

Transportation Planning Quarterly Report

October 2021

Administrative Activities

- Attended Charlottesville-Albemarle Metropolitan Planning Organization (CA-MPO) Tech Committee and Policy Board meetings in July and September
- Attended Thomas Jefferson Planning District Commission (TJPDC) Rural Transportation Technical Advisory Committee meeting in July and September
- Attended monthly Virginia Department of Transportation (VDOT)-County Transportation Meetings
- A public hearing to designate Routes 240 & 810 as Virginia Byways was held at the July 7 meeting where the Board supported the designation. The Byway designation request will go to the Commonwealth Transportation Board (CTB) at the October 2021 meeting for a vote on final approval.

Entrance Corridor Fixes

Albemarle County Board of Supervisors voted at their February 3, 2021 meeting in support of submitting a request for changes to the functional classification system on five highway segments in the County. The application request was also endorsed by the CA-MPO at the March 24, 2021 meeting. On August 12, after working to develop the applications, staff sent the materials to VDOT for the request of the functional classification changes from Major Collector to Minor Arterial for the following road segments:

- Avon Street Extended (Route 742) - Entire segment (City limits to Route 20)
- Barracks Road (Route 654) - City limits to Georgetown Road
- Thomas Jefferson Parkway (Route 53) - Entire segment (Rt. 20 to Fluvanna County line; an alternative is Rt. 20 to Rt. 795)
- Richmond Road (Route 250 East) - Route 22 to Fluvanna County line
- Old Lynchburg Road (Route 631) - Sunset Ave (Route 781) to Hickory Street

Albemarle County Transportation Priorities

County staff continues work to advance the projects on the Albemarle County Transportation Priorities list. Advancement constitutes planning, funding, design and engineering, construction, or implementation of the project. The typical methods to advance these projects are through the biennial grant programs administered by the State and Federal transportation Agencies such as Smart Scale, Revenue Sharing, and Transportation Alternatives, among others. Local sources of funding are available for any phase of a project, primarily through the Albemarle County Capital Improvement Program.

At the May 19 Board Meeting staff presented an update on the projects from the 2019 Transportation Priorities List, approved by the Board at the July 3rd, 2019 Meeting. The update included the following funding programs and information. (Numbers represent ranking on Albemarle County Transportation Priorities List 2019)

Smart Scale

2022 Applications

Staff is currently working with the CA-MPO, the TJPDC, and VDOT to develop projects for potential 2022 Smart Scale applications. The following projects have been recommended by the CA-MPO Policy Board for submission for this upcoming Smart Scale round.

#1. District Avenue Roundabout – This project was initially a component of the recommended Hydraulic/29 Intersection Improvements package which failed to get funding in 2018 Smart Scale application. It was removed from the 2020 application but is now recommended for a 2022 Smart Scale application by the CA-MPO.

N/A. Rivanna River Bike and Pedestrian Bridge: South Pantops to Woolen Mills – The Rivanna River bike and pedestrian bridge was a priority recommendation from the Jefferson Area Bicycle and Pedestrian Plan and is also identified in the Rivanna River Corridor Plan currently in development. VDOT performed an evaluation on potential locations for this bridge in 2020 and focused in on two locations in the Woolen Mills/Riverview Park/State Farm/Martha Jefferson area. The Charlottesville-Albemarle MPO has recommended an application for this project in the upcoming Smart Scale round. Additional planning and conceptual design by VDOT will be necessary. CA-MPO staff will lead additional public engagement on this project, and a stakeholder group that will meet monthly is currently being formed.

#10. Avon Steet Corridor Bicycle and Pedestrian Improvements – The recently completed Avon Street RE(Vision) Study, as well as the City of Charlottesville Bicycle & Pedestrian Plan and the most recent Long Range Transportation Plan identify a need for improved bicycle and pedestrian infrastructure along this developing corridor, which includes access to 5th Street Station. The Charlottesville-Albemarle MPO has recommended an application for this project in the upcoming Smart Scale round. The application will likely focus on bicycle and pedestrian improvements along Avon between Druid Avenue and the Avon Court Park & Ride. It should be noted that another Avon Street Corridor project (south of I-64) is being considered as a possible 2022 Smart Scale application by either Albemarle County or the TJPDC; this project is described in greater detail in the next section.

