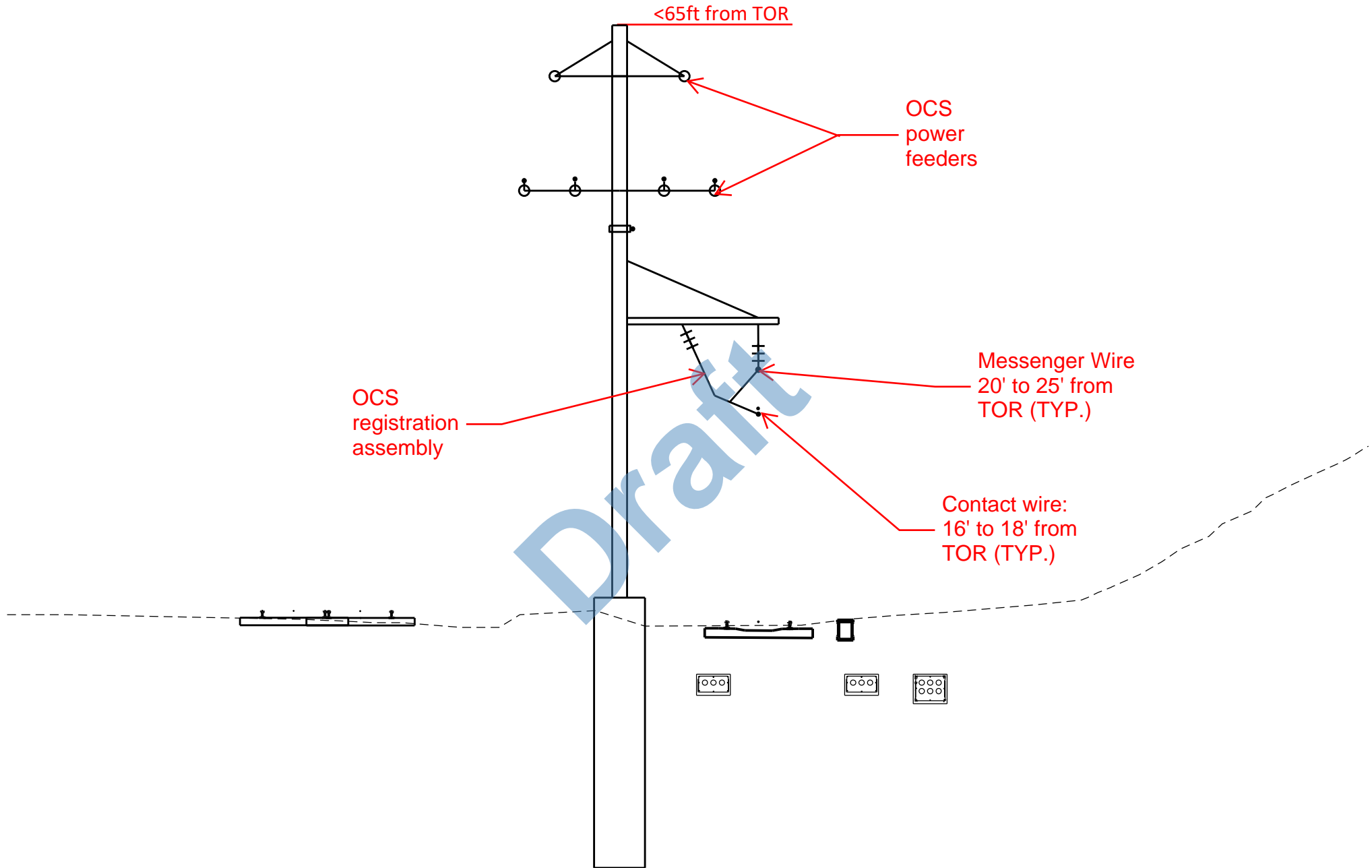
**ZONE 9:**  
 - NO EXISTING RAIL POWER OVERHEAD WIRES

