

Air Flow and Ventilation in Sewers and Tunnels

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FSS





Why is air flow in sewers & tunnels important?





Basics of Air-Water Interactions



Factors Affecting Air Flow and Odors in Sewers and Tunnels



Airflow Considerations for Sewer Design





Case Study: City of Akron, Ohio Canal Interceptor Tunnel (OCIT)



Summary



Acknowledgements & Questions

Basics of Air-Water Interactions

Basics of Air-Water Interactions

- Forces at work
 - $_{\circ}$ Friction
 - $_{\circ}$ Pressure-gradient
 - $_{\circ}$ Buoyancy
- Of interest for many types of hydraulic structures
 - $_{\circ}~$ Dam spillways and outlet gates
 - $_{\circ}~$ Inverted siphons
 - $_{\circ}$ Pipelines
 - $_{\circ}$ Drop shafts
 - $_{\circ}$ Closed conduits



D Factors Affecting Air Flow in Sewers and Tunnels

What Causes Air Flow in Sewers and Tunnels

- Friction drag force
- Displacement air
- Flushing airflow effect
- Buoyancy airflow effect
- Drop structure eduction

What Causes Air Flow in Sewers and Tunnels

- Friction drag force any sewer/tunnel with hydraulic flows
- Displacement air occurs while sewer/tunnel is filling (storm or diurnal)
- Flushing airflow effect rapid displacement, at the start of storm events
- Buoyancy airflow effect sewer/tunnel with no dry weather flows, cold-weather climate
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Friction Drag Airflow

- Flowing wastewater results in friction at airwater interface, which induces flow of air
- Predominant factor influencing ventilation in sewers and tunnels with dry-weather flows
- Air flows maximized when d/D = 0.5
- Modeled by Pescod & Price (1982)
- More recent models developed
 - $_{\circ}$ HDR First Principles

Displacement Air

- Rising water levels during wet-weather events forces air out of the sewer or tunnel
- Air Emission Time and Flow Rate inversely proportional
- Tends to exhaust at the farthest downstream outlet that is not occluded (blocked) by water levels

Flushing Airflow Effect

- Short-term displacement event in which a nearly-empty tunnel experiences a rapid inflow of water
- Can create high air pressures, blowing manhole covers or damaging ventilation structures
- Mitigate through design by spreading out hydraulic inlets to tunnel/sewer

Buoyancy Effect

- Temperature difference between tunnel air and atmospheric air causes pressure gradient
- Most common during cold weather
- Air flow travels upstream
- Has been observed in tunnels with no dry weather flow

Drop Structure Eduction

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 - $_{\odot}~$ Return air duct \rightarrow reduce net airflow into tunnel

03 Airflow & Odor Considerations for Sewer Design

Considerations for Sewer and Tunnel Ventilation Design

- Friction drag
 - o Minimize slope/diameter changes
 - Wind over an open stack/manhole can induce air flow – seal or use dampers.
 - Select pipe diameters considering both wastewater flow rate and air flow at different storm conditions
- Displacement airflows
 - Consider occlusion of the sewer/tunnel during different storm conditions
- Buoyancy airflows
 - Consider siting of tunnel drop shafts
 - $_{\circ}$ Use of dampers to manage airflow

Considerations for Sewer and Tunnel Ventilation Design

- Drop structure eduction
 - Mitigate through design
- Flushing airflow
 - Allow sewer/tunnel to "breathe"
 - Hydraulic modeling of flow inputs
- Other considerations:
 - $_{\circ}~$ Use of a fan to pull air from a sewer or tunnel
 - Selection of Materials: Consider corrosion resistant materials

Case Study: Doan Valley Tunnel (NEORSD)

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- Northeast Ohio Regional Sewer District (NEORSD)
- DVT project team:
 - McMillen Jacobs Associates and Wade Trim Joint Venture
 - HDR subconsultant to Joint Venture
- HDR performed ventilation study
- Ventilation study goals:
 - Provide review of existing odor control (air treatment) technologies and case studies
 - Determine potential locations of odorous air emissions
 - Evaluate potential capital costs and required land areas for odor control facilities

Project Location

- Project Overview
 - $_{\circ}~$ 3.7 miles total of rock tunnel
 - $_{\circ}~$ 18-ft to 8.5-ft diameter
 - $_{\circ}$ (3) Tunnel segments
 - \circ (6) Shaft sites
 - Contractor: McNally/Kiewit JV
 - $_{\circ}~$ Scheduled Completion: End of 2021

- Ventilation Evaluation
 - $_{\circ}$ Technology, Industry Reviews
 - $_{\circ}\;$ Two conditions:
 - Dry weather
 - Wet weather (1-month, 6-hour storm)
- Study Deliverables:
 - Locations of pressurization and approximate air emission flow rates (friction drag)
 - $_{\odot}~$ Theoretical buoyancy flow rates at each shaft
 - $_{\circ}$ Odor control facility alternatives
 - Locations, prioritized
 - Cost estimates
 - Required footprint

DVT System Schematic for Analysis

DVT System Schematic for Analysis

Results

- Risk of emissions during dry & wet weather:
 - DVT-1
 - WCT-2
 - DSRCS-6
- $_{\circ}\,$ Risk of emissions during wet weather:
 - MLK-1
- $_{\circ}\,$ Low risk of emissions:
 - WCT-3
 - WCT-1 FCS (duct carries airflow to DVT-2)
 - MLK-2

Table 4-8. Poten	tial Airflow Emissio	ons at Shafts due	to Friction Drag
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Shaft	Diameter (ft)	Vent	Friction Drag Airflow		
		Vault Area (ft2)	DWF (cfm)	1-month, 6-hour (cfm)	
WCT-3	34	20	0	0	
WCT-2	55	20	650	2,150	
WCT-1 FCS	28 X 37	TBD	1,100	3,200	
MLK-2	20	20	0	0	
MLK-1	7	20	0	1,200	
DVT-2	16	49	200	2,650	
DVT-1	18	70	1,600	9,800	

Odor Control Alternatives

No.	Alternative	Cost (\$MM)	Footprint (SF)
1	No OCFs	\$0	0
2a	DVT-1 OCF: 30,000 cfm (AC)	\$1.72	DVT-1: 1,500
2b	DVT-1 OCF: 30,000 cfm (AC) WCT-2 OCF: 5,000 cfm (AC)	\$2.35	DVT-1: 1,500 WCT-2: 250
3a	DVT-1 OCF: 15,000 cfm (BF) DVT-2 OCF: 15,000 cfm (BF)	\$2.43	DVT-1: 16,500 DVT-2: 8,200
3b	DVT-1 OCF: 15,000 cfm (BF) DVT-2 OCF: 15,000 cfm (BF) WCT-2 OCF: 5,000 cfm (AC)	\$3.06	DVT-1: 16,500 DVT-2: 8,200 WCT-2: 250
4	Option 2a, 2b, 3a, 3b PLUS: MLK-1 OCF: 5,000 cfm (AC, AD)	\$2.35-\$3.69	MLK-1: 250

AC: Activated Carbon BF: Biofilter AD: Air Dispersion

Note: costs in 2016 dollars.