#19. 5th Street Extended Multimodal Improvements – This project would extend bicycle and pedestrian infrastructure from the recently approved 5th Street Hub and Trails project north to Harris Road; the project would also address the intersection of 5th Street and 5th Street Station Parkway. It should be noted that another 5th Street Extended project (further south) is being considered as a possible 2022 Smart Scale application by either Albemarle County or the TJPDC; this project is described in greater detail in the next section.

The following projects have been discussed as possible 2022 Smart Scale applications by either Albemarle County or the TJPDC:

#4. Hillsdale Drive Extension and Realignment Phase 1: Mall Drive to Rio Road – Recommended in the Rio29 Small Area Plan, this project proposes to construct a new public roadway along the eastern boundary of the Fashion Square Mall property from Mall Dr to Rio Rd, a roundabout at the new intersection with Rio Rd with a connection to a realigned Putt-Putt Place. This project is currently being further evaluated through the Rio Rd Corridor Study. Additional study is likely necessary prior to being submitted for construction funding. This additional study should be considered for potential Transportation Leveraging Funds through the CIP.

#9. US 250 Corridor Improvements – Hansen Rd to Peter Jefferson Parkway: This potential project was identified as a VTRANS Need and is recommended for study under the VTRANS Multimodal Project

Pipeline program. This process would evaluate the segment for a variety of potential improvements to address identified multimodal transportation needs. Possible improvements could include park and ride and transit improvements, intersection operations, and bicycle and pedestrian connectivity. With the County's agreement, VDOT will undertake this study in coordination with the various stakeholders.

#10. Avon St. Bicycle and Pedestrian Improvements – Mill Creek Dr to Peregory Lane: This project is a segment of a recommendation from the Southern Areas Master Plan, the top priority recommendation from the Avon Street Corridor Study, and a proposal from the Quality-of-Life program. The recommendation is to construct a shared-use path adjacent to Avon St on the west side of the road from Mill Creek Dr to Peregory Ln. It also includes a pedestrian crossing of Avon St near the Lakeside Apartments. This project was initially submitted as a pre-application for the current round of Revenue Sharing; however, limited availability of revenue sharing funds have caused staff to evaluate this project for a potential Smart Scale application instead.

#16. US 250 West/US 29 Bypass Interchange – The interchange ramps at Ivy Rd (US 250) and the US 29 Bypass were identified in the US 250 West STARS Study as a high priority location for improvements to address safety and congestion issues in this critical regional corridor. It was also acknowledged that issues at these interchange ramps were tied to the US 250/Old Garth/Canterbury intersection. VDOT is currently evaluating this segment to identify potential solutions which could be the subject of a Smart Scale Grant in 2022.

#17. Belvedere Boulevard/Rio Road Intersection Improvement – Improvements at this intersection were initially proposed for a Smart Scale application in 2020. However, it was determined that the improvements at the adjacent intersection of John Warner Pkwy and Rio Rd were a necessary first step to this project and so it was removed from the application. The Rio Corridor Study is now further evaluating the recommendations for the Belvedere Intersection and it is recommended that the results of that evaluation determine the possible Smart Scale application in 2022.

#19. 5th Street Extended Bicycle and Pedestrian Improvements – Recommendations from the recently completed 5th St STARS Study included bicycle and pedestrian improvements along the entire corridor. Ongoing development in the corridor is exacerbating the need for more multi-modal connectivity. This proposal is to extend the shared-use path proposed by the ABC development to the north and south to create a continuous facility on the west side of 5th St/Old Lynchburg Rd from Sunset Ave Ext to Afton Pond Ct (Stagecoach Rd). Additional intersection improvements are also being explored.

#21. Crozet Ave/US 250 West Intersection Improvements – This intersection was identified in the Crozet Area Transportation Study and ongoing Master Plan update as currently experiencing failing movements and significant failure in the future. However, it should be noted that this priority ranking was set prior to that Study which showed that the more serious issue in this segment of 250 is the Old Trail/WAHS/US 250 intersection. It is staff's recommendation that it would be more effective to address that intersection prior to the Crozet Ave intersection. A two-lane roundabout at both the WAHS/Old Trail/250 intersection and the Brownsville-Henley entrance are recommended to address the issues in this segment.

