

Quality Matters

Vol. II, Issue 4 – Winter 2012

from the Quality Assurance Branch (QAB) of Highway Design

Implementing Access Management

Last issue, we addressed an overarching approach to access management in corridor planning and design. This article will lay out an important technique that allows a designer to effectively implement a non-traversable (i.e., depressed grass or raised curb) median. A median is one of the most basic and effective ways to minimize and separate conflict points. To successfully achieve this, a designer must identify the locations and designs of median openings while considering how drivers will safely get to and from each given property along that roadway.

Each full, unsignalized median opening introduces 32 conflict points. There are several techniques used to minimize the number of full openings, while still providing reasonable access to properties. Service roads, either in the form of a backage road or a well-designed frontage road, and the creation of U-turn locations are two ways to provide access.

One technique underutilized on highways in Kentucky is Directional Median Opening (DMO). The most common type of DMO allows a left-turn into a property while prohibiting left-turns or straight-out movements from the prop-



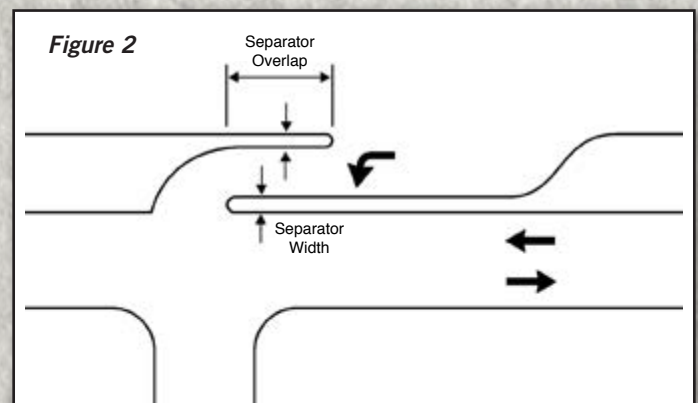
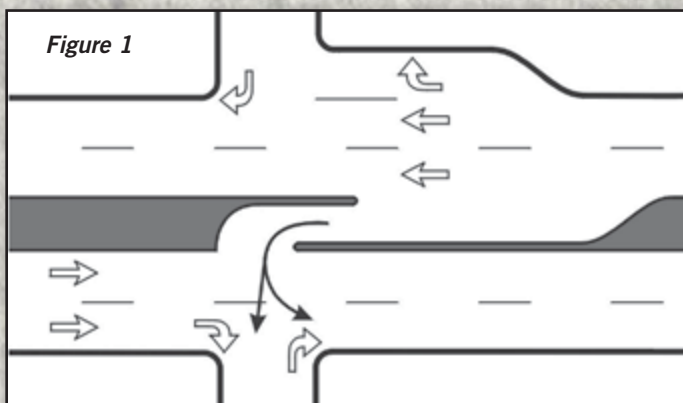
DMO on Eastern Parkway in Louisville

erty. This eliminates some of the most dangerous maneuvers a driver can make on a busy corridor. (See Figure 1.)

DMOs can be used at isolated locations or in a series, combined with full openings, along an arterial. On a heavily traveled highway, DMOs may need to be signalized. One of the advantages of the DMO is it can easily be integrated into a coordinated signal system. A pair of DMOs used for opposite access points can receive their green phase independently, allowing the full opening signals to dictate the timing sequence.

Ideally, the full openings would be at one-half mile intervals (allowing 45 mph progression) and one or two DMOs could be used in between. The number and spacing of DMOs depend on the deceleration and storage length needed to form the turning lanes. An example of this practice, found on the Division of Planning's [website](#), was done as part of a preliminary design study for Scottsville Road in Bowling Green.

To clearly channelize turning vehicles and prevent illegal turns, a DMO must incorporate a separator overlap of ap-



proximately 25 feet long. A median 18 feet wide is normally needed to allow for a raised concrete three-foot wide separator on each side and a 12-foot turning lane. In cases where space is limited, the width of separator overlaps may be reduced. (See Figure 2.)

The designer must also consider if the DMO will be used for U-turns or primarily to directly access the street or entrance. Is there enough room to accommodate a vehicle making a U-turn within the space of the median, travel lanes and shoulder or will an area outside the shoulder (i.e., loon) be needed?