Recommendations

- Planning for space/footprint on site, should potential odor control facilities be needed, at four sites:
 - 30,000 CFM activated carbon at DVT-1 OR 15,000 CFM biofilter at DVT-1 and 15,000 CFM biofilter at DVT-2
 - 5,000 CFM activated carbon at MLK-1
 - 5,000 CFM activated carbon at WCT-2
- Further ventilation evaluation under a greater range of storm conditions

05 Case Study: Ohio Canal Interceptor Tunnel (City of Akron)

Ohio Canal Interceptor Tunnel (OCIT)

- City of Akron Water Reclamation Services
 - Serves City of Akron and neighboring communities
 - $_{\circ}$ 96 square miles, population of 330,000
 - Akron Waterways Renewed!
 - Series of projects to reduce CSOs
 - OCIT: largest AWR project \$300M
- OCIT Team:
 - $_{\circ}~$ DLZ: Lead Designer
 - McMillan-Jacobs: Tunnel Designer
 - $_{\circ}~$ HDR: Odor Evaluation & Design

Ohio Canal Interceptor Tunnel (OCIT)

- 6,200 linear feet, 27-foot diameter
- Contractor: Kenny Obayashi Joint Venture
- Completion 2020
- Three dropshaft sites:
 - o OCIT-1/TDS: Downstream, residential
 - OCIT-2: Midpoint, potential future development
 - OCIT-3: Downtown
- HDR has performed the following:
 - $_{\circ}~$ Odor evaluation of existing system
 - $_{\circ}$ OCIT ventilation study
 - $_{\circ}~$ OCIT odor control facility plan
 - $_{\circ}~$ OCIT-1 odor control facility design

Ohio Canal Interceptor Tunnel (OCIT)

- Ventilation Evaluation
 - $_{\circ}$ Technology review
 - $_{\circ}~$ Typical year storm data
- Facility Plan Deliverables:
 - Frequency/duration/intensity of odorous air emissions – friction drag and displacement
 - $_{\circ}~$ Odor control facility alternatives
 - Site layouts
 - Cost estimates
 - Level of service

A picture of 0.1% of the data...