#39. US 250/Route 22 & US 250/Milton Dr Intersection Improvements – VDOT has identified this project through the VTRANS Needs Assessment and has recommended it for study under the VTRANS Multimodal Project Pipeline program to evaluate the potential alternatives to address congestion and safety issues with these intersections. With the County's agreement, VDOT will undertake this study in coordination with the various stakeholders.

2020 Applications

The results of the Smart Scale Projects submitted in 2020 which were approved with the Six-Year Improvement Program at the Commonwealth Transportation Board July include the following projects:

- #1. Hydraulic/29 Intersection Improvements:** The major features of this project include removal of the left-turns from Hydraulic to US 29, a pedestrian bridge over US 29, a new transit station, a protected left turn lane from Angus Rd, and a Roundabout at the Hydraulic/Hillsdale intersection.
- #2. Rt 250 East Corridor Improvements (Pantops) - From I-64 interchange to City Limits:** This project will close the center turn lane with a median between the Rt 20 intersection and Rolkin Rd with potential breaks at Hansen Rd, Town & Country Ln, and People Place for limited movements and additional right-turn lanes as necessary. Sidewalk gaps will also be addressed.
- #6. Fontaine Ave/29 Bypass Displaced Left-turn:** This project will reconstruct the existing traditional unsignalized diamond interchange to a partially displaced left-turn intersection also accommodating U-turns that would allow closure of the current left turn movement from northbound Rt 29 to westbound I-64. A Shared-use Path is proposed through the segment as well.
- #7. Old Lynchburg Rd/5th St Ext Intersection Improvements:** This project will address failing operations at the entrance to the County Office Building on 5th St with a roundabout including pedestrian crosswalks.
- #15. Rt 20/Rt 53 Intersection improvements:** This project will convert this intersection into a roundabout and include bicycle and pedestrian accommodations.
- #14. Rio Road/John Warner Parkway Intersection:** This project will construct a roundabout to address identified traffic issues at this intersection and improve pedestrian and bike facilities.
- #35. US 29 Shared-Use Path - From Seminole Lane North to Carrsbrook Drive:** This project will construct a shared-use path on the east side of US 29.
- #82. I-64/Exit 107 Crozet Park and Ride Lot:** This project will construct a park and ride lot at the corner of Patterson Mill Lane and US 250 just south of the I-64 interchange. This lot could potentially be served by both the Crozet Connect and the proposed Afton Express transit lines.

2018 Applications

One project was funded in Albemarle County in the 3rd Round of Smart Scale.

- #3. Intersection Improvements at Route 20/US 250 in Pantops:** The project will rebuild the traffic signal, add additional turn lanes and reallocate other lanes, add a pedestrian crossing of US 250 and crossings of Route 20 and Riverbend Drive, and close existing sidewalk gaps approaching the intersection. The project is currently in the design phase with expected construction in the 2025-2026 timeframe.

Revenue Sharing

2021 Applications

Staff submitted the following application for Revenue Sharing on October 1st.

- #8. Eastern Ave South: US 250 across Lickinghole Creek to Cory Farms Road** - This project is currently being evaluated through an alignment study and conceptual design which is funded through the Transportation Leveraging Fund in the Capital Improvement Program (CIP). The result of this study, which will produce 30% level design drawings and a conceptual cost estimate will be used to seek the necessary funding to complete construction on the project. The alignment report was presented to the Board in January and the preferred alignment was selected.

2019 Applications

One project from the FY19 application cycle is moving forward as a Revenue Sharing project while a second project that was initially applied for through the Revenue Sharing program is moving forward as a locally funded project. Both are described below.

#5. Berkmar Drive to Lewis & Clark Drive - Hollymead Town Center to Airport Road: This project will extend Berkmar Dr from its current terminus just north of Timberwood Blvd to Airport Rd and includes construction of a roundabout at the Airport Rd/Berkmar Dr/Lewis and Clark Dr intersection. Bike lanes and pedestrian facilities are also included. Previous funding has already initiated design, engineering and construction is anticipated for 2025. Total project cost is ~\$11MM with ~\$5MM local funding. A project kick-off meeting was held with the design team, VDOT, and Albemarle County staff.

