

**APPENDIX E:
CONSTRUCTION STAGING AND
MOT PLANS**

Appendix E CONSTRUCTION STAGING AND MOT PLANS

Summary of Unit Durations

UNIT 1 - TYPICAL CROSSROAD BRIDGE - DEMOLISH WITHOUT REPLACEMENT

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
1. SUPERSTRUCTURE DEMOLITION				
Detour Existing Cross Road	Close bridge & re-route traffic	Miscellaneous Reroute traffic (add 4 days if 1st item)		4
General Preliminaries	Remove miscellaneous bridge appurtenances: signs, pedestrian barriers, bridge lighting, disconnect & remove utilities		Assume that any I-75 major utility crossings affected by the bridge have been previously relocated	3
Demolish Existing Bridge Superstructure	Demolish existing deck (assume I-75 traffic can be maintained)	Bridge Repair Deck removal = 235 m ² /day assume typical deck = 25 m x 80 m = 2,000 m ² /235 m ² = 9 days		9
	Remove existing steel girders & bearings (off-peak closures)		Assume week-end work (completed over one week-end)	0
2. SUBSTRUCTURE - DEMOLISH EXISTING PIER & ABUTMENT (ONE SIDE OF I-75)				
I-75 Temporary lane-closure for outer-pier demolition	Close I-75 right-hand lane & shoulder to demolish existing pier	Miscellaneous Set-up traffic control = 1 day		1
Demolish existing Abutment Seat	Demolish existing abutment-seat (assume, one crew only)		Assume average 4 days/unit to demolish one abutment & wing-walls	4
Demolish Existing Outside Pier	Remove pier columns down to footing		Assume 2 days	2
	Remove N J barrier & pavement to sub-grade	Structures: Excavation for Substructure (Footings) = 1 unit/day		1
Restore outside lane & shoulder	Miscellaneous work: patch concrete shoulder, install temporary barrier	Surfacing Concrete curing minimum 7 calendar days	Assume 2 days for miscellaneous patching & 7 days curing but include weekend, say 7 days total	7
3. SUBSTRUCTURE - DEMOLISH EXISTING PIER & ABUTMENT (SECOND SIDE OF I-75)				
Repeat for Pier & Abutment on opposite side, I-75	Repeat steps from previous abutment/pier		Assume demolition crew moves from 1st side after demolition of pier footing Time required 2nd side = (4+2+1) demolition + 7 days=14 days; 6 additional	6
4. SUBSTRUCTURE - DEMOLISH CENTER PIER				
I-75 Temporary lane-closure for center-pier demolition	Close I-75 left-hand lane & shoulder (both sides) to demolish center pier	Miscellaneous Set-up traffic control = 1 day		1
Demolish Existing Center Pier	Remove pier columns & median N J barrier		Assume 2 days	2
Install N J barrier	Replace N J barrier along center-pier section	Miscellaneous: Concrete median barrier 300 m/day (7 calendar days curing)	5 Work Days	5
5. OPEN TO TRAFFIC				
Remove Traffic Control	Open I-75 to full traffic (4-lanes)	Miscellaneous Remove traffic control = 1 day		1

TOTAL WORKING DAYS	46	Days
Assume average 19 working days/month	2.4	Months

NOTES:

1. Assumes only one work-crew per relevant activity.
2. Assumes that the I-75 freeway shoulders will be restored after bridge demolition.
3. Work associated with roadway removal at bridge approaches is included in the duration of this work.

UNIT 2 - TYPICAL CROSSROAD BRIDGE - DEMOLISH & CONSTRUCT NEW BRIDGE AT SAME LOCATION

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
1. SUPERSTRUCTURE DEMOLITION				
Detour Existing Cross Road	Close bridge & re-route traffic	Miscellaneous Reroute traffic (add 4 days if 1st item)		4
General Preliminaries	Remove miscellaneous bridge appurtenances: signs, pedestrian barriers, bridge lighting, disconnect & remove utilities		Assume that any I-75 major utility crossings affected by the bridge have been previously relocated	3
Demolish Existing Bridge Superstructure	Demolish existing deck (assume I-75 traffic can be maintained)	Bridge Repair Deck removal = 235 m ² /day assume typical deck = 25 m x 80 m = 2,000 m ² /235 m ² = 9 days		9
	Remove existing steel girders & bearings (off-peak closures)		Assume week-end work (completed over one week-end)	0
2. SUBSTRUCTURE - DEMOLISH EXISTING PIER & ABUTMENT & CONSTRUCT NEW ABUTMENT (ONE SIDE OF I-75)				
I-75 Temporary lane-closure for outer-pier demolition	Close I-75 right-hand lane & shoulder to demolish existing pier	Miscellaneous Set-up traffic control = 1 day		1
Demolish existing Abutment Seat	Demolish existing abutment-seat (assume, one crew only)		Assume average 4 days/unit to demolish one abutment & wing-walls	4
Demolish Existing Outside Pier	Remove pier columns down to footing		Assume 2 days	2
	Remove N J barrier & pavement to sub-grade to expose footing & grade-beam	Structures: Excavation for Substructure (Footings) = 1 unit/day		1
Construct New Piled Abutment	Shallow sheeting to level-off for piling-rig platform	Structures: Sheeting (shallow) = 30 m/day	Assume 30 m length	1
	Install reinforced-concrete drilled-shafts for new abutment	Structures: Piles (12 m) = 15 piles/day or 1 unit	1 day + 7 days curing + 1 day integrity testing	9
Construct Abutment-seat, install bearings			Assume 5 days for r.f. & casting	12
			2 days set & grout bearings 5 work days curing	
Restore outside lane & shoulder	Miscellaneous work: patch concrete shoulder, install temporary barrier	Surfacing Concrete curing minimum 7 days	Assume this work coincides with abutment construction = 0 days	0
3. SUBSTRUCTURE - DEMOLISH EXISTING PIER & ABUTMENT & CONSTRUCT NEW ABUTMENT (SECOND SIDE OF I-75)				
I-75 lane-closure, demolish existing Abutment-seat & Pier	Set-up traffic control, demolish existing abutment-seat & pier		Assume coincidental with Item 1 above starting after the demolition of the abutment and pier from the first side is complete. Assume 7 additional days.	7
	Shallow sheeting to level-off for piling-rig platform	Structures: Sheeting (shallow) = 30 m/day		
Construct New Piled Abutment	Install drilled-shafts for new abutment	Structures: Piles (12 m) = 15 piles/day or 1 unit		
	Construct Abutment-seat, install bearings			
Restore outside lane & shoulder	Miscellaneous work: patch concrete shoulder, install temporary barrier	Surfacing Concrete curing minimum 7 days	Assume this work coincides with pier construction = 0 days	0
4. SUBSTRUCTURE - DEMOLISH CENTER PIER & CONSTRUCT NEW PIER IN SAME LOCATION				
I-75 Temporary lane-closure for center-pier demolition	Close I-75 left-hand lane & shoulder (both sides) to demolish center pier	Miscellaneous Set-up traffic control = 1 day	Assume coincidental with Items 2 & 3 above	0
Demolish Existing Center Pier	Demolish & remove pier columns & median N J barrier		Assume 2 days	3
	Excavate to new footing width		Assume 4 days	4
Construct Center Pier	Demolish & remove existing footing		Assume 4 days	4
	Cut-back existing ground-beams to width of proposed pile-cap			
Install reinforced-concrete drilled-shafts for new center-pier		Structures: Piles (12 m) = 15 piles/day or 1 unit	1 day + 7 days curing + 1 day integrity testing	9
	Construct reinforced-concrete Columns		Assume 7 days for r.f. casting & curing	7
Construct Pier-cap, install bearings			Assume 9 days for r.f. casting & curing	11
			2 days set & grout bearings	
Restore median shoulder	Miscellaneous work: patch concrete shoulder, install temporary barrier	Surfacing Concrete curing minimum 7 days	Assume this work coincides with pier construction = 0 days	0
5. SUPERSTRUCTURE - CONSTRUCT DECK & FITTINGS - OPEN TO TRAFFIC				
Erect Superstructure	Erect Main Girders (off-peak closures)		Assume week-end work (completed over two week-ends)	5
	Form & place bridge deck reinforcement	Bridge Decks: Form & place r.f. (60 m structure) = 15 days	Assume 80 m structure = 80/60 x 15 days = 20 days	20
Miscellaneous	Pour deck-slabs	Bridge Decks: Pour deck-slab @ 2 days/span = 4 days		4
	backfilling, paving, traffic-signals, pavement-marking, signs, pedestrian-barriers etc.		Assume 5 days after bridge is completed	5
Remove Traffic Control	Open Crossroad to traffic	Miscellaneous Open to traffic = 1 day		1