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IIIIIIIII L72 L42 L43 L43 <thl43< th=""> L43 <thl43< th=""> <thl43<< td=""><td>LB LB L4 L4 LD LD L4 L4 LD L0 L4 L4</td><td>2.64 J.23 L.01 L.01 L.04 L.04 L.12 J.21 L.21 <thl.21< th=""> L.21 L.21 <thl< td=""><td>Lett 1.31 Lett 1.32 Lett <thlett< th=""> Lett Lett <thl< td=""><td>L-0 L-3 L-4 L-4 L-4 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3</td><td>2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.84 1.84 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.04 1.01 1.01 1.01 1.01 1.01 1.01</td><td>L21 L25 LA4 L15 LA4 L32 H1 L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.02 0.01 0.21 1.01 0.01 1.02 1.01 0.03 0.04 0.04 0.04 1.02 0.01 0.</td></thl<></thlett<></td></thl<></thl.21<></td></thl43<<></thl43<></thl43<>	LB LB L4 L4 LD LD L4 L4 LD L0 L4 L4	2.64 J.23 L.01 L.01 L.04 L.04 L.12 J.21 L.21 L.21 <thl.21< th=""> L.21 L.21 <thl< td=""><td>Lett 1.31 Lett 1.32 Lett <thlett< th=""> Lett Lett <thl< td=""><td>L-0 L-3 L-4 L-4 L-4 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3</td><td>2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.84 1.84 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.04 1.01 1.01 1.01 1.01 1.01 1.01</td><td>L21 L25 LA4 L15 LA4 L32 H1 L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.02 0.01 0.21 1.01 0.01 1.02 1.01 0.03 0.04 0.04 0.04 1.02 0.01 0.</td></thl<></thlett<></td></thl<></thl.21<>	Lett 1.31 Lett 1.32 Lett Lett <thlett< th=""> Lett Lett <thl< td=""><td>L-0 L-3 L-4 L-4 L-4 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3 L-3</td><td>2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.84 1.84 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.04 1.01 1.01 1.01 1.01 1.01 1.01</td><td>L21 L25 LA4 L15 LA4 L32 H1 L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.02 0.01 0.21 1.01 0.01 1.02 1.01 0.03 0.04 0.04 0.04 1.02 0.01 0.</td></thl<></thlett<>	L-0 L-3 L-4 L-4 L-4 L-3	2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.84 1.84 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.84 1.01 1.01 1.01 1.01 1.01 1.01 1.01 2 1.14 1.04 1.01 1.01 1.01 1.01 1.01 1.01	L21 L25 LA4 L15 LA4 L32 H1 L44 L41 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<>	1.02 0.01 0.21 1.01 0.01 1.02 1.01 0.03 0.04 0.04 0.04 1.02 0.01 0.
Human L.D L.D L.L L.L <thl< th=""> <thl< th=""></thl<></thl<>		2.48 1.74 L.48 L.48 L.42 L.41 L.43 L.31 L.31 <thl.31< th=""> L.31 L.31 <thl< td=""><td>64 1.31 1.33 1.32 1.33 1.33 1.33 1.31 1.32 1.33 1.33 1.34 1.33 1.32 1.44 1.33 1.32 1.44 1.33 1</td><td>L4 L3 L4 L4 L4 L3 <thl3< th=""> L3 L3 L3<!--</td--><td>2 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4</td><td>L30 L34 L44 L44 L43 L32 L44 L41 L43 L43 L41 L43 <thl43< th=""> <thl43< th=""> <thl43< th=""></thl43<></thl43<></thl43<></td><td>1.17 L.0 L.33 1.0 L.0 1.14 L.0 L.4 L.0 L.4 L.0 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4</td></thl3<></td></thl<></thl.31<>	64 1.31 1.33 1.32 1.33 1.33 1.33 1.31 1.32 1.33 1.33 1.34 1.33 1.32 1.44 1.33 1.32 1.44 1.33 1	L4 L3 L4 L4 L4 L3 L3 <thl3< th=""> L3 L3 L3<!--</td--><td>2 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4</td><td>L30 L34 L44 L44 L43 L32 L44 L41 L43 L43 L41 L43 <thl43< th=""> <thl43< th=""> <thl43< th=""></thl43<></thl43<></thl43<></td><td>1.17 L.0 L.33 1.0 L.0 1.14 L.0 L.4 L.0 L.4 L.0 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4 L.4</td></thl3<>	2 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	L30 L34 L44 L44 L43 L32 L44 L41 L43 L43 L41 L43 L43 <thl43< th=""> <thl43< th=""> <thl43< th=""></thl43<></thl43<></thl43<>	1.17 L.0 L.33 1.0 L.0 1.14 L.0 L.4 L.0 L.4 L.0 L.4
Internet Lay Lay <thlay< th=""> <thlay< th=""> <thlay< th=""> <thlay< t<="" td=""><td>LB LB L4 L3 LB LB L4 L3 LB LB L4 L3</td><td>2.54 1.02 6.01 1.41 6.01 1.43 6.12 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 <th1.51< th=""> 1.51 1.51 <th1< td=""><td>101 131 132 132 133 132 133 132 133 132 133<td>CI L33 L-41 L-01 L-01 L-33 L-31 L-</td><td>D LAT <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<></td><td>L30 L75 L84 L86 L84 L53 L53 H L40 L1 L40 L1 L5 L53 L75 L54 L56 L54 L51 L53 H L40 L51 L50 L51 L55 L53 L55 L55 L54 L56 L54 L51 L50 L54 L51 L55 L55 L53 L55 L55 L54 L56 L55 L55 L55 L55 L55 L55 L55 L55 L55</td><td>1.71 6.11 6.23 1.11 6.11 1.11 6.11 6.14 6.41 6.41 6.44 1.51 6.18 6.23 1.11 6.44 1.51 6.11 6.44 6.44 6.44 1.52 6.18 6.23 1.11 6.18 1.52 1.11 6.44 6.45 6.45</td></td></th1<></th1.51<></td></thlay<></thlay<></thlay<></thlay<>	LB LB L4 L3 LB LB L4 L3 LB LB L4 L3	2.54 1.02 6.01 1.41 6.01 1.43 6.12 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 1.53 1.51 <th1.51< th=""> 1.51 1.51 <th1< td=""><td>101 131 132 132 133 132 133 132 133 132 133<td>CI L33 L-41 L-01 L-01 L-33 