



Technical Memorandum

Alley Structural Pavement Design Technical Memo

Document #: COE-IM-TMO-0004

Version: 02

Synopsis

This document is provided to give direction regarding the design and construction of residential and commercial alleyway structures.

Parent Document				Technical Memo	
VER	Date	Name	Number	Issued Date	Issued By
04	2021-10-22	Complete Streets Design and Construction Standards	COE-IM-GUIDE-0011	2023-02-07	Cherie Fuchs

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This memo provides clarity regarding the structural design and subgrade prep requirements for the design and construction of residential and commercial alleyways. Specifically, this memo is intended to address issues related to differences between greenfield development and brownfield renewal and reconstruction. Red line drawings to replace [Volume 2: Complete Streets Design and Construction Standards](#), **Standard Drawing 2040 - 4.00m Residential Alley** and **Standard Drawing 2041 - 6.00m Commercial Alley** have been included.

It should be noted that existing specifications for design and construction will not change unless noted in this document. This document will be reviewed and updated as required prior to formal update of the specifications.

Utilities Coordination

Coordination with utilities should occur at each stage of the design process. For capital renewal and reconstruction, this includes circulation of the 5-year capital plan, preliminary locates and data collection, issues mitigations, and circulations. Many shared opportunities exist to coordinate efforts, improve network performance, and reduce carbon footprint.

The 5-year capital plan should be circulated to all utilities for review and identification of any conflicts, issues or opportunities to coordinate works.

During preliminary design, utility locations including hydrovac elevations should be determined and recorded. Identify any issues that require use of an exception to **Standard Drawing 2040 - 4.00m Residential Alley** and **Standard Drawing 2041 - 6.00m Commercial Alley** or require coordination of utility relocation. Potential issues include poor soils, poor drainage, shallow utilities, change in structural requirements, et. al.

Utilities shall submit to the Project Manager (PM) trench backfill designs to be used where line relocations are required to enable appropriate road structure design. Post construction as-built drawings should also be submitted to the PM and recorded. As-builts should provide geolocates for line locations within the right-of-way including depth and be recorded.

Design Considerations

Future Use - Alley design should consider future use including infill and development. In some cases, alleys previously serving single family residential housing may require additional consideration where future use may include medium to high density residential or where additional infill or commercial development is anticipated. In some cases, the functional class of an alley may change.

Loading - Residential alleys are required to carry passenger vehicles, service vehicles, garbage trucks, and delivery trucks. Commercial alleys are likely to see more frequent use by larger and heavier delivery trucks and in some cases tractor trailers. Loading considerations should consider construction traffic.

Structures - Standard drawings indicate minimum structures. Loading (including construction traffic), use, tie-ins, drainage, utilities should be considered in the structural design to identify

any changes or improvements needed. Additional structure may be required for some alleyways with higher volumes of heavy traffic.

Subsurface Conditions - Obtain utility locates including depth during preliminary design and engage utility on any conflicts, concerns or coordinated works. Additional assessment to confirm soil conditions may be warranted, especially in cases of in-place recycling, special use, extensive failure of existing structure, or suspected unsuitable soils.

Pavement Structures

Residential Alley Structure

Unstaged Asphalt Pavement

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-LT (Single lift) ¹	100 mm	100 mm
Granular Base Course - Des 3 Class 20 (2 lifts) ²	225 mm	300 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift) - Des 3 Class 63 (bottom lift) ²	125 mm 150 mm	125 mm 225 mm

- 10mm-LT placement in a single 100mm lift is restricted to alley paving
- Atop prepared subgrade and non-woven geotextile or as specified by the engineer of record based on subgrade conditions and City approval.

Staged Asphalt Pavement

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-LT (Final Lift)	35 mm	35 mm
Asphalt - 10mm-LT (First Lift)	65 mm	65 mm
Granular Base Course - Same as above ¹		

- Atop prepared subgrade and non-woven geotextile or as specified by the engineer of record based on subgrade conditions and City approval.

Commercial Alley Structure

Unstaged Asphalt Pavement

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-HT (surface lift) ¹	50 mm	50 mm
Asphalt - 20m-B (bottom lift)	75 mm	75 mm
Granular Base Course - Des 3 Class 20 (2 lifts)	300 mm	375 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift) ¹ - Des 3 Class 63 (bottom lift)	150 mm 150 mm	150 mm 225 mm

1. Atop prepared subgrade and non-woven geotextile or as specified by the engineer of record based on subgrade conditions and City approval.