TOTAL WORKING DAYS	126	Days
Assume average 19 working days/month	6.6	Months

NOTES:

1. Assumes only one work-crew per relevant activity.
2. Assumes that I-75 freeway, outside shoulders will be restored after bridge demolition
3. Removal of existing roadway from the bridge to the adjacent service drive (including the intersection) and subsequent reconstruction, is assumed to be part of this work duration.
4. Embankment work will be finalized as part of the I-75 widening work
5. Center pier and abutment-supports are assumed to be drilled, reinforced-concrete shafts.

UNIT 3 - SERVICE DRIVE CONSTRUCTION.

Assume 400 meter segment (approximate distance between I-75 bridge crossings)

Assume 50 meter length of retaining wall is required in each 400 meter segment

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
1. REMOVE EXISTING SERVICE DRIVE & RELOCATE UTILITIES				
Detour traffic & close existing Local Road	Re-route traffic	Miscellaneous Set-up traffic control (add 4 days if 1st item)		4
Site Clearance	Clear site of existing obstructions, structures, foundations, trees etc.		If proposed Service Drive alignment is different from existing. Assume 10 days	10
Utility relocation & construction	Relocate local utilities (assume utilities crossing I-75 do not affect Service Drive).	Utilities:	Assume individual utilities will not be constructed concurrently	
		watermain - 400 m/ 100 m/day = 4 days	Assume pressure-testing, flushing is concurrent with other construction.	4
		gas main - 400 m/100 m/day = 4 days		4
		All others (elec, telcomm) = 100 m/day	say, 2 utils x 400/100 m/day = 8 days	8
Pavement Removal	Remove existing pavement, curb, sidewalk	Miscellaneous: Remove concrete pavement @450 m2/day	Assume 10 m road + 2 m sidewalk = 12 x 400/450 = 11 days, partially concurrent with utilities. Assume 5 addit. work days.	5
Drainage Removal	Remove existing sewers, M H, catch-basins		All drainage rates assumed - no MDOT Rate	
			Assume remove sewer @ 100 m/day = 400/100 = 4 days	4
			Assume MHs @ 50 m c/c remove @ 6 units/day = 8/6 = 2 days	2
			Assume CBs @ 25 m c/c both sides Remove @ 8 units/day = 32/8 = 4 days	4
2. CONSTRUCT RETAINING-WALL BETWEEN I-75 & SERVICE DRIVE (ASSUME 50 METERS LENGTH)				
Retaining wall	Misc. earthwork assoc. w/ wall	General excavation @ 750 m3/day	Assume 10 m wide x 3 m deep = (10 x 3 x 50)/ 750 = 2 days	2
	Construct "driven" wall	Retaining walls: 1 panel/day (min 10 days)	Assume based on panel length = 5 m = 50/5 = 10 days	10
3. CONSTRUCT NEW SERVICE DRIVE				
Install drainage & sub base	Install drainage		Assume crowned road section: Single trunk-sewer = 400 m length MHs @ 50 m c/c = 8 units Catch-basins, both sides @ 25 m c/c = 2 x 16 = 32 units Laterals = 32 x say 10 m = 320 m	
	Trunk-sewer & Catch-basin connectors	Drainage: Sewers = 40 m/day = (400 + 320)/40 = 18 days		18
	Install M H s	Drainage: M H s @ 3 units/day = 8/3 = 3 days		3
	Install catch-basins	Drainage: Catchbasins @ 4 units/day = 32/4 = 8 days		8
	Preliminary grading & roll to subgrade	Earthwork & Grading: Grading (G & DS) 750 m/day = 1 day		1
	Lay sub base & under-drains	Earthwork & Grading sub base @ 450 m/day = 2 days		2
Curbing, pavement & sidewalk	Curbing	Surfacing: Curbing @ 750 m/day (curing = 7 calendar days min)	assume 1 day for curbs both sides= 1 day + 5 work days curing= 6 days	6
	Pavement	Surfacing: concrete pavement, 450 m/day (minimum curing = 7 days)	Assume 1 day + 5 work day curing = 6 Days	6
	Pave sidewalk		Assume sidewalk is paved concurrently with pavement curing	0
Appurtenances & open to traffic	Install all appurtenances detector-loops, signs, barriers, fences, pavement-markings, remove detours & open to traffic		Estimated time = 10 days	10

TOTAL WORKING DAYS	111	Days
Assume average 19 working days/month ~	5.8	Months

NOTES:

- Assumes only one work-crew per relevant activity.
- Assume, where 400 meter Service Drive segment coincides with a Local Ramp exit / entrance, the widened section is included in the Service Drive construction, as far as the ramp gore.
- Assume, where a 400 meter Service Drive unit coincides with an I-75 reconstructed bridge-crossing, the cross-road is not included in the Service Drive construction.