L-31 L-</td><td>D LAT <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<></td><td>L30 L75 L84 L86 L84 L53 L53 H L40 L1 L40 L1 L5 L53 L75 L54 L56 L54 L51 L53 H L40 L51 L50 L51 L55 L53 L55 L55 L54 L56 L54 L51 L50 L54 L51 L55 L55 L53 L55 L55 L54 L56 L55 L55 L55 L55 L55 L55 L55 L55 L55</td><td>1.71 6.11 6.23 1.11 6.11 1.11 6.11 6.14 6.41 6.41 6.44 1.51 6.18 6.23 1.11 6.44 1.51 6.11 6.44 6.44 6.44 1.52 6.18 6.23 1.11 6.18 1.52 1.11 6.44 6.45 6.45</td></td></th1<></th1.51<>	101 131 132 132 133 132 133 132 133 132 133 <td>CI L33 L-41 L-01 L-01 L-33 L-31 L-</td> <td>D LAT <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<></td> <td>L30 L75 L84 L86 L84 L53 L53 H L40 L1 L40 L1 L5 L53 L75 L54 L56 L54 L51 L53 H L40 L51 L50 L51 L55 L53 L55 L55 L54 L56 L54 L51 L50 L54 L51 L55 L55 L53 L55 L55 L54 L56 L55 L55 L55 L55 L55 L55 L55 L55 L55</td> <td>1.71 6.11 6.23 1.11 6.11 1.11 6.11 6.14 6.41 6.41 6.44 1.51 6.18 6.23 1.11 6.44 1.51 6.11 6.44 6.44 6.44 1.52 6.18 6.23 1.11 6.18 1.52 1.11 6.44 6.45 6.45</td>	CI L33 L-41 L-01 L-01 L-33 L-31 L-	D LAT LAT <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<>	L30 L75 L84 L86 L84 L53 L53 H L40 L1 L40 L1 L5 L53 L75 L54 L56 L54 L51 L53 H L40 L51 L50 L51 L55 L53 L55 L55 L54 L56 L54 L51 L50 L54 L51 L55 L55 L53 L55 L55 L54 L56 L55 L55 L55 L55 L55 L55 L55 L55 L55	1.71 6.11 6.23 1.11 6.11 1.11 6.11 6.14 6.41 6.41 6.44 1.51 6.18 6.23 1.11 6.44 1.51 6.11 6.44 6.44 6.44 1.52 6.18 6.23 1.11 6.18 1.52 1.11 6.44 6.45 6.45
International Internat	LB LB LG L3 LB LB LG L3 LB LB LG L3	2.22 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0		L22 L41 L41 L42 L41 L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<>	J LAT LAT <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<>	Lat Lat <thlat< th=""> <thlat< th=""> <thlat< th=""></thlat<></thlat<></thlat<>	1.23 6.34 6.32 1.31 6.34 6.31 6.33 6.34 <th< td=""></th<>
1000000 6.41 6.42 6.42 6.32 6.31 6.31 6.31 6.31 6.41 6.42 6.44 6.33 1000000 6.41 6.42 6.43 6.31 6.31 6.31 6.41 6.42 6.44 6.33 1000000 6.41 6.42 6.43 6.31 6.31 6.31 6.41 6.42 6.44 6.33 1000000 6.41 6.42 6.43 6.32 6.31 6.31 6.41 6.42 6.44 6.33 1000000 6.41 6.42 6.43 6.32 6.31 6.31 6.41 6.43 6.43 6.33 1000000 6.41 6.42 6.43 6.32 6.31 6.31 6.41 6.43 6.43 6.33 1000000 6.43 6.43 6.43 6.43 6.43 6.33 6.31 6.41 6.43 6.43 6.33	LIN LIN LAN LAN LAN LAN LAN LAN LAD LAD LAN LAN	3.53 1.71 6.40 1.40 6.40 6.41 6.47 1.31 6.30 1.35 1.35 3.53 1.71 6.40 6.40 6.41 6.47 6.31 6.30 6.35 6.35 1.	64 6.31 6.33 6.32 6.33 6.33 6.33 6.33 6.33 6.34 6	1.0 1.3 1.4 1.4 1.4 1.5 1.8 1.1 1.4 1.4 1.3 1.4 1.4 1.4 1.5 1.3 1.4 1.4 1.5	2	6.38 6.75 6.84 6.85 6.84 6.22 00 6.44 6.44 6.44 6.48 6.48 6.48 6.48 6.44 6.44	1.13 6.16 6.23 1.11 6.06 1.13 1.11 6.44 6.44 6.44 1.13 6.16 6.23 1.11 6.06 1.13 1.11 6.44 6.48 6.48 6.44
100000 1.02 1.02 1.01 <	LB LB L4 LB LB LB L4 LB	2.6% 1.41 6.16 6.46 6.11 6.27 6.21 <th6.21< th=""> 6.21 6.21 <th6< td=""><td>131 131 132 132 131 132 133 131 131 134 144 1 131 131 132 132 131 132 133 141 133 134 144 1 131 131 132 132 133 141 131 134 144 1 31 131 132 132 133 141 131 134 143 144 144 144</td><td>L0 L3 L4 L4 L4 L3 <thl3< th=""> L3 L3 L3<!--</td--><td>LAT LAT CAN LAT LAT LAT LAT LAT LAT LAT LAT LAT LAT</td><td>L30 L24 LA4 LA4 LA4 LA4 LA2 III L41 L44 L41 L41 LA4 L44 L41 L44 L44 L44 L44 L44 L44 L44 L4</td><td>1.12 L.0 0.22 1.0 0.00 1.12 1.0 0.44 1.40 0.44 1.12 1.0 0.44 0.41 0.44 0.44 0.44 0.44</td></thl3<></td></th6<></th6.21<>	131 131 132 132 131 132 133 131 131 134 144 1 131 131 132 132 131 132 133 141 133 134 144 1 131 131 132 132 133 141 131 134 144 1 31 131 132 132 133 141 131 134 143 144 144 144	L0 L3 L4 L4 L4 L3 L3 <thl3< th=""> L3 L3 L3<!--</td--><td>LAT LAT CAN LAT LAT LAT LAT LAT LAT LAT LAT LAT LAT</td><td>L30 L24 LA4 LA4 LA4 LA4 LA2 III L41 L44 L41 L41 LA4 L44 L41 L44 L44 L44 L44 L44 L44 L44 L4</td><td>1.12 L.0 0.22 1.0 0.00 1.12 1.0 0.44 1.40 0.44 1.12 1.0 0.44 0.41 0.44 0.44 0.44 0.44</td></thl3<>	LAT LAT CAN LAT	L30 L24 LA4 LA4 LA4 LA4 LA2 III L41 L44 L41 L41 LA4 L44 L41 L44 L44 L44 L44 L44 L44 L44 L4	1.12 L.0 0.22 1.0 0.00 1.12 1.0 0.44 1.40 0.44 1.12 1.0 0.44 0.41 0.44 0.44 0.44 0.44
1000000 1.07 1.07 1.00 1.07 1.38 1.01 1.38 1.01 1.01 1.01 1.01 1.01 1.01 1.01 1.0		1.48 1.44 6.49 1.43 6.44 6.47 6.31 6.33 6.31 6.33 1.44 1.43 1.44 1.43 1.44 1.43 1.44 1.44 1.44 1.41 1.41 1.43 1.44 <th< td=""><td>33 6.31 6.33 6.32 6.33 6.01 6.01 6.01 6.03 6.01 6</td><td>6.0 6.33 6.41 6.43 6.43 6.33 6.31 6.33 6.0 6.33 6.41 6.41 6.43 6.23 6.31</td><td></td><td>6.30 6.7b 6.44 6.4b 6.44 6.33 6.44 <th< td=""><td>1.03 6.08 6.03 1.08 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 1.01 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 6.00 6.03 6.01 6.04 6.04 6.04</td></th<></td></th<>	33 6.31 6.33 6.32 6.33 6.01 6.01 6.01 6.03 6.01 6	6.0 6.33 6.41 6.43 6.43 6.33 6.31 6.33 6.0 6.33 6.41 6.41 6.43 6.23 6.31		6.30 6.7b 6.44 6.4b 6.44 6.33 6.44 <th< td=""><td>1.03 6.08 6.03 1.08 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 1.01 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 6.00 6.03 6.01 6.04 6.04 6.04</td></th<>	1.03 6.08 6.03 1.08 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 1.01 6.08 1.03 6.08 6.04 6.04 6.04 1.03 6.08 6.03 6.00 6.03 6.01 6.04 6.04 6.04
