

S-24 UNSHRINKABLE BACKFILL

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24.01. SCOPE OF WORK

This specification shall cover the requirements for the supply of all materials, labour, and equipment necessary for the placing of Unshrinkable Backfill. This material shall be placed in all underground utility trenches and cuts, and around underground structures placed within the City of Windsor's right-of-way, that will be under a concrete, asphalt, or brick paver surface. This will include all items listed above as well as all other items of work as herein described.

24.02. REFERENCES

This specification refers to the following standards, specifications, or publications:

- OPSS 1359
- OPSS 1301
- OPSS 1302

24.03. MIX DESIGNS

Concrete suppliers that wish to supply the City of Windsor with Unshrinkable Backfill will be required to provide the appropriate mix designs and documentation confirming that their

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Unshrinkable Backfill meets the requirements of this specification. This documentation is to be provided to the City Engineer before the backfill is delivered to the site.

24.04. MATERIALS

Materials shall meet the following requirements:

- a) All granular materials in the mix shall be approved by the City Engineer.
- b) The unshrinkable backfill shall not contain any supplementary cementitious materials unless otherwise approved by the City Engineer.
- c) The contractor shall supply all materials.
- d) The material shall be mixed so that it will flow into the excavation and fill the entire space without the aid of vibration, further, this material should not show any signs of segregation as it is being placed in the excavation.
- e) Water used in the mix shall meet the requirements of OPSS 1302 and the cementing materials shall meet the requirements of OPSS 1301.

24.05. EQUIPMENT

Equipment shall meet the requirements of OPSS 1359 with the addition of the following requirements.

- a) The unshrinkable backfill shall be batched at a central mixing or dry batch plant capable of accurately measuring and mixing the required materials as per City of Windsor Standard Specification S-9.
- b) The discharge equipment shall place the unshrinkable backfill into the excavation using the chutes of the ready mix trucks, approved concrete pumping methods or by mechanical bucket placement.

24.06. CONSTRUCTION

Placement of the unshrinkable backfill shall meet the requirements of OPSS 1359 with the addition of the following requirements.

- a) If the backfill is being placed in cold weather, protection must be undertaken as outlined in City of Windsor Standard Specification S-9 for concrete placed in cold weather.
- a) Any bracing, shoring or sheet piling that may be required to protect existing structures or utilities, shall be removed, without damage to the structure or utility, as the backfilling proceeds.
- b) Unshrinkable Backfill shall not be placed in direct contact with any underground utility plant. A carefully compacted layer of acceptable granular backfill (by the utility) shall

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be placed to a depth of 300mm around the utility plant before the placing of the Unshrinkable Backfill. The Contractor is responsible to contact the appropriate utility to get approval of the backfill material and compaction method before the Unshrinkable Backfill is placed.

Failure to comply with the compaction method and granular material approved by the utility will result in the removal and replacement of the Unshrinkable Backfill at the Contractor's expense.

- c) The unshrinkable backfill shall match the line and grade of the underside of the existing adjacent hard surface within the excavated area. The permanent surface restoration is completed in compliance with the City of Windsor Standard Specification S-24.
- d) The unshrinkable backfill surface shall be screeded while it is still sufficiently flowable to achieve the desired grades and elevation. The surface shall be uniform and free from undulations and projections.
- e) When vehicular traffic needs to be accommodated, including construction equipment, the unshrinkable backfill shall be protected by covering it with a steel plate suitable for traffic loading for a minimum of 24 hours. The steel plate shall be fastened to the surrounding asphalt surface with steel spikes to prevent the displacement of the plate. The steel spikes shall be hammered flush with the top of the plate(s) and extend the full depth into the existing asphalt or to a maximum depth of 150mm.

Where vehicular traffic is not being accommodated, the backfilled area shall be entirely fenced off with orange construction fencing for the protection of users of the municipal right of way until the unshrinkable backfill, has in the opinion of the City Engineer, adequately set up.

Where unshrinkable backfill is to be used on a construction project in the roadway where the roadway is clearly marked closed except for local traffic and pedestrians, the backfilled area will be entirely fenced off with orange construction fencing for a minimum of 24 hours.

The contractor shall be responsible to maintain the plating or fencing until the unshrinkable backfill is accepted by the City Engineer.

24.07. QUALITY ASSURANCE

Quality assurance shall meet the requirements of OPSS 1359 with the addition of the following requirements.

- I. Slump testing shall be completed each time the unshrinkable backfill is sampled for compressive strength. Minimum slump is 150mm.
- II. Compressive strength testing shall be done according to OPSS 1359 with the following requirements.

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- a) No individual strength test shall be more than 0.1 MPa above the specified strength.
- b) Strength testing shall be the average of two 150mm diameter x 300mm long cylinders tested at the same age.
- c) The minimum test requirement shall be one set of two cylinders, per supplier, per day.

The unshrinkable backfill will be accepted when the compressive strength requirements are met.

If the compressive strength does not meet the minimum requirements set out in this specification, then the unshrinkable backfill shall be removed and replaced at the Contractor's expense including any and all other surface or sub-surface work that was undertaken by the Contractor before the unshrinkable backfill was accepted by the City Engineer.

24.08. MEASUREMENT FOR PAYMENT

Measurement for unshrinkable backfill shall be by volume, in cubic metres (m³).

Measurement shall be by the summation of delivery tickets supplied by the ready mix company supplying the backfill and that total shall not exceed 10% of the theoretical volume.

24.09. BASIS OF PAYMENT

Payment at the unit price bid for the above item shall be full compensation for all labour, equipment, materials and incidentals to do the work. Payment shall include, but not be limited to, the supplying and placing of the Unshrinkable Backfill and the supplying, placing and removing of the steel plates, including the steel spikes, the orange construction fencing, including the steel bars to support it or any other protection required by the City Engineer.