UNIT 4 - GATEWAY CORRIDOR CONSTRUCTION.

Assume the following:

- The Gateway Corridor will generally be constructed from Fort Street to Jefferson Avenue (approx. 800m)
- It will be 4-lane divided highway with a median, upgrading an existing local road alignment.
- The required R.O.W. corridor will be serve dual-purpose as a corridor for relocated, major utilities (relocated due to plaza construction).
- Proposed sequencing is:
 - maintain 2-way local traffic on existing local road.
 - on some Alt. install major utilities alongside existing local road (future northbound & median).
 - construct northbound roadway
 - switch local traffic to new northbound roadway (2-way).
 - demolish existing local road & complete major utility installation for some Alt.
 - construct southbound roadway.
 - open to traffic
- Because utility installation is a major activity, it is considered as a separate unit & not included here.
- Assume 400 meter long construction segments.

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
1. SET-UP TRAFFIC CONTROL, RELOCATE EXISTING UTILITIES & INSTALL MAJOR UTILITIES				
Set-up local traffic control & install utilities	Major utility work is considered separately. Some utility work assumed.	Miscellaneous Set-up traffic control (add 4 days if 1st item)	Assume 4 days traffic control, 10 days of utility work, and 5 days rough grading.	19
2. NORTHBOUND CONSTRUCTION - INSTALL DRAINAGE, CONSTRUCT PAVEMENT, OPEN TO TRAFFIC				
Install drainage & sub base	Install drainage		Assume: Roadway crossslope to outside edge: Single trunk-sewer = 400 m length MHs @ 50 m c/c = 8 units Catch-basins @ 25 m c/c = 400/25 = 16 units	
	Trunk-sewer & Catch-basin connectors	Drainage: Sewers = 40 m/day = 400/40 = 10 days		10
	Install M H s	Drainage: M H s @ 3 units/day = 8/3 = 3 days		3
	Install catch-basins	Drainage: Catchbasins @ 4 units/day = 16/4 = 4 days		4
	Preliminary grading & roll to subgrade	Earthwork & Grading: Grading (G & DS) 750 m/day = 1 day		1
Lay sub base & under-drains	Earthwork & Grading sub base @ 450 m/day = 1 day		1	
Curbing, pavement & sidewalk	Curbing		assume 1 day, curbs for each side = 1 + 1 days + 5 days curing (week-end included) = 7 days	7
	Concrete Pavement	Surfacing: concrete pavement, 450 m/day (minimum curing = 7 calendar days)	Assume 1 day + 5 day curing (incl. weekend) = 6 Days	6
	Pave sidewalk		Assume sidewalk, one side & paved concurrently with pavement construction & curing	0
Clean-up & switch traffic	Pavement-marking, signs, traffic-signals & open Northbound to local traffic after both NB segments completed.		Assume 10 days	10

TOTAL WORKING DAYS	61	Days
Assume average 19 working days/month ~	3.2	Months

NOTES:

- Assumes only one work-crew per relevant activity.
- Assumes R.O.W. is shared with the Plaza utility-corridor for some Alternates and that:
 - only roadwork, drainage and some utilities are included here.
 - all umajor tility installation & demolition of existing utilities are included in a separate work-unit.
- Assumes the 10 days assigned to "Open to traffic" includes final signalization & signing work at the junctions with Fort Street & Jefferson Avenue.
- Assumes that Northbound & Southbound have the same construction duration.

UNIT 5 - I-75 WIDENING FOR AUXILLIARY LANES

Assume 400 meter segment (approximate distance between I-75 bridge crossings)

Assume 150 meter length of retaining wall is required in each 400 meter segment.

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
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I-75 WIDENING (ASSUME TWO LANE WIDENING & SEE NOTE 3 BELOW)

1. PRELIMINARY WIDENING WORK

Utilities Relocation	Relocation of utilities crossing I-75		Assumes that major, long-term utility work will be done separately & is complete.	0
Shift I-75 traffic to center-lanes	Close shoulder & shift I-75 traffic to center-lanes	Miscellaneous Set-up traffic control (add 4 days if 1st item)		4
Pavement Removal	Remove existing pavement, barrier	Miscellaneous: Remove concrete pavement @450 m ² /day	Assume 5 m wide strip = 5 x 400/450 = 5 days Assume barrier removed at same time.	5
Drainage Removal	Remove existing sewers, M H, catch-basins	Drainage: Sewers @ 200 m/day = 400/200 = 2 days MHs @ 6 units/day (assume 2x install rate) Catchbasins @ 8 units/day (assume 2x install rate)	All drainage rates assumed - no MDOT Rate	2
			Assume 50 m c/c = 8/6 = 2 days Assume 25 m c/c = 16/6 = 2 days	2 2

2. EMBANKMENT EXCAVATION (ASSUME 250 M LENGTH, TWO-LANE WIDENING)

Embankment Excavation	Strip topsoil & excavate to proposed, widened cross-section	Earthwork & Grading: 1500 m ³ /day	Assume widening cuts into embankment by 8 meters 8 m wide strip x 6 m high embankment = (8 x 6 x 250 long) / 1500 = 8 days	8
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3. CONSTRUCT RETAINING-WALL BETWEEN I-75 & SERVICE ROAD (ASSUME 150 METERS LENGTH)

Retaining wall (Driven)	Excavate in front of wall	Earthwork & Grading: 1500 m ³ /day	Assume 8 m widening requires 4 m high wall excav = 16 m ² /m length (150 x 16)/1500 = 2 days	2
	Construct "driven" wall	Retaining walls: 1 panel/day (min 10 days)	Assume: Based on panel length = 5m = 150m/5 = 30 days	30