HUBBER L42 L43 L43 L43 L23 L31 L21 L31 L41 L41 L43 L21 HUBBER L42 L43 L43 L21 L21 L31	LIP LIP L41 L33 LIII LIP L41 L34 LIII L1II L41 L34	2.63 1.71 8.87 1.62 8.46 6.64 8.17 6.21 8.28 6.21 6.21 6.23 1.62 1.62 1.62 1.63 1.64 1.64 1.61 1.64 1.63 <th< td=""><td>Le3 L.31 L.32 L.32 L.32 L.31 L.41 L.31 L.41 L.31 <thl< td=""><td>LO L33 L41 L41 L41 L33 L31 L31 L L41 L32 L41 L41 L41 L33 L31 L31 L L41 L33 L41 L41 L41 L33 L31 L31 L</td><td>1.14 1.84 0.81 <th< td=""><td>L31 L35 L44 L45 L44 L32 BH L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.13 0.18 0.22 1.11 0.16 1.13 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.04 1.01 0.01 0.01 0.04 0.04</td></th<></td></thl<></td></th<>	Le3 L.31 L.32 L.32 L.32 L.31 L.41 L.31 L.41 L.31 L.31 <thl< td=""><td>LO L33 L41 L41 L41 L33 L31 L31 L L41 L32 L41 L41 L41 L33 L31 L31 L L41 L33 L41 L41 L41 L33 L31 L31 L</td><td>1.14 1.84 0.81 <th< td=""><td>L31 L35 L44 L45 L44 L32 BH L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.13 0.18 0.22 1.11 0.16 1.13 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.04 1.01 0.01 0.01 0.04 0.04</td></th<></td></thl<>	LO L33 L41 L41 L41 L33 L31 L31 L L41 L32 L41 L41 L41 L33 L31 L31 L L41 L33 L41 L41 L41 L33 L31 L31 L	1.14 1.84 0.81 <th< td=""><td>L31 L35 L44 L45 L44 L32 BH L44 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<></td><td>1.13 0.18 0.22 1.11 0.16 1.13 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.04 1.01 0.01 0.01 0.04 0.04</td></th<>	L31 L35 L44 L45 L44 L32 BH L44 L41 L41 <thl41< th=""> L41 <thl41< th=""> <thl41< th=""> <thl41< th=""></thl41<></thl41<></thl41<></thl41<>	1.13 0.18 0.22 1.11 0.16 1.13 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.24 1.11 0.01 1.12 1.11 0.04 0.44 0.04 1.03 0.16 0.04 1.01 0.01 0.01 0.04 0.04
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HUBBER LAU LAU <thlau< th=""> <thlau< t<="" td=""><td>LIP L.B L.H L.33 L.B L.B L.H L.32 L.B L.B L.H L.32</td><td>3.46 1.75 8.47 1.47 8.46 6.42 8.17 6.31 <th< td=""><td>Left 5.26 5.38 5.31 5.32 5.33 5.47 5.67 5.47 5.68 5.31 5.34 5.49 5.49 5.40 5.40 5.40 5.40 5.40 5.40 5.40 5.40</td><td>1.0 1.23 1.41 1.41 1.41 1.23 1.31 <th1< td=""><td>14 1.63 1.63 8.61 8.61 8.61 8.60 8.60 8.60 8.60 8.70 14 1.63 1.63 8.61 8.61 8.61 8.60 8.61 8.61 1.51 14 1.63 1.63 8.60 8.61 8.61 8.61 8.61 8.61 8.61</td><td>B.28 B.25 B.44 B.48 B.44 B.22 B.01 <th< td=""><td>1.13 0.18 0.26 1.11 0.01 1.13 1.01 0.01 <th0.01< th=""> 0.01 0.01 <th0< td=""></th0<></th0.01<></td></th<></td></th1<></td></th<></td></thlau<></thlau<>	LIP L.B L.H L.33 L.B L.B L.H L.32 L.B L.B L.H L.32	3.46 1.75 8.47 1.47 8.46 6.42 8.17 6.31 <th< td=""><td>Left 5.26 5.38 5.31 5.32 5.33 5.47 5.67 5.47 5.68 5.31 5.34 5.49 5.49 5.40 5.40 5.40 5.40 5.40 5.40 5.40 5.40</td><td>1.0 1.23 1.41 1.41 1.41 1.23 1.31 <th1< td=""><td>14 1.63 1.63 8.61 8.61 8.61 8.60 8.60 8.60 8.60 8.70 14 1.63 1.63 8.61 8.61 8.61 8.60 8.61 8.61 1.51 14 1.63 1.63 8.60 8.61 8.61 8.61 8.61 8.61 8.61</td><td>B.28 B.25 B.44 B.48 B.44 B.22 B.01 <th< td=""><td>1.13 0.18 0.26 1.11 0.01 1.13 1.01 0.01 <th0.01< th=""> 0.01 0.01 <th0< td=""></th0<></th0.01<></td></th<></td></th1<></td></th<>	Left 5.26 5.38 5.31 5.32 5.33 5.47 5.67 5.47 5.68 5.31 5.34 5.49 5.49 5.40 5.40 5.40 5.40 5.40 5.40 5.40 5.40	1.0 1.23 1.41 1.41 1.41 1.23 1.31 <th1< td=""><td>14 1.63 1.63 8.61 8.61 8.61 8.60 8.60 8.60 8.60 8.70 14 1.63 1.63 8.61 8.61 8.61 8.60 8.61 8.61 1.51 14 1.63 1.63 8.60 8.61 8.61 8.61 8.61 8.61 8.61</td><td>B.28 B.25 B.44 B.48 B.44 B.22 B.01 <th< td=""><td>1.13 0.18 0.26 1.11 0.01 1.13 1.01 0.01 <th0.01< th=""> 0.01 0.01 <th0< td=""></th0<></th0.01<></td></th<></td></th1<>	14 1.63 1.63 8.61 8.61 8.61 8.60 8.60 8.60 8.60 8.70 14 1.63 1.63 8.61 8.61 8.61 8.60 8.61 8.61 1.51 14 1.63 1.63 8.60 8.61 8.61 8.61 8.61 8.61 8.61	B.28 B.25 B.44 B.48 B.44 B.22 B.01 B.01 <th< td=""><td>1.13 0.18 0.26 1.11 0.01 1.13 1.01 0.01 <th0.01< th=""> 0.01 0.01 <th0< td=""></th0<></th0.01<></td></th<>	1.13 0.18 0.26 1.11 0.01 1.13 1.01 0.01 <th0.01< th=""> 0.01 0.01 <th0< td=""></th0<></th0.01<>