#26. Old Lynchburg Road Bicycle and Pedestrian Improvements: This priority project to address connectivity issues was recommended for funding through the Board of Supervisors Quality of Life program. Initially staff attempted to use the funding as leverage through the Revenue Sharing Program to expand the project to include the segment of greenway between Sunset Ave and Old Lynchburg Rd. Unfortunately, the full project was not funded as a result of funding shortages related to COVID. Therefore, it was decided to focus on the Old Lynchburg segment only utilizing local funds. A consultant has provided a scope and cost for the design and preliminary engineering and staff will be going to the Board for appropriation of funds for the design and preliminary engineering phases.

2017 Applications

- **Commonwealth Dr./Dominion Dr. Pedestrian Improvements** – This project will construct continuous sidewalks on Commonwealth Dr from Hydraulic Rd to Dominion Dr and Dominion Dr from Commonwealth Dr to Rt 29. Initial designs came in over budget and staff has been reviewing funding and potential design options presented by the consultant to determine a preferred design alternative prior to coming back to the Board and public to present potential options to address the cost increases.
- **Crozet Square** – This project will reconstruct Crozet Square and Oak St to improve traffic flow and parking. Engineering and design phase are underway, heading into right-of-way phase; and construction is planned to begin mid-2022.
- **Library Avenue Extension** – Staff has been working closely with the private developer designing this project and VDOT through the engineering and design phase. This has involved numerous public and project team meetings to determine design requirements that meet VDOT standards. The project team is in the process of finalizing design, and the Right of Way phase will begin soon. Construction is expected to begin in late 2022.
- **Berkmar Drive Bicycle and Pedestrian Improvements** – This project, will extend the shared-use path on Berkmar Dr from Hilton Heights Rd to just south of Woodbrook Dr. A second phase of this project, funded through the Quality-of-Life effort, would extend it to Rio Rd. A consultant is now under contract for design and engineering.

Albemarle County FY 22-27 Secondary Six-Year Plan (SSYP)

The SSYP allocates funding for the construction, maintenance, and improvement of roads in the state secondary system including the hard surfacing of unpaved roads. The Board approved the FY 22-27 SSYP and the Albemarle County Priority List for Secondary Road Improvements, Unpaved Roads at the public hearing held on May 19, 2021. The Board identified the need to consider environmental factors in the identification of roads both to be paved and those to not pave as well as a desire to ensure public outreach on roads on the list but no specific changes were made at this time. Through the SSYP and supported by Resolutions, letters to the

property owners on the Rural Rustic Roads to be paved in FY22 (Burnt Mill Road, Hammocks Gap Road, and Harris Creek Road) were sent and comments received. The Board supported by Resolutions all these roads for Rural Rustic Road Paving at the July 7 Board Meeting. In January 2022 staff will begin FY23-28 SSYP update.

Major Planning Efforts

Route 29 North Corridor Study

Staff has begun working with VDOT and the TJPDC on an evaluation of the 29 Corridor from Airport Road north to Deerfield Drive in Greene County. The purpose of this study is to identify safety and operational improvements for the corridor. A Kick-off Meeting, the first Stakeholder Meeting, and the first of two public meetings have been held, and the consultant has completed a technical memo that reviews existing conditions for all modes and safety analyses. A second public meeting will be held in early 2022. The estimated completion date for this study is February 2022.

Rio Corridor Study

Staff is working with the consultant on the corridor study which is evaluating transportation in the Rio Corridor. The initial extents of the project were from US 29 to approximately John Warner Parkway, but a second phase was approved in the previous quarter to extend the proposal south on Rio Road to the City Line. The consultant is currently focusing on data collection and an assessment of existing conditions in the Corridor. The initial public meetings to discuss the project and gain feedback were held in March. Public input opportunities are ongoing with three community pop-up meetings at three locations along the corridor to gather feedback on the study design concepts and recommendations. Regular meetings are being held with various County staff to continue to advance this project.

Crozet Master Plan

Staff has been working on the update to the Crozet Master Plan. This quarter, the transportation study performed in association with the Master Plan was completed, and the recommendations were incorporated into the draft Master Plan. Staff also assisted in the public meetings to discuss these recommendations with the community and the Planning Commission. The draft Crozet Master Plan document was finalized, and a public hearing was held with the Planning Commission on September 14. The Board of Supervisors public hearing will be held October 20.