4. CONSTRUCT WIDENED I-75 (AUXILLIARY-LANE, SHOULDER & BARRIER)

Install drainage sub base & pavement	Install drainage	Drainage: Sewers = 40 m/day = 400/40 = 10 days		10
	Install M H s	Drainage: M H s @ 3 units/day = 8/3 = 3 days	Assume = 50 m c/c = 8 MH s	3
	Install catch-basins	Drainage: Catch-basins @ 4 units/day = 16/4 = 4 days	Assume = 25 m c/c = 16 CBs	4
	Lay sub base & under-drains	Earthwork & Grading sub base @ 450 m/day = 2 days	Assume this includes preliminary grading & rolling.	2
	Barrier	Miscellaneous: Barrier @ 300 m/day (7 day min. curing)	Assume barrier constructed continuous with pavement	0
	Drill & grout dowels for longitudinal-joint between new & existing pavement joint	Surfacing: Concrete pavement (7.3 m) = 450 m/day (minimum curing = 7 days)	Assume 450 m/day + 7 day curing = 1 day + 5 days (weekend) = 6 days	6
Pavement, shoulder & gutter		Assume 1 day + 5 days curing (incl. week-end)	6	

4. OPEN TO TRAFFIC

Appertenances & open to traffic	Install all appertenances signs, barriers, fences, pavement-markings, remove temporary barriers & open to traffic		Estimated time = 5 days	5
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TOTAL WORKING DAYS	91 Days
Assume 19 working days/month ~	4.8 Months

1. Assumes only one work-crew per relevant activity.

2. Assume, where 400 meter I-75 widening-segment coincides with a Plaza or Local Ramp exit / entrance, the ramp construction adjacent to the widened section (between I-75 & the Service Drive) is included in time duration for the I-75 widening.

3. Time duration has been estimated for a cross-section, assuming two-lane widening. Actual sections will vary (some sections will have one-lane widening and/or taper-sections & ramp merge/diverge)

UNIT 6 - Re-alignment of approximately 1,600 meters of I-75 freeway

- This unit only details the construction stages required for re-alignment of I-75 Freeway between Livernois Avenue & Clark Street.
- Road works outside this area will take place at the same time, using the standard work-unit durations already developed.
- Assume that construction of the elevated Plaza Ramps in this area will be sequenced into the freeway construction duration with no extra time required.
- Assume demolition of bridges at Dragoon & Junction & reconstruction of Clark Street bidge in two-halves also occurs within the construction duration.

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
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1. SITE CLEARANCE, PRIMARY EARTHWORK & UTILITY RELOCATION

I-75 traffic remains on existing northbound & southbound alignment during this stage of construction

Close existing local roads & detour local traffic to Fort Street	Set-up traffic control			
	Fence & secure construction area with Contractor access. Close Dragoon & Junction crossings	Miscellaneous Set-up traffic control (add 4 days if 1st item)		4
Site Clearance	Demolish existing properties, remove existing ramps & service drives. Building removal		Demolish & remove properties & structures say 30 days	30
	Remove existing pavement from Service Drive, Ramp & local connecting-roads	Miscellaneous: Remove old pavement = 60 m/day	Assume: 1,000 m Service Drive, 200 m Ramp, 400 m local roads = 1,600 m @ 60 m/day = 27 days Assume coincides with property removal & use 30 days	0
Local Utilities	Relocate local utilities (assume these will be carried out under a separate contract or concurrently with earthwork)	Utilities: watermain - 100 m/day gas main - 100 m/day All others (elec, telcomm) = assume 100 m/day/util	Assume carried-out under separate contract or during primary earthwork	0
Drainage Removal	Remove existing sewers, M H, catch-basins from local roads.	Drainage: Sewers @ 200 m/day = 1,300/200 = 7 days MHs @ 6 units/day (assume 2x install rate) Catchbasins @ 8 units/day (assume 2x install rate)	All drainage rates assumed - no MDOT Rate	8
			Assume 50 m c/c = 32/6 = 2 days Assume 25 m c/c = 64/6 = 2 days	6 8

TOTAL WORKING DAYS	56 Days
Assume 19 working days/month ~	2.9 Months

1. - PRELIMINARY SITE-CLEARANCE WORK

2. PRIMARY EARTHWORK, RELOCATE I-75 UTILITY-CROSSINGS & CONSTRUCT RETAINING-WALLS

Primary Earthwork	Earthwork for re-aligned I-75	Earthwork & Grading: Excavation (Freeway) = 1,500 to 5,300 m ³ /day	Assume: Average excavation @ 3,500 m ³ /day 2 crews Volume = 1,000 long x 6 deep x (av.) 65 wide = 390,000 m ³ 390,000/(3,500 X 2) /day = 56 days	56
Retaining-walls	Install retaining-walls	Retaining walls: 1 panel/day (min 10 days)	Assume 150 m along south side side, 5 m panels = 150/5 = 30 days Assume also, constructed part-concurrent with earthworks = say, 10 days	10
Relocate major utilities crossing I-75	Assume: 1. All relocations will be non-destructive 2. Extensions to the 7 sewer (inverted-syphons) will be major activity 3. All other crossings will be completed within the same time.		Assume: 1. Each sewer extension requires 30 days (diversion, construction, re-connection) 2. Work is staggered & new diversion starts 10 days after previous one. = 10+10+10+10+10+10+10+10+10 = 90 days Assume partially coincides with earthworks (say, 60 days) - use 30 days	30

TOTAL WORKING DAYS	96 Days
Assume 19 working days/month ~	5.1 Months

2. EARTHWORK, UTILITIES, RETAINING-WALLS

3. INSTALL DRAINAGE & SUB BASE, CONSTRUCT PAVEMENT & BARRIERS IN MAIN AREA (EXCLUDING

For full-width pavement construction, assume:
Southbound Direction - 400 m tie-in (S end) + 600 m full width pavement construction + 600 m tie-in (N end) = 1,600 m Total length
Northbound Direction - 300 m tie-in (S end) + 600 m full width pavement construction + 500 m tie-in (N end) = 1,600 m Total length