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1000000 0.01 0.02 0.01 0.00 0.02 0.01 0.02 0.01 0.00 0.00	LD 1.0 1.4 1.0 1.0 1.0 1.4 1.0 1.0 1.0 1.4 1.0	2.53 1.71 6.47 1.69 6.44 6.42 1.31 6.31 <th< td=""><td>-C1 -C3 -C4 -C2 -C3 -C4 -C4</td></th<> <td> L.3 L.4 L.4 L.4 L.3 <thl.3< th=""> <thl.3< th=""> <thl.3< th=""></thl.3<></thl.3<></thl.3<></td> <td></td> <td>L.30 L.7b L.44 L.4b L.44 L.22 HE L.44 L.46 L.44 L.31 L.7b L.44 L.4b L.44 L.33 L.44 L.44</td> <td>1.12 6.08 6.20 1.0 6.08 1.12 1.0 6.04 6.44 6.44 1.0 6.08 6.20 1.0 6.08 1.0 1.0 6.0 6.0 6.0 6.0 1.0 6.0 6.00 1.0 6.0 1.0 1.0 6.0 6.0 6.0</td>	-C1 -C3 -C4 -C2 -C3 -C4	L.3 L.4 L.4 L.4 L.3 L.3 <thl.3< th=""> <thl.3< th=""> <thl.3< th=""></thl.3<></thl.3<></thl.3<>		L.30 L.7b L.44 L.4b L.44 L.22 HE L.44 L.46 L.44 L.31 L.7b L.44 L.4b L.44 L.33 L.44	1.12 6.08 6.20 1.0 6.08 1.12 1.0 6.04 6.44 6.44 1.0 6.08 6.20 1.0 6.08 1.0 1.0 6.0 6.0 6.0 6.0 1.0 6.0 6.00 1.0 6.0 1.0 1.0 6.0 6.0 6.0
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HUMBER LAU LAU <thlau< th=""> <thlau< t<="" td=""><td>LB LB L4 L53 LB LB L4 L53 LB LB L4 L53</td><td>2.64 1.72 6.87 1.62 6.48 6.53 6.17 1.01 6.38 1.01 1.02 1. 3.64 1.73 6.87 1.02 6.48 6.53 6.17 1.01 6.38 1.01 1.02 1.02 1.02 1.02 1.02 1.02 1.02</td><td>64 6,21 6,38 1,47 6,38 1,47 6,48 6,31 6,32 6,31 1,47 6,48 6,41 6,31 6,32 6,31 1,47 6,48 6,41 6,43 6,32 6,32 6,41 1,41 6,48 6,31 6,32 6,42 6,43 6,31 6,32 6,42 6,43 6,43 6,31 6,32 6,43 6,44 6,44 6,43 6,31 6,32 6,43 6,44 6,44 6,44 6,43 6,32 6,43 6,44 6,44 6,44 6,44 6,43 6,32 6,43 6,44 6</td><td>1.45 1.33 1.41 1.41 1.41 1.22 1.31 1.21 1.41 1.46 1.33 1.41 1.41 1.46 1.23 1.31 1.</td><td>10 142 148 141 141 141 141 141 141 141 141 141</td><td>6.38 6.75 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.34 3.34 3.34 3.34 3.34 3.34 3.34 3.34 3.34 <th< td=""><td>1.13 0.18 0.28 1.01 0.08 1.02 1.01 0.04 0.04 0.04 0.04 0.04 0.04 0.04</td></th<></td></thlau<></thlau<>	LB LB L4 L53 LB LB L4 L53 LB LB L4 L53	2.64 1.72 6.87 1.62 6.48 6.53 6.17 1.01 6.38 1.01 1.02 1. 3.64 1.73 6.87 1.02 6.48 6.53 6.17 1.01 6.38 1.01 1.02 1.02 1.02 1.02 1.02 1.02 1.02	64 6,21 6,38 1,47 6,38 1,47 6,48 6,31 6,32 6,31 1,47 6,48 6,41 6,31 6,32 6,31 1,47 6,48 6,41 6,43 6,32 6,32 6,41 1,41 6,48 6,31 6,32 6,42 6,43 6,31 6,32 6,42 6,43 6,43 6,31 6,32 6,43 6,44 6,44 6,43 6,31 6,32 6,43 6,44 6,44 6,44 6,43 6,32 6,43 6,44 6,44 6,44 6,44 6,43 6,32 6,43 6,44 6	1.45 1.33 1.41 1.41 1.41 1.22 1.31 1.21 1.41 1.46 1.33 1.41 1.41 1.46 1.23 1.31 1.	10 142 148 141 141 141 141 141 141 141 141 141	6.38 6.75 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.32 6.84 6.84 6.34 3.34 3.34 3.34 3.34 3.34 3.34 3.34 3.34 <th< td=""><td>1.13 0.18 0.28 1.01 0.08 1.02 1.01 0.04 0.04 0.04 0.04 0.04 0.04 0.04</td></th<>	1.13 0.18 0.28 1.01 0.08 1.02 1.01 0.04 0.04 0.04 0.04 0.04 0.04 0.04
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HUBBER LAP LAP <thlap< th=""> <thlap< t<="" td=""><td>LA LA LA LA LA LA LA LA LD LD LA LA</td><td>A31 IA1 E42 IA2 E40 EA1 E42 IA1 E41 E41<td>CH CH CH<</td><td>Lit Lit <thlit< th=""> <thlit< th=""> <thlit< th=""></thlit<></thlit<></thlit<></td><td>Interface Interface <t< td=""><td>LUE 1/3 LUE LUE LUE LUE LUE LUE LUE LUE LUE LUE</td><td>1.0 6.0 6.0 1.0 1.0 6.0 1.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1</td></t<></td></td></thlap<></thlap<>	LA LA LA LA LA LA LA LA LD LD LA LA	A31 IA1 E42 IA2 E40 EA1 E42 IA1 E41 E41 <td>CH CH CH<</td> <td>Lit Lit <thlit< th=""> <thlit< th=""> <thlit< th=""></thlit<></thlit<></thlit<></td> <td>Interface Interface <t< td=""><td>LUE 1/3 LUE LUE LUE LUE LUE LUE LUE LUE LUE LUE</td><td>1.0 6.0 6.0 1.0 1.0 6.0 1.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1</td></t<></td>	CH CH<	Lit Lit <thlit< th=""> <thlit< th=""> <thlit< th=""></thlit<></thlit<></thlit<>	Interface Interface <t< td=""><td>LUE 1/3 LUE LUE LUE LUE LUE LUE LUE LUE LUE LUE</td><td>1.0 6.0 6.0 1.0 1.0 6.0 1.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1</td></t<>	LUE 1/3 LUE	1.0 6.0 6.0 1.0 1.0 6.0 1.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1
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1000000 1.07 1.07 1.01 1.01 1.07 1.01 1.03 1.01 1.01 1.01 1.01 1.01 1.01	LB LB LG LD LD LD LG LD	3.67 1.33 6.67 1.39 6.64 1.51 6.27 1.31 6.31 <th< td=""><td>33 1.31 6.38 1.32 6.38 1.31 6.38 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 6.31 1.34 6.41 6.31 6.31 6.34 6</td><td>L0 L3 L4 L4 L6 L3 <thl3< th=""> L3 L3 L3<!--</td--><td></td><td>6.30 6.75 6.44 6.45 6.44 6.23 6.44 <th< td=""><td>1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44 1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44</td></th<></td></thl3<></td></th<>	33 1.31 6.38 1.32 6.38 1.31 6.38 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 1.34 6.31 1.34 6.41 6.31 1.34 6.41 6.31 6.31 6.34 6	L0 L3 L4 L4 L6 L3 L3 <thl3< th=""> L3 L3 L3<!--</td--><td></td><td>6.30 6.75 6.44 6.45 6.44 6.23 6.44 <th< td=""><td>1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44 1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44</td></th<></td></thl3<>		6.30 6.75 6.44 6.45 6.44 6.23 6.44 <th< td=""><td>1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44 1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44</td></th<>	1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44 1.03 6.08 6.34 1.0 6.08 1.03 1.0 6.44 6.44 6.44