**ZONE 9:**  
 - NO EXISTING RAIL POWER OVERHEAD WIRES

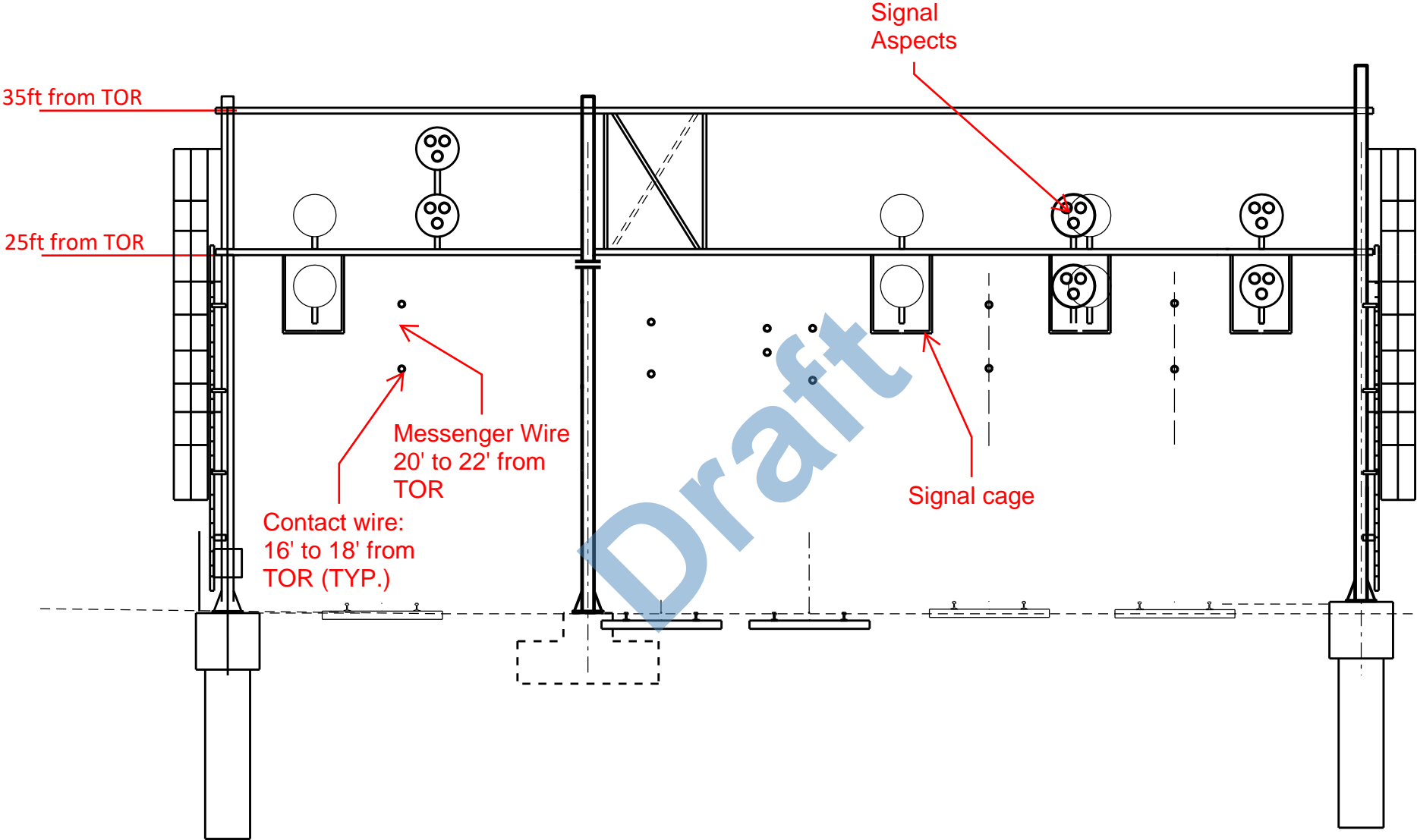
**A.1.3.1 - OCS PORTAL (K-FRAME) STRUCTURE (TYP)**