Install drainage & sub base	Install drainage		Assume: a). 4 lines (2 @median & 2 @ o/s edges); b). 2 crews working simultaneously c). 600 m length (S'band) & 800 m length (N'band)	35
	Trunk-sewers	Drainage: Sewers = 40 m/day	Assume = 2 (800 + 600) / (40 x 2) = 35 days	
	Install M H s	Drainage: M H s @ 3 units/day	Assume 2 crews & MHs @ 50 m c/c: 2 (800/50 + 600/50) / (3 units x 2 crews) = 10 days Less construction time than sewer, assume 3 day lag behind sewer construction for MHs	3
	Install catch-basins	Drainage: Catchbasins @ 4 units/day	Assume 2 crews & CBs @ 15 m c/c: 2 (800/15 + 600/15) / (4 units x 2 crews) = 24 days Less construction time than sewer, assume 3 day lag behind sewer construction for Catch-basins.	0
Concrete pavement	Preliminary grading & roll to subgrade	Earthwork & Grading: Grading (G & DS) 750 m/day	Assume = (800 + 600) / 750 = 2 days	2
	Lay sub base & under-drains	Earthwork & Grading sub base @ 450 m/day = (800 + 600)/450 = 8 days	Assume = (800 + 600) / 450 = 4 days	4
Concrete pavement	Concrete Pavement	Surfacing: concrete pavement (7.3 M), 450 m/day (minimum curing = 7 days)	Assume 3 passes required each side (N'bound & S'band, including aux. lanes as req'd.) 3 x (800 + 600) / 450 = 10 days	10
	Construct N J Barrier	Miscellaneous: Barrier @ 300 m/day (7 day min. curing)	Assume: 800 (N'band) = 3 days 800 (median) = 3 days 600 (S'band) = 2 days (curing not included, assume barrier part-coincides with paving)	8
Median Street Lighting	Erect street-lighting in median		Assume this work is carried-out during construction of tie-in sections	0
Prepare for Traffic Cross-over Detours	Remove existing median-barrier & street-lighting, pave shoulder & place temporary-barriers		Remove street lights = 1 day Remove barrier for cross-overs (150 m) say = 100 m/day = 3days Pave shoulders (asphalt) = 2 days = 1 + 3 + 2 = 6 days Assume concurrent with other activities	0

TOTAL WORKING DAYS	62 Days
Assume 19 working days/month ~	3.3 Months

3. - MAINLINE DRAINAGE & PAVEMENT CONSTRUCTION (EXCLUDING TIE-INS)

4. CONSTRUCT NORTHBOUND TIE-INS (300 M SOUTH & 500 M NORTH, TIE-INS)

Northbound Direction - 300 m tie-in (S end) + 800 m full width construction + 500 m tie-in (N end) = 1,600 m Total length
Assume, all tie-in work is expedited & carried-out simultaneously on both tie-ins to reduce time for detours (800 m tie-in is critical)

Shift I-75 traffic to existing I-75 southbound (2-lanes each direction)	Prepare advance signing & lane-tapers (4 lanes to 2 lanes) Remove temporary median-barriers & shift traffic		Assume 5 days	5
	Drainage Remove existing & install new drainage	Remove existing pavement	Surfacing: Concrete pavement (7.3 m) = 450 m/day	Assume 2 x (7.3 m rate): 2 (300 + 500) / 450 = 4 days
Remove existing drainage & install to new alignment		Drainage: Sewers = 40 m/day	Assume: 2 crews Demolish coincidental with pavement removal + say, 5 days 2 (300 + 500) / (2 x 40) = 20 + 5 days = 25 days	25
		Drainage: M H s @ 3 units/day	Assume 50 m c/c = 2 (300 + 500)/50 = 106 units = 106/3 = 11 days (< sewer install) Assume follows-on from trunk-sewer, say 5 days behind	5
		Drainage: Catchbasins @ 4 units/day = 27/4 = 7 days	Assume 2 crews: 15 m c/c = 2 (300 + 500)/15 = 106 units = 106/(2 x 3) = 18 days (< sewer install) Assume follows-on from trunk-sewer.	0
Sub base	Grade & roll to sub-grade, under-drains & sub base	Earthwork & Grading: Grading (G & DS) 750 m/day	Assume (300 + 500) / 750 = 1 day	1
		Earthwork & Grading sub base @ 450 m/day	Assume (300 + 500) / 450 = 2 days	2
Concrete Paving	Concrete Pavement	Surfacing: concrete pavement (7.3 M), 450 m/day (minimum curing = 7 days)	Assume 3 passes required 3 (300 + 500) / 450 = 5 days (curing during N J barrier construction)	5
	Construct N J Barrier	Miscellaneous: Barrier @ 300 m/day (7 day min. curing)	Assume: 2 (300 + 500)/300 = 5 days + 5 days curing (week end included) = 10 days	10
Pavement-markings Switch Cross-over Traffic Diversion	Pavement-markings, signing		Assume 5 days	5
4. - CONSTRUCT NORTHBOUND TIE-INS			TOTAL WORKING DAYS	62 Days
			Assume 19 working days/month ~	3.3 Months

5. CONSTRUCT SOUTHBOUND TIE-INS (400 M SOUTH & 600 M NORTH, TIE-INS)

Southbound Direction - 400 m tie-in (S end) + 800 m full width construction + 600 m tie-in (N end) = 1,600 m Total length
Assume, all tie-in work is expedited & carried-out simultaneously on both tie-ins to reduce time for detours (600 m tie-in is critical)

Shift I-75 traffic to completed NB I-75 (2-lanes each direction)	Prepare advance signing & lane-tapers (4 lanes to 2 lanes) Remove temporary median-barriers & shift traffic		Assume 5 days	5
	Drainage Remove existing & install new drainage	Remove existing pavement	Surfacing: Concrete pavement (7.3 m) = 450 m/day	Assume 2 x (7.3 m rate): 2 (400 + 600) / 450 = 5 days
Remove existing drainage & install to new alignment		Drainage: Sewers = 40 m/day	Assume: 2 crews Demolish coincidental with pavement removal + say, 5 days 2 (400 + 600) / (2 x 40) = 25 + 5 days = 30 days	30
		Drainage: M H s @ 3 units/day	Assume 50 m c/c = 2 (400 + 600)/50 = 106 units = 106/3 = 14 days (< sewer install) Assume follows-on from trunk-sewer, say 5 days behind	5
		Drainage: Catchbasins @ 4 units/day = 27/4 = 7 days	Assume 2 crews: 15 m c/c = 2 (400 + 600)/15 = 134 units = 134/(2 x 3) = 22 days (< sewer install) Assume follows-on from trunk-sewer.	0
Sub base	Grade & roll to sub-grade, under-drains & sub base	Earthwork & Grading: Grading (G & DS) 750 m/day	Assume (400 + 600) / 750 = 2 day	2
		Earthwork & Grading sub base @ 450 m/day	Assume (400 + 600) / 450 = 3 days	3
Concrete Paving	Concrete Pavement	Surfacing: concrete pavement (7.3 M), 450 m/day (minimum curing = 7 days)	Assume 3 passes required 3 (400 + 600) / 450 = 7 days (curing during N J barrier construction)	7
	Construct N J Barrier	Miscellaneous: Barrier @ 300 m/day (7 day min. curing)	Assume barrier only one side (median already constructed): (400 + 600)/300 = 4 days + 5 days curing (week end included) = 9 days	9
Pavement-markings, lighting Fully open to traffic	Pavement-markings, signing		Assume 5 days	5
5. - CONSTRUCT SOUTHBOUND TIE-INS			TOTAL WORKING DAYS	71 Days
			Assume 19 working days/month ~	3.7 Months