Subgrade Preparation

All greenfield alley pavement structures are at a minimum, to be placed atop 150 mm prepared subgrade in accordance with Sections 4.1 - Subgrade Preparation, 4.2 - Cement Stabilized Subgrade, and 4.3 - Proof Rolling within the [Complete Streets Design and Construction Standards](#). Where standard subgrade prep is carried out, a non-woven geotextile separation layer is required to be placed atop the prepared subgrade prior to placement of the specified pavement structure. See Section 4.5 - Geotextile. The exposed subgrade must be approved by the geotechnical engineer of record for the project and density and proof roll results accepted by the City prior to proceeding with base construction.

Special considerations for renewal or reconstruction of existing alleys

Alternative construction methods may be required to accommodate tie-ins, poor soil conditions, and shallow utilities where existing alleys are undergoing renewal or reconstruction. Alternatives listed below are approved for use where required for brownfield reconstruction or renewal projects only. Changes should be documented in the project change register with reference to this memo.

Option A - Alternative Subgrade Prep

In lieu of carrying out subgrade prep of in-situ soils, the following alternative is acceptable for brownfield alley renewal / reconstruction:

- Over-excavate to the depth of the recommended subgrade prep (minimum 150mm),
- Compact and proof roll the exposed soil,
- Place and compact 150mm of low to medium plastic engineered clay fill in accordance with Section 4.1 Subgrade Preparation
- Place a non-woven geotextile as a separation layer between the engineered clay fill and the pavement structures shown on the standard drawings.

Option B - Alternative Subgrade Prep (renewal/reconstruction only)

In lieu of carrying out subgrade prep of in-situ soils, the following alternative is acceptable for brownfield alley renewal / reconstruction:

Unstaged Residential

Unstaged Asphalt Pavement

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-LT (Single lift) ¹	100 mm	100 mm
Granular Base Course - Des 3 Class 20 (2 lifts)	275 mm	350 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift) ¹ - Des 3 Class 63 (bottom lift)	150 mm 175 mm	150 mm 250 mm
Non-woven geotextile and biaxial geogrid OR combigrid equivalent ²	-	-

1. 10mm-LT placement in a single 100mm lift is restricted to alley paving
2. Atop compacted and proof rolled soil

Unstaged Commercial

Unstaged Asphalt Pavement

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-HT (surface lift) ¹	50 mm	50 mm
Asphalt - 20m-B (bottom lift)	75 mm	75 mm
Granular Base Course - Des 3 Class 20 (2 lifts)	275 mm	350 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift) - Des 3 Class 63 (bottom lift)	150mm 175 mm	150mm 250 mm
Non-woven geotextile and biaxial geogrid OR combigrid equivalent ¹	-	-

1. Atop compacted and proof rolled soil



Other considerations

- Technical Services-Construction Materials and Testing should be contacted for consideration of other alternative methods as required including material changes or use of geocells.
- Technical Services-Construction Materials and Testing should be contacted to provide structural design for alleyways anticipated to carry exceptionally high volumes of heavy traffic.
- Planned work within 1.0 m of utility lines must be submitted to appropriate utility for review and comment