Multimodal Transportation Plan

Staff are currently drafting a scope of work for a multimodal transportation plan that will be included within the upcoming update to the Comprehensive Plan. The Multimodal Transportation Plan will use population data, land use information, and public input to identify important activity centers throughout the county and, subsequently, how to facilitate movement through and between those centers for individuals of all ages and abilities, no matter the travel mode they choose. Both urban and rural areas of Albemarle County will be considered in the Multimodal Transportation Plan.

Earlysville/Reas Ford Intersection Improvements

The County is engaging with consultants to explore options for safety improvements at this intersection.

Public Transit Program

Regional Transit Partnership

Staff attends the monthly meetings of the partnership. One significant topic currently underway through the partnership is the Regional Transit Vision Plan, a partially grant-funded effort to collaboratively develop a clear vision for the future of transit in the region. Since the last update, TJPDC staff hosted a kick-off meeting with stakeholders, and another stakeholder meeting (open to the public for viewing only) is set for October 7th. A project website is now online. This study will be complete no later than June 2022.

Transit Stop Improvements

Staff has been working with CAT and stakeholders to make improvements at select transit stops around the county. Improvements include installation of benches or other seating, shelters, or minor alterations in the routing or stop locations to improve safety, convenience, or circulation. Much of this work is also being coordinated with proposed developments that can offer stop locations or amenities. Additionally, staff has been participating the “Sense of Place” project to bring public art to select bus stops in Albemarle County. Staff has been coordinating on the efforts towards the pilot projects located within the Stonefield development. Once the process is developed for the pilot, other areas may be explored for future rollout.

Albemarle County Transit Expansion Study

This study is also the result of a recent grant the TJPDC was awarded from the DRPT. This is a feasibility study and an implementation plan for expanded transit service to population and employment centers in the Pantops area, Thomas Jefferson’s Monticello, and along Route 29 north between City Limits and the UVA Research Park and Rivanna Station. Since your last update, public meetings were held for the Route 29 and Pantops study areas; stakeholder meetings were held for all three study areas. Multiple transit service scenarios will be presented to the technical committee in early October and to the general public in late October. The timeline for this effort will take it through January of 2022 allowing any recommendations to be submitted for demonstration project funds through DRPT.

Bicycle and Pedestrian Program

- Staff attended the Regional Bicycle and Pedestrian Coordination Committee monthly meetings, made up of representatives from the City, the TJPDC, and UVA, and the Regional Greenways Advisory Group, which is an outgrowth of a grant received by the Piedmont Environmental Coalition and the CA-MPO, on planning and implementation of the recommendations from the 2019 Jefferson Area Bike and Pedestrian Plan. .

Currently Funded Projects

Two projects previously approved for Transportation Alternatives Grants are currently underway and approaching construction:

- **Greer/Jouett Bike/Pedestrian Improvements** – Funded in 2018, the project would construct sidewalk and shared-use paths to connect from Hydraulic Rd to Greer ES. Engineering and design phase is complete. This project was put out to bid for construction. Construction is likely to begin in Summer 2022.
- **Mountainview ES Pedestrian Improvements** – Funded in 2018, this project will construct a pedestrian crossing of Avon St and connections to the front of Cale ES. The engineering and design phase is complete. This project was put out to bid for construction but bids came back over budget. Funds have

now been identified to move to the project to get it completed. Construction is underway and final completion is anticipated by early-October.

Bicycle and pedestrian projects currently under construction include:

- **Ivy Road (US 250) Bicycle and Pedestrian Improvements** - This project will construct continuous sidewalk on the south side of Ivy Road from the City Line west to Stillfried Lane and include bike lane and curb and gutter. A crosswalk and pedestrian signals will also be installed to cross Ivy Road at the Old Ivy Road intersection.
- **Avon Street Pedestrian Improvements** – This project will construct various segments of sidewalk on Avon Street Extended between Swan Lake Drive and Arden Drive.
- **Rio Road Pedestrian Improvements** – This project will construct segments of sidewalk along Rio Road from the John Warner Parkway to Towne Lane and include a new pedestrian crosswalk and pedestrian signal at the Pen Park Road intersection.
- **US 250 West Pedestrian Improvements** – This project will construct segments of sidewalk along US 250 West in Crozet from Cory Farms Drive to Clover Lawn Lane and include a new pedestrian crosswalk and pedestrian crossing beacon near Clover Lawn Lane.

Bicycle and Pedestrian Planning

There are several bicycle and pedestrian projects that are in the early, conceptual planning stages.