	Days	Months
1. - PRELIMINARY SITE-CLEARANCE WORK	56	2.9
2. EARTHWORK, UTILITIES, RETAINING-WALLS	96	5.1
3. - MAINLINE DRAINAGE & PAVEMENT CONSTRUCTION (EXCLUDING TIE-INS)	62	3.3
4. - CONSTRUCT NORTHBOUND TIE-INS	62	3.3
5. - CONSTRUCT SOUTHBOUND TIE-INS	71	3.7
TOTAL (assuming 19 days/month)	347	18.3

NOTES:

- Assumes multiple work-crews for earthwork and drainage during construction of tie-ins to minimize disruption and duration of traffic restrictions.
- Removal of remaining existing I-75 pavement & final landscaping will require addit. time, but does not affect the construction period and opening to traffic.

UNIT 7 - RAMPS A, B, C, D - ELEVATED STRUCTURES

Assumptions:

- 60 meter average spans, composite deck, r.f. concrete deck on steel beams.
- Abutments are MSE facing-walls with abutment-seats supported on steel H-piles. Assume 10 piles & MSE walls 14 m wide with 10 m returns.
- Piers are reinforced-concrete construction with foundations supported on either steel-piles or concrete bored-shaft (both alts. checked)

Work Element	Description	MDOT Rates for Time Estimates	Assumptions (where MDOT Rate not available)	Duration (workdays)
1. SUBSTRUCTURE - ABUTMENTS				
Prepare Site			Assume 2 days for clearing, levelling & safety	2
Install steel piles for Abutment	Drive steel H-piles	Structures: Piles (12 m) = 15 piles/day or 5 days/unit	Assume 10 piles are required but deeper than 12 m (assumed by MDOT) say = 2 days	2
Install MSE retaining-walls (First-stage - to Abutment-seat elevation)	Install MSE retaining-walls on three sides (abutment-face & return-walls) - up to abutment-seat elevation with select-backfill	Retaining walls: 1 panel/day (min 10 days)	Assume 10 days: 1. Walls & backfill constructed up to abutment-seat elevation ready to form & cast seat. 2. Embankment approaches to abutment are coordinated with this work. These are site-specific & may be embankment or retaining-walls	10
Construct Abutment-seat	Form & cast		Assume 3 days to form & cast, 7 days curing. Assume curing occurs during backfilling.	3
Complete retaining-walls & coping	Complete with backfilling to pavement elevation		Assume 5 days	5
Set abutment bearings	Set bearings		Assume 2 days for placing Curing not included (placing of beams will lag sufficiently behind)	2
TOTAL WORKING DAYS			24 Days	
			Assume 19 working days/month ~	1.3 Months

2. SUBSTRUCTURE - PIERS

Check two alternative methods of foundation construction

Alternate A - steel H-piles

Set-up site	Set-up, clear & level site		Assume 1 day	1
Install steel piles for pier support	Drive steel H-piles	Structures: Piles (12 m) = 15 piles/day or 5 days/unit	Assume 16 piles are required but deeper than 12 m (assumed by MDOT) say = 3 days	3
Construct Pile-cap	Cast r.f. concrete pile-cap		Assume 2 days to form & cast & 7 days curing	9
				13 Days

Alternate B - Shaft Foundation

Set-up site	Set-up, clear & level site		Assume 1 day	1
Bore shaft	Bore shaft		Assume 2 days	2
Cast & Cure Shaft	Cast & cure shaft		Assume 1 day to cast & 7 days curing	8
Integrity testing	Check for soundness & cavities		Assume 1 day	1
				12 Days

Full Pier Construction

Construct Foundation	From above, assume steel piles as longer time (13 days to 12 days)		Assume steel piles and 13 days (from above al	13
Column	Construct reinforced-concrete column	Structures: Substructures Piers & Abutments) = 5 days/unit	Assume: Form & fix reinf. = 1 day Cast concrete = 1 day Curing = 7 day; use 5 days including weekend	7
Cross-head	Construct cross-head	Structures: Substructures Piers & Abutments) = 5 days/unit	Assume: Form & r.f. = 2 days (more complex formwork) cast = 1 day Curing = 7 day; use 5 days	8
Bearings	Set & grout bearings		Assume 2 days for placing Curing not be included (placing of beams will lag sufficiently behind)	2
TOTAL WORKING DAYS			30 Days	
			Assume 19 working days/month ~	1.6 Months

3. SUPERSTRUCTURE - MAIN SPANS

Place main Girders	Place main girders assume structural steel	Structures: Erect Structural Steel = 3 days/span		3
Form & place deck r.f.	Form deck & place reinforcement	Bridge Decks: Form & place reinforcement (60 m structure) = 15 days		15
Pour Deck Slab	Pour deck slab	Bridge Decks: Pour deck slab = 2 days/span		2
Curing	Curing of deck-slab	Bridge Decks: Cure = 14 days	Assume 14 days curing will only be used for the last span = 0 days (u. n. o.) Include 14 days curing in miscellaneous items below.	0
TOTAL WORKING DAYS			20 Days	
			Assume 19 working days/month ~	1.1 Months

4. MISCELLANEOUS

Deck Curing	Curing of last span of deck	Bridge Decks: Cure = 14 days	Assume continuous construction & 14 days curing time is only required for the last-constructed span	14
Expansion-joints, barrier, signs, pavement-markings	Cut-in expansion-joints, erect barrier, drainage & general finishing		Assume 15 days	15
TOTAL WORKING DAYS				29 Days
Assume 19 working days/month ~				1.5 Months