ENGINEERING
AUTHENTICATED BY

ENGINEERING RESPONSIBLE MEMBER QA
VALIDATED BY

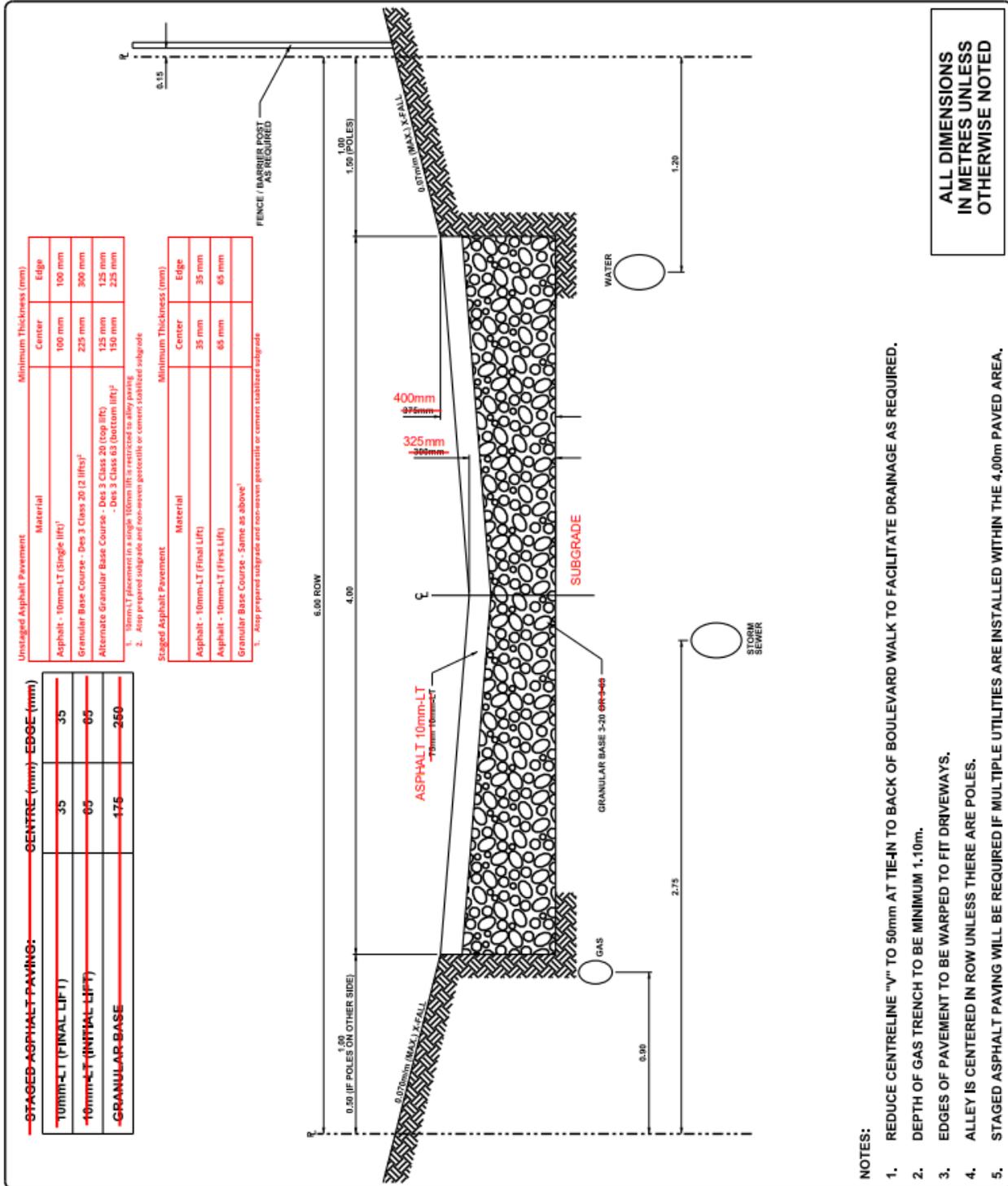
Cherie Fuchs, General Supervisor, Construction
Materials Engineering and Testing (CMET)

Natalie Lazurko, Director, Transportation
Planning & Design

Complete Streets Design Standards

Complete Streets Standards Drawings

COE-IM-GUIDE-0011



Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-LT (Single Lift)	100 mm	150 mm
Granular Base Course - Des 3 Class 20 (2 lifts)	225 mm	300 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift)	135 mm	135 mm
Alternate Granular Base Course - Des 3 Class 63 (bottom lift)	150 mm	225 mm

1. 10mm-LT placement in a single 100mm lift is restricted to alley paving.
2. Any prepared subgrade and non-woven geotextile or cement stabilized subgrade.

Minimum Thickness (mm)

Material	Center	Edge
Asphalt - 10mm-LT (Final Lift)	35 mm	35 mm
Asphalt - 10mm-LT (Final Lift)	65 mm	65 mm
Granular Base Course - Same as above	65 mm	65 mm

1. Any prepared subgrade and non-woven geotextile or cement stabilized subgrade.

STAGED ASPHALT PAVING:

CENTRE (mm)	EDGE (mm)
10mm-LT (FINAL LIFT)	35
10mm-LT (INITIAL LIFT)	65
GRANULAR-BASE	260

- NOTES:
1. REDUCE CENTRELINE "V" TO 50mm AT TIE-IN TO BACK OF BOULEVARD WALK TO FACILITATE DRAINAGE AS REQUIRED.
 2. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m.
 3. EDGES OF PAVEMENT TO BE WARPED TO FIT DRIVEWAYS.
 4. ALLEY IS CENTERED IN ROW UNLESS THERE ARE POLES.
 5. STAGED ASPHALT PAVING WILL BE REQUIRED IF MULTIPLE UTILITIES ARE INSTALLED WITHIN THE 4.00m PAVED AREA.