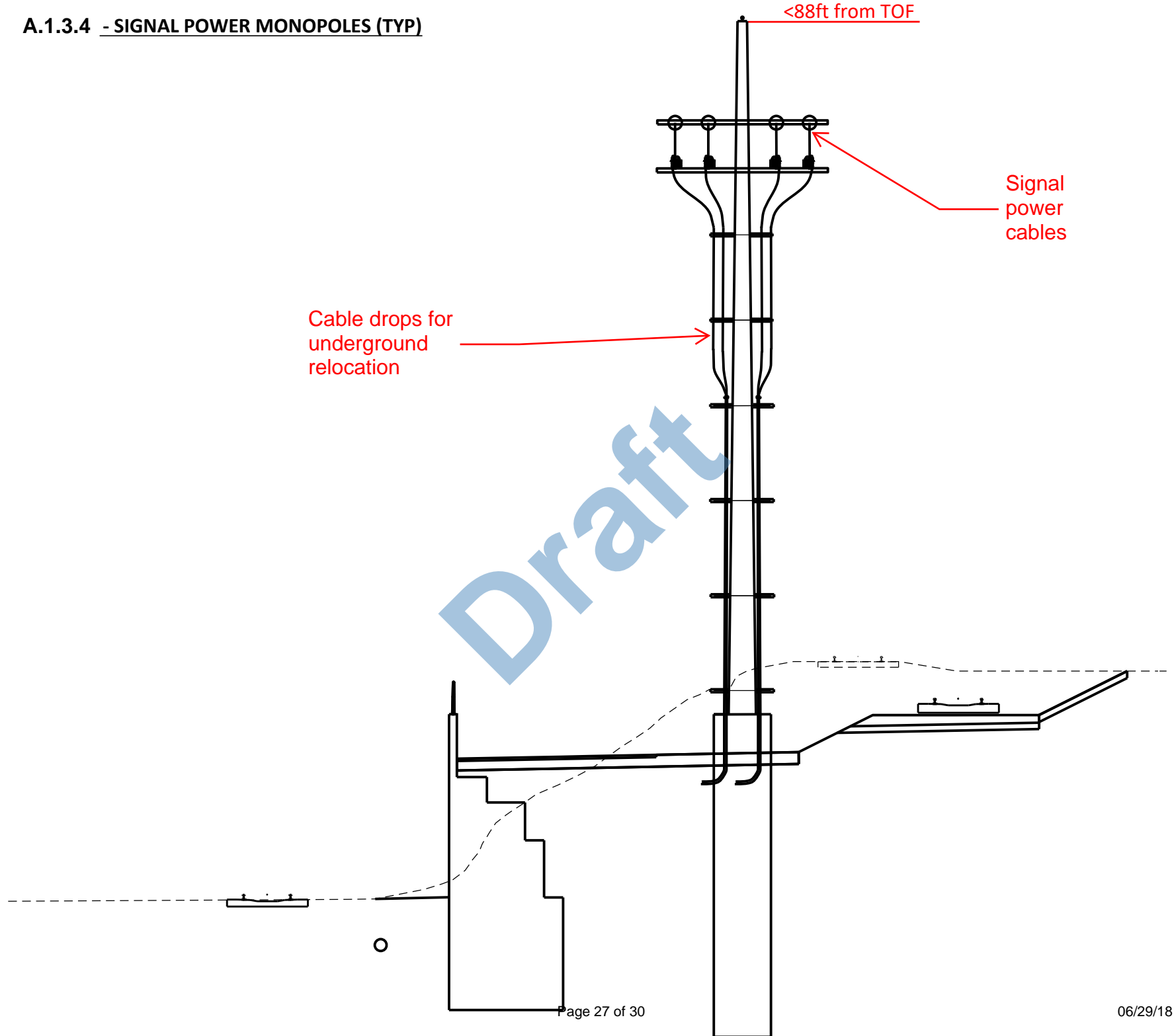
**A.1.3.2 - OCS CANTILEVER STRUCTURE (TYP)**



A.1.3.3 - SIGNAL BRIDGE (TYP)



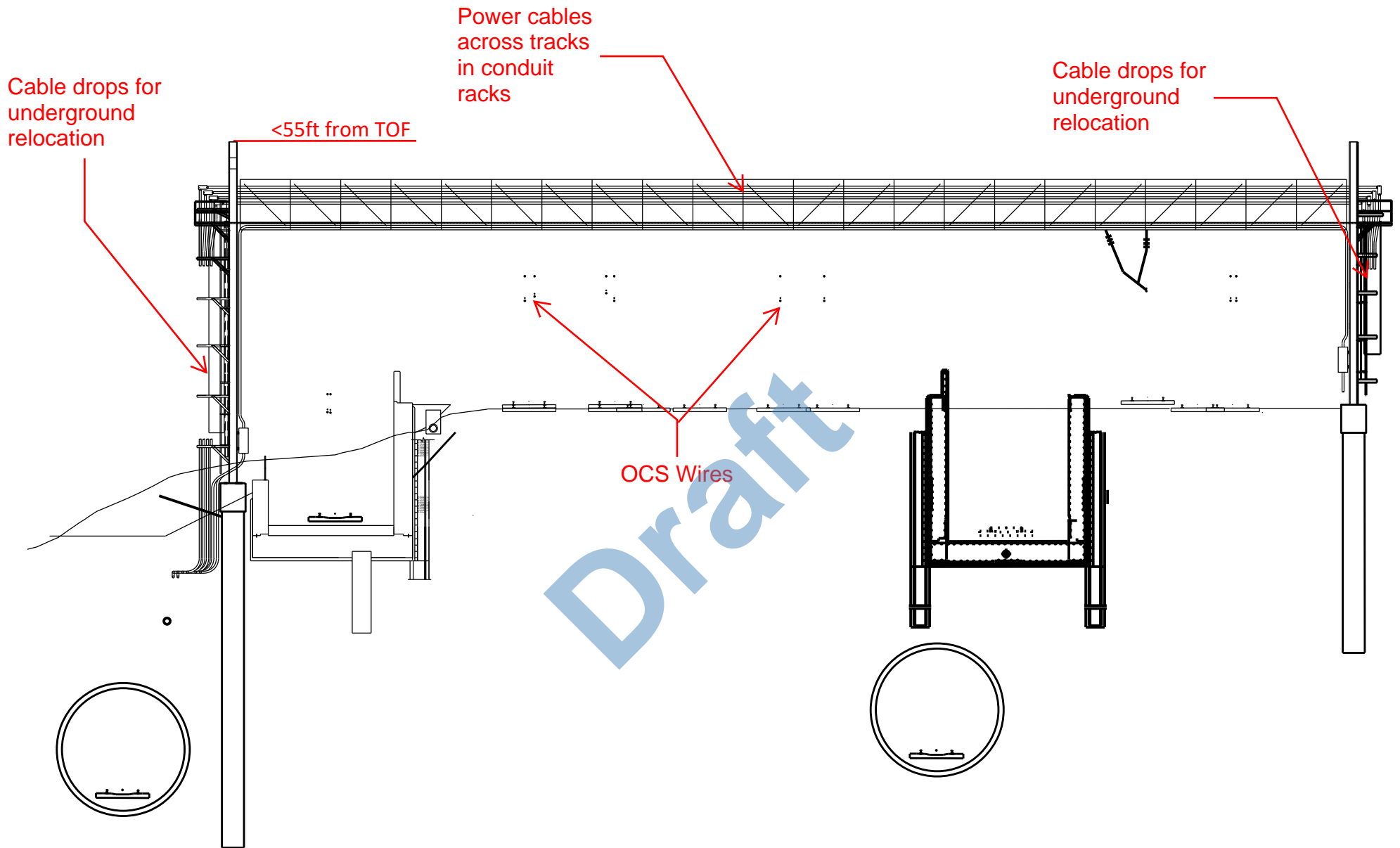
A.1.3.4 - SIGNAL POWER MONOPOLES (TYP)