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100000 1.01 1.00 1.01 1.00 1.20 1.01 1.20 1.01 1.01	LP 1.P 1.4 1.5 LP 1.6 1.4 1.5 L6 1.6 1.4 1.5	2.46 1.75 2.48 1.47 2.46 6.42 2.47 1.21 6.28 6.21 6.21 6.21 1.21 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.24 1.24 1.24 1.24 1.24 1.24 1.23 1.23 1.23 1.23 1.23 1.23 1.23 1.24 <th1.24< th=""> 1.24 1.24 <th1< td=""><td>Left Log <thlog< th=""> <thlog< th=""></thlog<></thlog<></td><td>1.0 1.23 1.6 1.6 1.6 1.73 1.31 1.3</td><td>1.03 1.03 1.03 1.03 1.03 1.03 1.01 <th< td=""><td>L-28 L-24 L-34 L-34 L-32 BB L-41 L-31 L</td><td>1.12 8.08 8.28 1.01 8.08 1.12 1.01 8.04 8.44 8.00 1.13 8.18 8.28 1.01 8.08 1.13 1.01 8.04 8.08 8.04 1.13 8.18 8.28 1.01 8.08 1.01 1.01 8.04 8.04 8.04</td></th<></td></th1<></th1.24<>	Left Log Log <thlog< th=""> <thlog< th=""></thlog<></thlog<>	1.0 1.23 1.6 1.6 1.6 1.73 1.31 1.3	1.03 1.03 1.03 1.03 1.03 1.03 1.01 <th< td=""><td>L-28 L-24 L-34 L-34 L-32 BB L-41 L-31 L</td><td>1.12 8.08 8.28 1.01 8.08 1.12 1.01 8.04 8.44 8.00 1.13 8.18 8.28 1.01 8.08 1.13 1.01 8.04 8.08 8.04 1.13 8.18 8.28 1.01 8.08 1.01 1.01 8.04 8.04 8.04</td></th<>	L-28 L-24 L-34 L-34 L-32 BB L-41 L-31 L	1.12 8.08 8.28 1.01 8.08 1.12 1.01 8.04 8.44 8.00 1.13 8.18 8.28 1.01 8.08 1.13 1.01 8.04 8.08 8.04 1.13 8.18 8.28 1.01 8.08 1.01 1.01 8.04 8.04 8.04
1 6.01 6.	LB LB L4 L53 LB LB L4 L53 LB LB L4 L53	2.54 1.74 6.40 1.60 6.40 6.32 6.32 6.33 6.33 6.31 <th6.31< th=""> 6.31 6.31 <th6< td=""><td>641 6,21 6,23 6,23 6,21 6,11 6,21 6,23 6,21</td><td>6.0 6.23 6.43 6.41 6.46 6.23 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.23 6.24 7.24 7.24 <th< td=""><td>1.03 <th< td=""><td>E.33 L.74 E.44 E.44 E.32 E.44 E.43 E.33 E.44 E.43 E.44 E.43 E.44 <th< td=""><td>1.13 0.16 0.28 1.11 0.16 1.12 1.11 0.16 0.13 0.16 0.06 <th0.06< th=""> 0.06 0.06 <th0< td=""></th0<></th0.06<></td></th<></td></th<></td></th<></td></th6<></th6.31<>	641 6,21 6,23 6,23 6,21 6,11 6,21 6,23 6,21	6.0 6.23 6.43 6.41 6.46 6.23 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.24 6.21 6.23 6.24 7.24 7.24 <th< td=""><td>1.03 <th< td=""><td>E.33 L.74 E.44 E.44 E.32 E.44 E.43 E.33 E.44 E.43 E.44 E.43 E.44 <th< td=""><td>1.13 0.16 0.28 1.11 0.16 1.12 1.11 0.16 0.13 0.16 0.06 <th0.06< th=""> 0.06 0.06 <th0< td=""></th0<></th0.06<></td></th<></td></th<></td></th<>	1.03 1.03 <th< td=""><td>E.33 L.74 E.44 E.44 E.32 E.44 E.43 E.33 E.44 E.43 E.44 E.43 E.44 <th< td=""><td>1.13 0.16 0.28 1.11 0.16 1.12 1.11 0.16 0.13 0.16 0.06 <th0.06< th=""> 0.06 0.06 <th0< td=""></th0<></th0.06<></td></th<></td></th<>	E.33 L.74 E.44 E.44 E.32 E.44 E.43 E.33 E.44 E.43 E.44 E.43 E.44 E.44 <th< td=""><td>1.13 0.16 0.28 1.11 0.16 1.12 1.11 0.16 0.13 0.16 0.06 <th0.06< th=""> 0.06 0.06 <th0< td=""></th0<></th0.06<></td></th<>	1.13 0.16 0.28 1.11 0.16 1.12 1.11 0.16 0.13 0.16 0.06 <th0.06< th=""> 0.06 0.06 <th0< td=""></th0<></th0.06<>
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Horstein A.H. B.H.	LB LB LB LB LD	3.63 1.73 6.47 1.61 6.47 6.17 6.18 6.18 6.14 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 1.61 6.14 <th< td=""><td>644 6.20 <th7< td=""><td>1.03 1.67 1.61 1.68 1.71 1.81 1.11 1.8 1.64 4.23 1.63 4.61 1.66 4.71 6.31 1.11 6.4 1.64 4.23 1.63 1.64 1.71 6.31 1.11 6.4 1.64 6.32 1.63 1.64 1.72 1.31 6.31 1.31 6.33</td><td>0 1.44 1.46 0.40 0.</td><td>6.33 6.72 6.64 6.05 6.64 6.02 600 6.04 6.04 6.01 6.04 6.33 6.72 6.04 6.05 6.04 6.01 6.01 6.04 6.01 6.0</td><td>1.03 0.04 0.03 0.04 0.03 0.04 <th0.04< th=""> 0.04 0.04 <th0< td=""></th0<></th0.04<></td></th7<></td></th<>	644 6.20 <th7< td=""><td>1.03 1.67 1.61 1.68 1.71 1.81 1.11 1.8 1.64 4.23 1.63 4.61 1.66 4.71 6.31 1.11 6.4 1.64 4.23 1.63 1.64 1.71 6.31 1.11 6.4 1.64 6.32 1.63 1.64 1.72 1.31 6.31 1.31 6.33</td><td>0 1.44 1.46 0.40 0.</td><td>6.33 6.72 6.64 6.05 6.64 6.02 600 6.04 6.04 6.01 6.04 6.33 6.72 6.04 6.05 6.04 6.01 6.01 6.04 6.01 6.0</td><td>1.03 0.04 0.03 0.04 0.03 0.04 <th0.04< th=""> 0.04 0.04 <th0< td=""></th0<></th0.04<></td></th7<>	1.03 1.67 1.61 1.68 1.71 1.81 1.11 1.8 1.64 4.23 1.63 4.61 1.66 4.71 6.31 1.11 6.4 1.64 4.23 1.63 1.64 1.71 6.31 1.11 6.4 1.64 6.32 1.63 1.64 1.72 1.31 6.31 1.31 6.33	0 1.44 1.46 0.40 0.	6.33 6.72 6.64 6.05 6.64 6.02 600 6.04 6.04 6.01 6.04 6.33 6.72 6.04 6.05 6.04 6.01 6.01 6.04 6.01 6.0	1.03 0.04 0.03 0.04 0.03 0.04 <th0.04< th=""> 0.04 0.04 <th0< td=""></th0<></th0.04<>
						134 137 134 156 154 153 10 154 154 154 154 154	