SUMMARY & ASSUMPTIONS	
	RAMP C = RAMP D = 7 SPANS
	RAMP A = RAMP B = 4 SPANS
	TYPICAL ABUTMENT CONSTRUCTION TIME (MONTHS) = 1.3
	TYPICAL PIER CONSTRUCTION TIME (MONTHS) = 1.6
	TYPICAL SPAN CONSTRUCTION TIME (MONTHS) = 1.1
	MISCELLANEOUS (MONTHS) 1.5

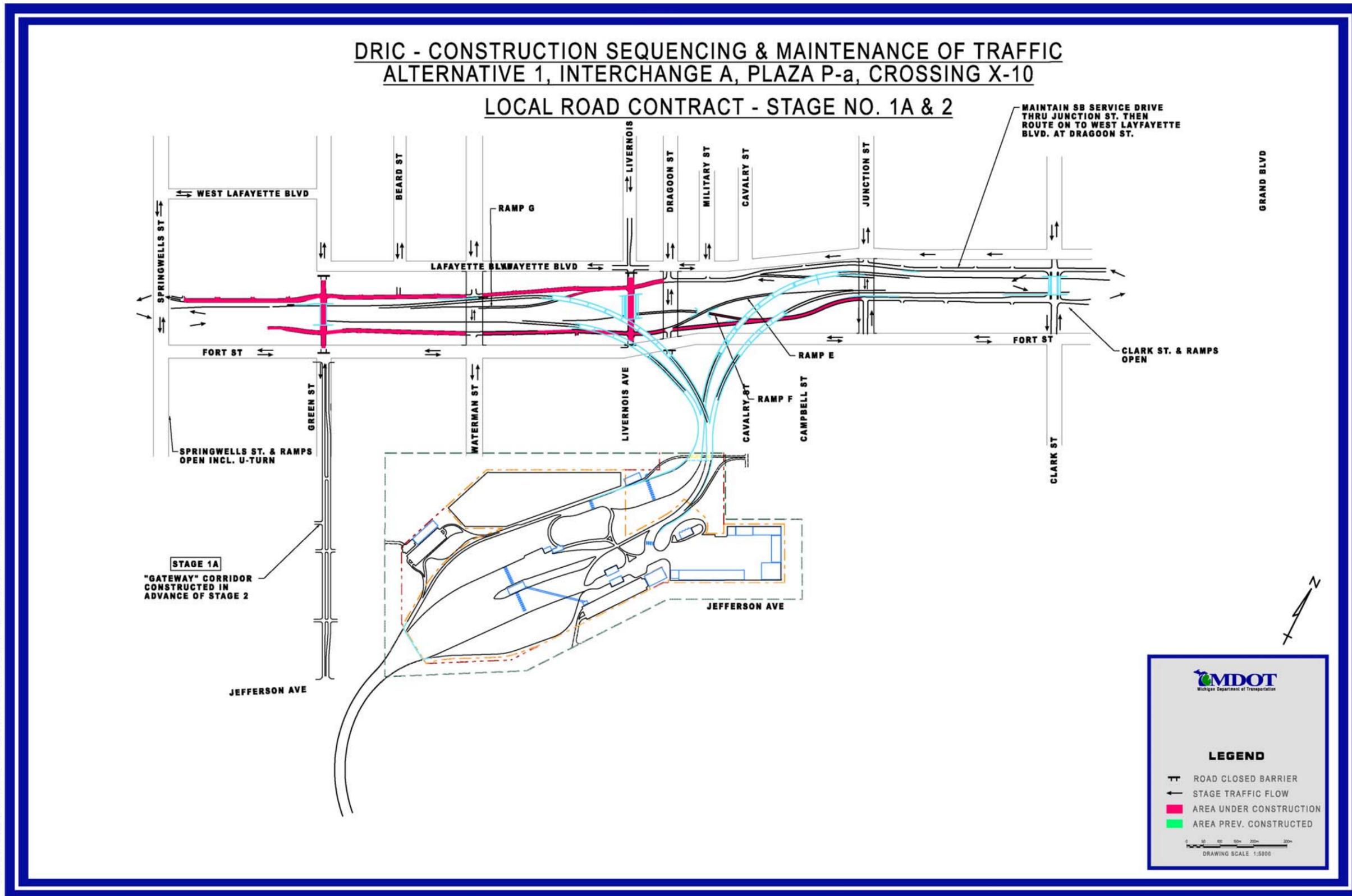
NOTES:

1. Assumes only one work-crew per relevant activity.
2. Assumes that embankment construction for the approaches to elevated structures on Ramps A, B, C, D coincides with construction of the structures & will be completed within the same time period.