- **Free Bridge Lane** – This roadway between Darden Towe Park and 250 currently has shared use path along the west side of the unstriped roadway, but there are concerns that the shared use path is poorly defined at some parts, making it a hazard to vulnerable users. Free Bridge Lane currently sees low traffic volumes. Future use of Free Bridge Lane includes access to a future Albemarle County park site (using proffered land just to the east of the roadway). Staff have requested a conceptual design and limited feasibility study from LPDA to investigate limiting motor vehicle travel to southbound only, improving bicycle and pedestrian facilities, and addressing parking needs for the future park site.
- **Route 20 Shared Use Path** – Staff have begun to conceptualize a shared use path on the east side of Route 20 from Quarry Road to at least as far south as Dairy Barn Road. Challenges to this design include crossing I-64 on- and off-ramps, bridging Moor’s Creek, and limited space beneath I-64. Any conceptual designs will be discussed with VDOT before additional steps are taken.

Additionally, staff has been working VDOT’s Charlottesville Residency to identify bicycle accommodations that can be incorporated into the routine paving schedules. This effort aims to implement bicycle infrastructure (bike lane, shared roadways, or additional shoulder) where previously identified and VDOT finds acceptable.

Development Projects

Transportation staff reviews and comments on transportation issues related to pre-application meetings and projects submitted for Zoning Map Amendments, Special Use Permits, and Site Development Plans.

Transportation staff’s role is to review the Traffic Impact Assessment or other transportation information and assist the lead reviewer or engineer in the development and scoping of traffic studies and review of plans/plats for transportation and mobility issues such as transit, pedestrian access and interconnectivity. Major projects reviewed/discussed this quarter include:

- **ZMA202100008 Old Ivy Residences- Review of the proposal and TIA of transportation impacts on Old Ivy Road & Rt 250.**
- **ZMA202100003 Clifton Inn/Collina Farm Resubmittal – Review of proposal and impacts to Rt. 250**

- **ZMA2021-00005 1805 Avon St. PRD - 2nd Submittal** – Review of the proposal and traffic impacts of this residential rezoning on Avon Street.
- **Barnes Lumber development and Library Ave design** – Staff continues to attend meetings with County officials, VDOT, and developers of the Barnes Lumber related to the Library Avenue Extension Project, the proposed development of the property, and necessary traffic improvements.
- **ZMA202000007 RST Residences** – Review of the proposal and Traffic Impacts of this residential rezoning on US 29 north.
- **ZMA202000005 Old Dominion Village** – Review of the proposal and transportation aspects/impacts of this Neighborhood Model rezoning in Crozet.
- **ZMA201900008 Rio Point** – Review of the proposal and traffic impacts of this residential rezoning on Rio Road.
- **ZMA202100006 Maplewood** – Review of the proposal and traffic impacts of this residential rezoning on Proffit Road.
- **ZMA202100004 Breezy Hill** – Review of the proposal and traffic impacts of this residential rezoning on US 250 In the Village of Rivanna.
- **SP202000016 Claudius Crozet Park** – Staff is reviewing the proposed redevelopment of the Crozet Park Recreational facilities to add an expanded exercise facility and improved pool and associated resources.
- **SDP202100022 Albemarle Business Campus** – Review of the site development plan and transportation facility design for this mixed-use development on 5th Street Extended.

Local Transportation Issues

Staff has been engaged in addressing local concerns related to a variety of transportation issues. Staff has instituted a documentation process to track these ongoing issues and keep a record of these concerns. This includes collecting relevant data and reporting through proper channels as appropriate. A tracking list of these concerns/issues has been developed and is reviewed and presented at bi-monthly traffic coordination meetings with VDOT, Albemarle County Police Department, and other agencies. Following is a list of the primary issues staff has been working on in this quarter.

- Castle Rock Road speed study
- Rt. 20 Speed limit signage and passing lanes
- Belvedere neighborhood parking and speeding concerns
- Crozet Ave pedestrian safety
- St George Ave traffic calming
- Westhall and Westlake neighborhoods speed concerns
- Fontana Dr speed concerns
- Old Trail Dr roundabout pedestrian crossings restriped
- Ivy Farm Dr speed concerns, speed limit reduced and posted to 25mph Berkmar Dr truck parking signed implemented