The designer should also consider how drivers will get to destinations to the left when leaving a property. Is there a frontage or local road leading to a full access location? Is there a viable cross

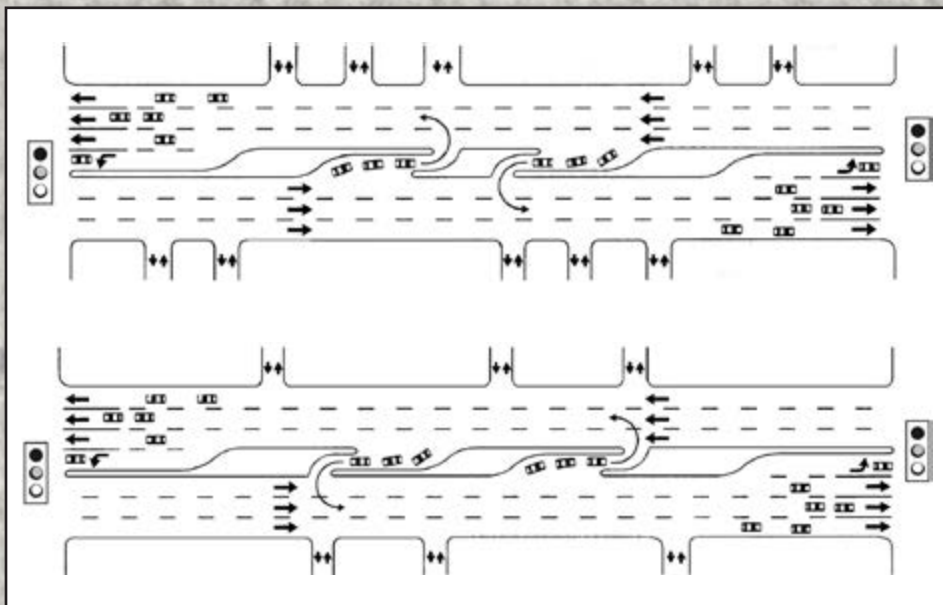
connection between private properties? Will drivers need to make an indirect left by turning right and then do a U-turn downstream? If not properly accounted for in the design, drivers will often make unsafe or illegal maneuvers to reach their destination.

In conclusion, a non-traversable median helps maximize the safety and throughput of an arterial. Using Directional Median Openings can be an effective strategy toward the secondary function of providing access along that corridor.

Recommended resources to learn more:

TRB Access Management Manual
Florida DOT Median Handbook

by [Brent A. Sweger, PE, AVS](#)



Farewell



Barely a year in QAB and gone...

We want to thank Roy Sturgill for his work as the Constructability Review Coordinator. He has contributed his time and talents to the Quality Assurance Branch by updating how the status of constructability reviews are kept. Also, he improved the Quality Matters newsletters by bringing his construction knowledge. Sturgill has started on a new journey with the Kentucky Transportation Center. He will work on transportation research, while pursuing his Doctorate in Construction Management. If you would like to contact him his new email is:

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Upcoming Training:

Kentucky Engineering Center: (kyengcenter.org)-many more online

- Dec. 5, 2012 – Fall/Winter Dendrology & Native Tree Identification
- Dec. 11, 2012 – MicroStation II (four days)
- Dec. 11, 2012 – Sewer/Stormwater One Day Seminar
- Feb. 5, 2013 – ACEC – Bridge/Structural Seminar

ATSSA courses: (<http://www.atssa.com/TrainingCertification/WorkZoneSafetyGrant.aspx>)

- Feb. 4-6, 2013 – ATSSA – Work Zone Safety Traffic Control (Course #31957 & 31958)



Selection of the Earthwork Bid Item

On most grade and drain projects earthwork is a major item and can represent the single largest portion of the construction cost. Therefore, it is important that plans contain sufficient and accurate earthwork information, which normally is provided through cross-sections, geotechnical information, earthwork summaries, etc.

In addition, it is necessary to determine the appropriate earthwork bid item for the general summary and bid package. Based on the General Summary sheet standard specifications, the specific bid item is significant during the bidding process and administration of the construction contract, especially if earthwork-related change orders or claims arise during construction.

As part of normal practice, the standard bid item of ROADWAY EXCAVATION (item code 02200) is used when the overall project balance indicates more material will be generated from project cuts than the amount needed for proposed embankments.

Conversely, the standard bid item of EMBANKMENT IN PLACE (item code 02230) is used when the balance indicates insufficient material is available from proposed cuts for all required proposed embankments, thus requiring borrow.

With the selections as described above being KYTC's representation to prospective bidders of the estimated overall project balance (excess or borrow), only one of these items is declared on a project. Even though payment for

both items is based on the design plan quantity, the specifications have some differences.

During construction, if the balance was opposite of the depicted bid item (i.e., setup as Roadway Excavation but ended up requiring borrow), the current (2012) specifications now contains language for addressing additional payment. However, this type of situation could result in significant additional costs for KYTC.

Therefore, it is essential that during final design phase (after geotechnical report is complete, final grades/slopes established, etc.) the earthwork balance should be analyzed carefully, utilizing shrink/swell factors, to select the appropriate bid item. Sometimes just looking at the raw embankment and excavation volumes can be misleading, especially if balance is close.