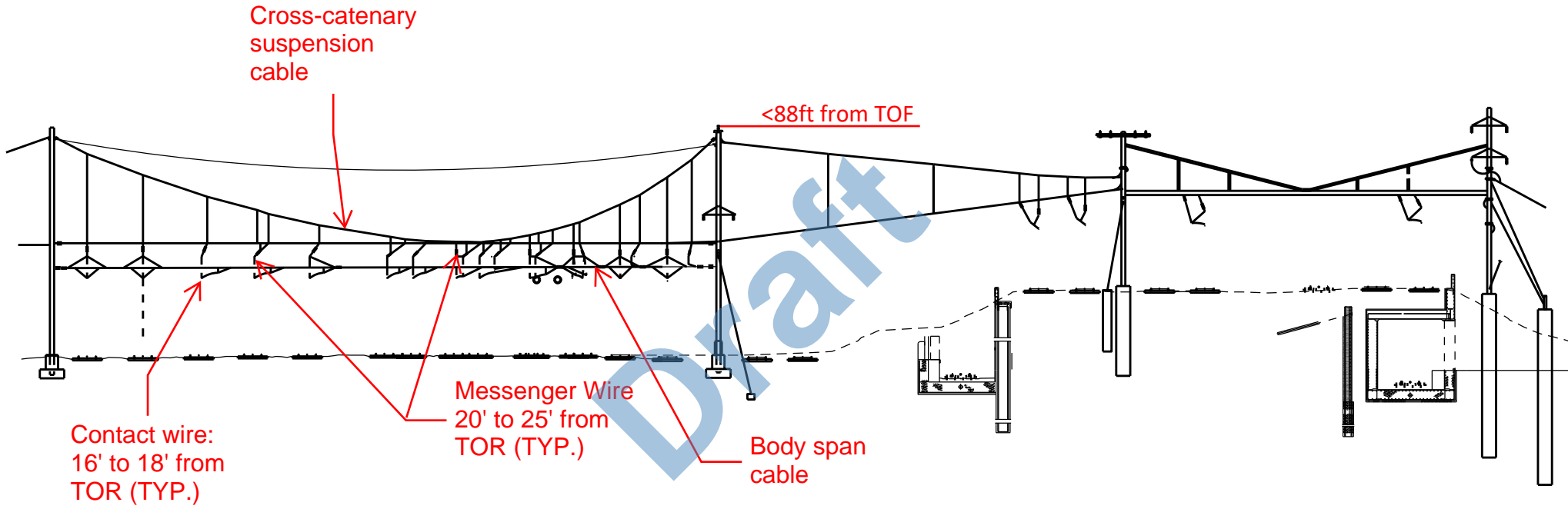
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**A.1.3.5 -AERIAL UTILITY CROSSING BRIDGE**



**A.1.3.6 - CROSS CATENARY STRUCTURE**



**A.1.3.7 - YARD CROSS-CATENARY LIGHTING STRUCTURE CATENARY STRUCTURE**