Dry Weather Flow (d/D \approx 0.07)

Frequency	Duration	Return Interval
N/A	>90% of Year (>328 days/yr)	N/A

d/D at TDS ≥ 0.3

d/D at TDS = 0.45 to d/D at TDS = 0.65

d/D at TDS = 0.65 to d/D at TDS = 1.0

d/D at TDS = 1.0 to d/D at OCIT-2 = 1.0

d/D at OCIT-2 = 1.0 to d/D at OCIT-3 = 1.0

d/D at OCIT-3 > 1.0

Storm	Peak d/D		Time Spent In Scenario (hours)					
Start Date	TDS	OCIT-2	OCIT-3	1. Filling Adit	2. Full at Adit	3. Full at TDS	4. Full at OCIT-2	5. Full at OCIT-3
4/12	1.57	1.44	1.24	2.1	3.4	1.2	0.9	5.4
8/13	1.57	1.42	1.23	1.8	7.6	2.5	1.8	5.6
7/7	1.56	1.42	1.23	1.6	3.2	1.2	1.1	2.7
7/2	1.11	0.95	0.76	1.6	3.9	2.2	-	-
8/20	1.02	0.87	0.68	1.7	5.2	1.6	-	-
4/13	0.85	0.70	0.51	2.4	3.4	-	-	-
7/21	0.65	0.48	0.31	3.7	-	-	-	-
4/9	0.64	0.48	0.30	5.1	-	-	-	-
9/9	0.55	0.40	0.21	1.9	-	-	-	-
7/28	0.55	0.39	0.21	2.2	-	-	-	-
1/27	0.49	0.34	0.16	2.9	-	-	-	-
8/11	0.48	0.31	0.13	0.7	-	-	-	-
6/29	0.46	0.30	0.12	0.4	-	-	-	-

Table 3-2. Peak d/D and Airflow Scenario Duration for Typical Year Storms

Ohio Canal Interceptor Tunnel

Airflow Scenario Frequency and Duration

Airflow Scenario	Typical Year Frequency⁵	Duration (hours)	Return Interval
Dry Weather Flow (d/D at TDS≤0.07)	>90% of year	N/A	N/A
Tunnel Full at OCIT-1 Connector (d/D at TDS>0.3)	22 / yr	Avg: 5.2 Max: 20.4 Annual: 124.0	>1 month
(1) OCIT-2 Adit Begins to Fill (d/D at TDS>0.45)	13 / yr	Avg: 6.2 Max: 19.3 Annual: 81.2	>1 month
(2) Tunnel Full at OCIT-2 Adit (d/D at TDS>0.65)	6 / yr	Avg: 8.8 Max: 17.5 Annual: 53.0	>2 month
(3) Tunnel Full at TDS (d/D at TDS>1.0)	5 / yr	Avg: 5.2 Max: 9.9 Annual: 26.2	>3 month
(5) Tunnel Full at OCIT-3 (d/D at OCIT-3=1.0)	3 / yr	Avg: 4.6 Max: 5.6 Annual: 13.7	>7 month

Ohio Canal Interceptor Tunnel – Level of Service

Untreated Airflow Emissions at TDS at Various OCF Levels of Service

TDS OCF Capacity (cfm)	Level of Service	Frequency of Untreated Emissions	Duration of Untreated Emissions
30,000	DWF Only	10% of typ year. 100+ / yr	Avg: 8 hrs / event Max: 34 hrs / event Annual: 40 days / yr
40,000	DWF + minor WWF (d/D<0.15)	40 / yr	Avg: 5 hrs / event Max: 21 hrs / event Annual: 16 days / yr
60,000	DWF + moderate WWF (d/D<0.35)	14 / yr	Avg: 5.5 hrs / event Max: 20 hrs / event Annual: 3 days / yr
80,000	DWF + all WWF	<1 / yr	N/A

Ohio Canal Interceptor Tunnel

- Recommendations:
 - Air Flaps/Ducts throughout system (Auxiliary Structures)
 - $_{\circ}~$ OCIT-1 Odor Control Facility
 - OCIT-2 Air Jumper
 - $_{\odot}~$ OCIT-3 Air Dispersion Stack

Ohio Canal Interceptor Tunnel

Odor Control Alternatives

No.	Alternative	Cost (\$MM)
1	-OCIT-1 Odor Control Facility, 30,000 cfm -OCIT-2 Air Jumper -Ventilation "Auxiliary Structures"	\$5.06
2	Alternative 1 PLUS: -OCIT-2 Odor Control Facility	\$6.70
3	Alternative 2 PLUS: -OCIT-1 Odor Control Facility, add'l 50,000 cfm -OCIT-3 Odor Control Facility	\$9.99

Ohio Canal Interceptor Tunnel

OCIT-1 Odor Control Facility

- $_{\circ}\,$ Technology Selection Workshop
- $_{\odot}\,$ 30,000 cfm Activated Carbon system
 - Two 15,000 cfm fans
 - Sized to induce negative pressure throughout entire tunnel system
- $_{\circ}\,$ Vent Vault for control of excess air flows

OCIT Vent Vault Structural Section

Summary

- Air-water interactions are key to many types of structures, including sewers
- Several mechanisms ventilate and move air within sewers and tunnels
- Consider air flow when designing sewers and tunnels.
 - $_{\circ}$ Ventilation considerations may affect sewer diameters and potential air ducts.
- For complex tunnel systems, evaluate the air flow and ventilation strategies of the entire system holistically early in the design
- Two case studies were presented in which tunnels under design were assessed for ventilation and odor control planning
- Proactive air management strategies decrease operations risk upon start-up / commissioning

Acknowledgements & Questions

Acknowledgements

- City of Akron
 - $_{\circ}~$ DLZ Corporation
 - $_{\circ}~$ V&A Consulting Engineers, Inc.
- NEORSD
 - $_{\odot}~$ McMillen Jacobs Associates & Wade Trim Joint Venture

References

- Falvey, H.T. (1980). Air-water flow in hydraulic structures. Denver, CO: U.S. Dept. of the Interior, Water and Power Resources Service, Engineering and Research Center.
- Pescod, M.B. and Price, A.C. (1982). Major factors in sewer ventilation. *Journal (Water Pollution Control Federation)*, 54(4), 385-397.
- Bentzen, T.R., Ostertoft, K.K., Vollertsen, J., Fuglsang, E.D., Nielsen, A.H. (2016). Air flow in gravity sewers – determination of wastewater drag coefficient. *Water Environment Research*, 88(3), 195-287.
- USEPA Design Manual, Odor and Corrosion Control in Sanitary Sewerage Systems and Treatment Plants (1985), EPA/625/1-85/018

Questions?