Keep in mind the raw, neat-line volumes calculate the pay quantity and are listed in the earthwork summary on plans. For internal analysis of overall balance, the shrink/swell factors should be used for calculations and those factors should not be placed on the plan sheets. If project phasing has an impact on available material and balance, those need to be included as notes in the plans for clarification.

For several years, KYTC used SPECIAL NOTE FOR EXCAVATION AND EMBANKMENT (10Z) on some projects when the net earthwork balance was close and not clearly apparent. Special Note 10Z provided for use

of dual earthwork bid items of EXCAVATION (21554EN) and EMBANKMENT (21553EN); payment was made for cross-section volumes of both items (essentially paying twice for moving the same cubic yard of material). In some cases, this produced unbalanced bids, while skewing the earthwork fuel adjustment. During committee meetings for developing the 2012 Standard Specifications, representatives from the highway construction industry expressed difficulty in bidding contracts with this note. In conjunction with the new 2012 Standard Specifications, which included some revisions to the excavation section, KYTC decided to eliminate Special Note 10Z and use the standard specifications.

For all projects being let under the 2012 Specifications:

- Special Note 10Z has been eliminated.
- Do not use dual bid items of EXCAVATION (21554EN) and EMBANKMENT (21553EN) on any project.
- On projects with close balance, designer/KYTC should review internally using estimated shrink/swell factors to determine the most likely net balance situation (waste or borrow), and select either ROADWAY EXCAVATION (2200) or EMBANKMENT IN PLACE (2230) as the earthwork bid item.

by [Rodney Little](#), PE

New Bid Item: Erosion Control Blanket – Short Term

As a follow-up to an article in the last issue, [“Erosion Control Blanket - Help, Hindrance, or Both?”](#), a new bid item, has been created for a rapid photodegradable matting that lasts only 90 days. It is called “Erosion Control Blanket –

Short Term” labeled 24560EN and measured in square yards.

There is one cable guardrail project identified in the December letting that will have hydromulch and Erosion Control Blanket – Short Term in the plans.

(Item 8-2804.00) The Quality Assurance Branch will follow up with the District to assess the outcome after placement. Stay posted for the results, lessons learned and recommendations.

by [Boday Borres](#), PE, AVS

Lessons Learned

This is the fourth installment of the series titled “Lessons Learned from the Post Construction Review (PCR) Circuit.” The Quality Assurance Branch (QAB) continues to meet with various divisions and districts to solicit input from KYTC staff, design consultants and contractors. We have chosen to highlight the following issues from the most recent discussions.

Reinforcing Entrance Curb

We were informed about a situation where entrance radii were being damaged shortly after completion of construction due to large trucks entering and exiting. In this particular case, the Cabinet directed the contractor to repair curb sections and reinforce them with a mountable curb apron installed behind the curb. It was the consensus of the PCR team this method should be considered for areas where entrance delineation is being proposed in and around businesses with a large volume of truck traffic.

Although handled as described, designers can check truck turning tem-

plates at entrances. It should be done for both left and right turns. Driveway width, driveway lane widths, or curb radii may need to be adjusted accordingly.

Granular Embankment Bid Items

Due to the variability in the material available from local sources for granular embankment, a PCR team discussed the possibility of improving the presentation of those items in the contract documents during a recent meeting. It was recommended designers should consider using separate bid items for erodible and non-erodible granular embankment to better reflect the quantities as indicated in the geotechnical report.

QAB recently reviewed a project that had granular embankment specified for various areas and purposes. Actual granular embankment, as defined in the specifications, was unwarranted in some locations because it was not being utilized for drainage purposes. The actual intent was to use rock embankment, which is normally more cost effective than paying for the item of Granular Embankment.

According to the PCR team, sometimes the geotechnical report will inadvertently call for granular embankment when really the intent is for rock material to be used. Another potential source of confusion was the lack of clarity in the spec book when describing the uses and applications of granular embankment and as such it is not uncommon for geotechnical notes to conflict with the roadway plans.

by [Nathan Wilkinson](#)

[Lessons Learned Database Online](#)

Straightening Out What's Included in Diversions

One district has recently received intent for a claim from a contractor who thinks he should be paid for any temporary pipe needed for a diversion. KYTC interprets the specification addressing diversions (Section 112.04.18) differently.

The spec reads, “The Department will not measure grade and drain work for payment and will consider it incidental to this item. The Department will measure base course and surface course items for payment. The Department will not measure installation, maintenance or removal for payment and will consider them incidental to this item of work.” The Cabinet’s interpretation is that any temporary structures are incidental to the bid item.

Until the specification is clarified, when the diversion bid item is used, designers can add notes to the general summary sheets to address what work and items are included.

Also, if there is more than one diversion on a project, consider bidding them separately, each as lump sum. If a contractor’s work method enables the work to be completed without one of those diversions, it can be eliminated without renegotiating a price for the remaining diversions.

by [Gary Raymer, PE](#)

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