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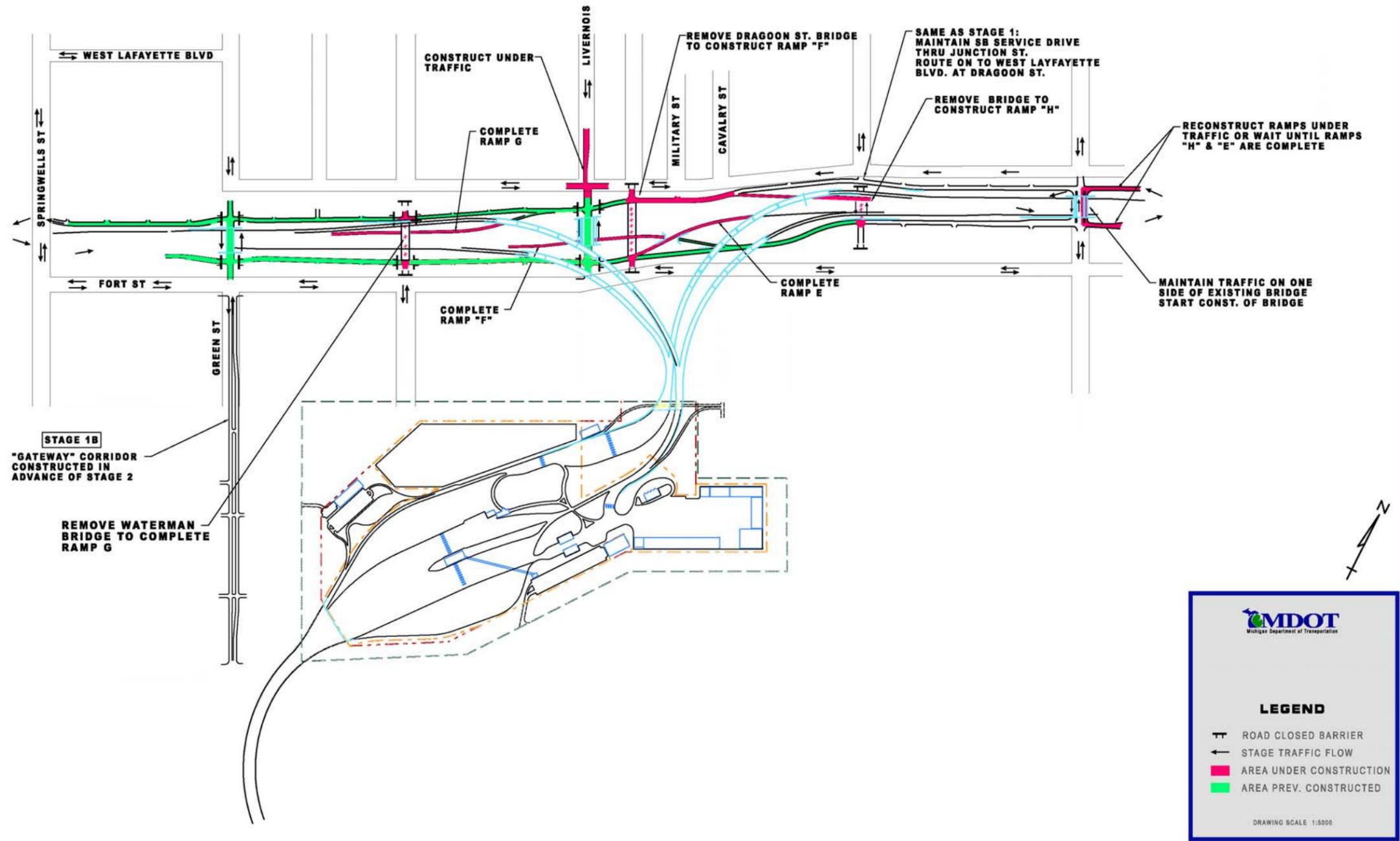
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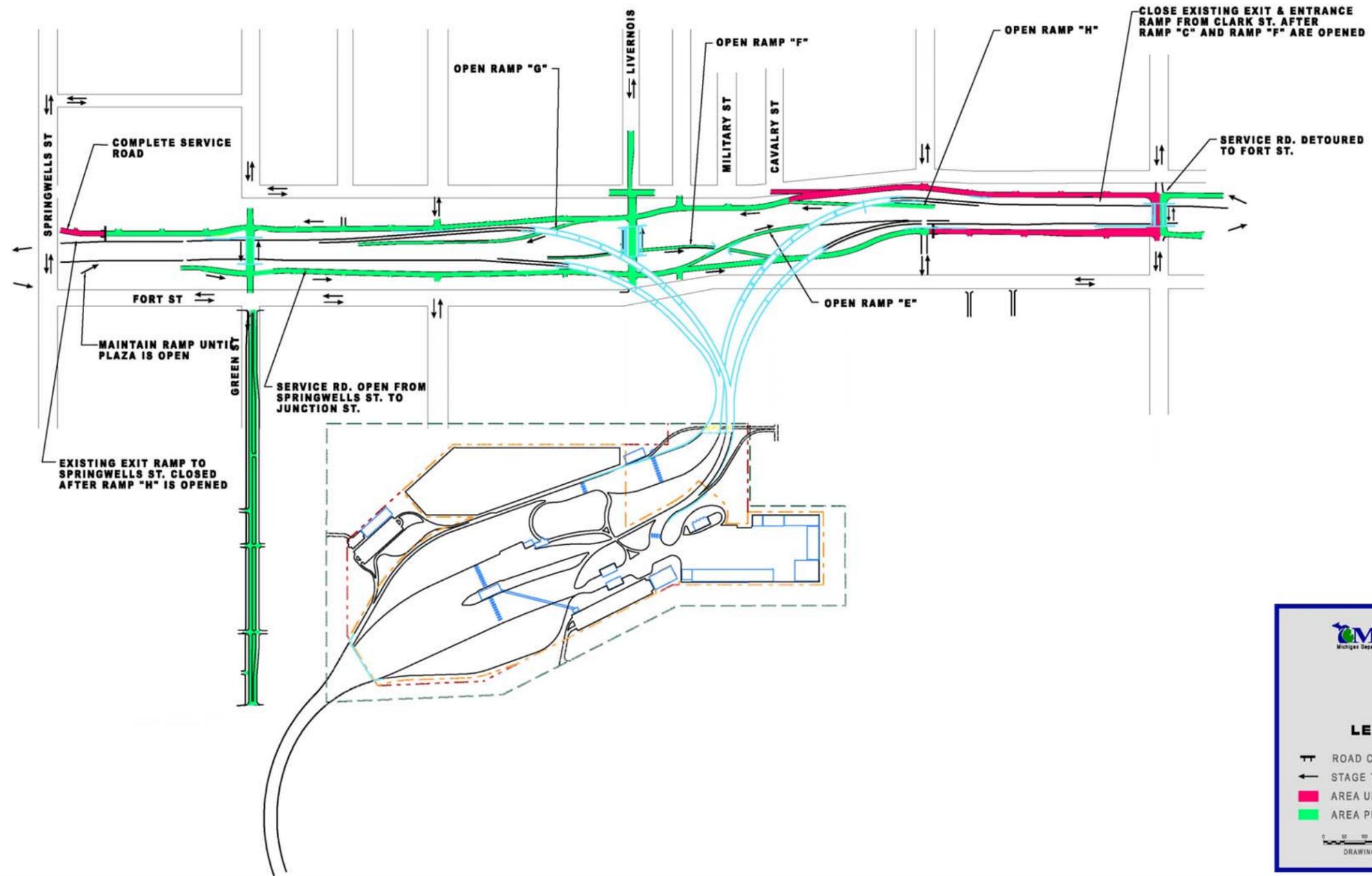
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DRIC - CONSTRUCTION SEQUENCING & MAINTENANCE OF TRAFFIC ALTERNATIVE 1, INTERCHANGE A, PLAZA P-a, CROSSING X-10 LOCAL ROAD CONTRACT - STAGE NO. 1B & 3



DRIC - CONSTRUCTION SEQUENCING & MAINTENANCE OF TRAFFIC
ALTERNATIVE 1, INTERCHANGE A, PLAZA P-a, CROSSING X-10

LOCAL ROAD CONTRACT STAGE NO.4



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