ALL DIMENSIONS
IN METRES UNLESS
OTHERWISE NOTED

STANDARD DRAWING

2021-10-22

4.00m RESIDENTIAL ALLEY

DATE APPROVED: **2018**

SCALE: **N.T.S.**

DRAWN BY: **KSYC**

CHECKED BY: **JN**

APPROVED: *M.A.R.*

DRAWING NUMBER: **2040**

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Complete Streets Design Standards

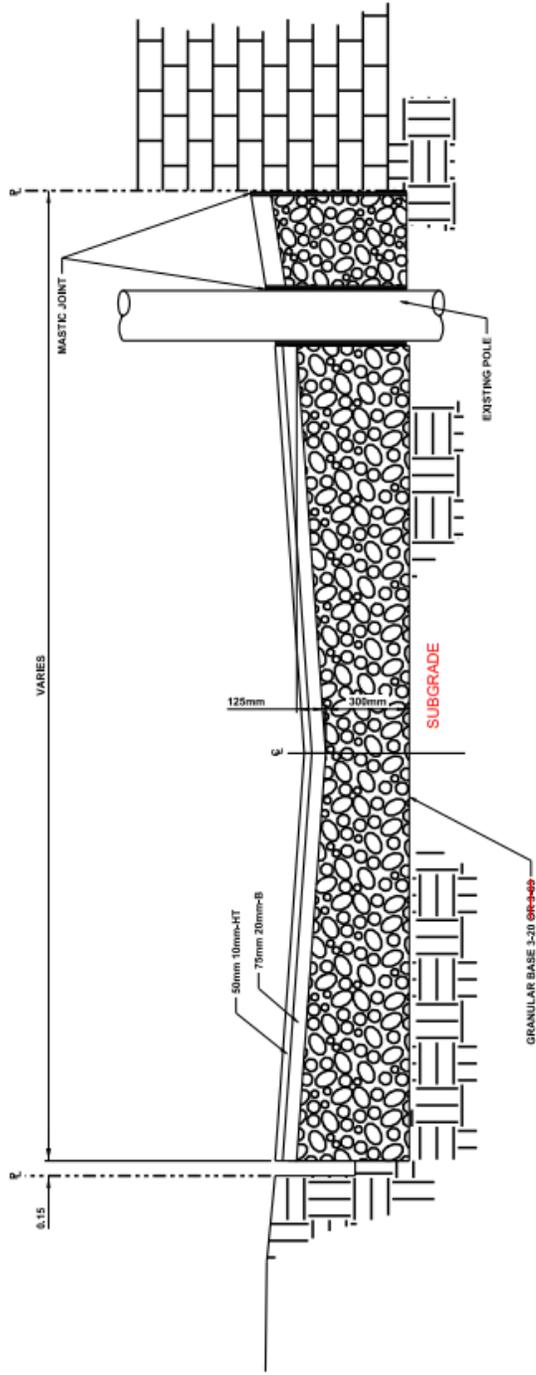
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Multiple Streets Diagrams Drawings

STRUCTURE	TYPE	CENTRE (mm)	EDGE (mm)	MINIMUM THICKNESS (mm)
ASPHALT		125	125	
GRAVEL	3-20	300	375	
ALTERNATIVE STRUCTURE	3-63	300	375	

Unstaged Asphalt Pavement	Material	Minimum Thickness (mm)
Asphalt - 10mm-HT (surface lift)		Center 50 mm Edge 50 mm
Asphalt - 20m-B (bottom lift)		Center 75 mm Edge 75 mm
Granular Base Course - Des 3 Class 20 (2 lifts)		Center 300 mm Edge 375 mm
Alternate Granular Base Course - Des 3 Class 20 (top lift) - Des 3 Class 63 (bottom lift)		Center 150 mm Edge 150 mm

1. Atop prepared subgrade and non-woven geotextile or cement stabilized subgrade



**ALL DIMENSIONS
IN METRES UNLESS
OTHERWISE NOTED**

- NOTES:
1. REDUCE CENTRELINE "V" TO 50mm AT TIE-IN TO BACK OF BOULEVARD WALK TO FACILITATE DRAINAGE AS REQUIRED.
 2. IN ALLEY CONSTRUCTION, THE SAG POINT MAY BE OFF CENTERED AND/OR THE CROSS-FALL VARIED TO MATCH EXISTING GRADES ALONG THE ALLEY EDGES.
 3. EXCAVATION LIMITS TO BE AS SHOWN ABOVE.

STANDARD DRAWING

2021-10-22

6.00m COMMERCIAL ALLEY

DATE APPROVED: 2018	DRAWN BY: KSYC	APPROVED: <i>M.R.</i>	DRAWING NUMBER: 2041
SCALE: N.T.S.	CHECKED BY: JN		

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