



# APPENDIX D

## DVRPC TIP-LRP Project Benefit Evaluation Criteria

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# DVRPC TIP-LRP PROJECT BENEFIT CRITERIA

Using evaluation criteria is one tool to effectively balance programming the region's needs and resources. The goal of the TIP-LRP Project Benefit Evaluation Criteria is to provide a universal, data-informed support tool to guide transportation project investment decisions. The criteria analyze how each proposed candidate TIP project aligns with the vision and goals of the *Connections 2050 Long-Range Plan* and contributes to implementing the region's vision in the shorter-term TIP. The criteria also provide data to analyze how each candidate project supports the FHWA and FTA Transportation Performance Measures and related safety and asset management plans.

The Benefit Criteria are intended to highlight some of the trade-offs that occur as the region strives to develop a balanced program of investments, including diverse project types and regional equity. The Benefit Criteria can be used to evaluate a variety of modes (roadway, transit, bike, pedestrian, freight) and project types, and can be used in the New Jersey and Pennsylvania counties in the DVRPC region. The Benefit Criteria draw from existing analytical processes already conducted by DVRPC, most notably the Congestion Management Process (CMP). FHWA requires a project evaluation process to guide selecting projects for the TIP.

The Benefit Criteria analysis is one of many considerations that go into determining which projects are ultimately advanced into the TIP. There are many benefits that an individual project may have that are not fully captured in this analysis. Projects may have inaccurate, missing, or incomplete data largely due to the early stages of project development in which a project exists. Some other project selection considerations include geographic equity, regional and local priorities, political support, funding eligibility, performance-based planning and asset management, project readiness, and ability to leverage other investments. More specific project criteria will continue to be used to evaluate projects using special fund categories. Funding sources that have their own criteria developed for very specific analysis include Transportation Alternatives Set-Aside Program (TASA), Highway Safety Improvement Program (HSIP), and Congestion Mitigation and Air Quality (CMAQ). In these instances, the more specific project evaluation criteria will be used in conjunction with or in place of the TIP-LRP Project Benefit Evaluation Criteria. During the development of the TIP for Pennsylvania, only new candidate projects were assessed by DVRPC's universal Benefit Criteria.

For this analysis, DVRPC used the revised TIP-LRP Project Benefit Evaluation Criteria adopted by the DVRPC Board on July 25, 2019. The Benefit Criteria were developed with New Jersey and Pennsylvania members of a working subcommittee of the DVRPC Regional Technical Committee (RTC) and were designed to align directly with the multimodal goals of the LRP, as well as reflect the increasingly multimodal nature of projects in the TIP and LRP. The original and newly adopted Benefit Criteria generally consider one of two key questions:

- Is this project located where we want to make investments?
- How beneficial or effective is this project?

The Benefit Criteria were developed to represent the following characteristics:

- align with the LRP and other regional objectives;
- be relevant to different types of TIP and LRP projects;
- indicate differences between projects;
- avoid measuring the same goal(s) multiple times;
- cover the entire nine-county region;

- be more quantitative than qualitative;
- incorporate scale;
- use readily available data with a strong likelihood of continued availability; and
- be simple and understandable.

The following briefly summarizes each criterion for project evaluation.

## Safety

This criterion relates to the LRP goal of creating a safer transportation system. Projects score points by implementing FHWA-proven safety countermeasures or other safety strategies with specific crash reduction factors, addressing department of transportation (DOT)-identified high-crash locations and crashes in communities of concern, including high concentrations of low income, racial and ethnic minority, and disabled populations; or by implementing safety-critical transit projects that help meet safety performance measures identified by a Public Transportation Agency Safety Plan (PTASP).

## Facility/Asset Condition and Maintenance

This criterion relates to the LRP goal of rebuilding and maintaining the region's transportation infrastructure. Projects score by bringing a facility or asset into a state of good repair, extending the useful life of a facility or asset, or providing reduced operating/maintenance costs.

## Reliability and Congestion

Increasing reliability and reducing congestion are goals in the LRP. Projects score based on location in a CMP congested corridor, implementing a CMP strategy appropriate for that corridor, or being located on a road with a high Planning Time Index (PTI); or transit facility with a low on-time performance.

## Centers and the Economy

This criterion reflects the LRP's core principle to create livable communities within more than 120 regional development centers and 44 Freight Centers. Projects score based on location within a quarter-mile of a Planning or Freight Center; or within a high, medium-high, or medium transit score area, providing a connection between two or more Centers; location in a municipality that meets Economic Development Administration funding eligibility requirements (per capita income or unemployment); location within a half-mile of a major regional visitor attraction; or for being part of a major-county-identified economic development project.

## Multimodal Use

This criterion looks at how much use the facility or asset receives in a multimodal manner, to determine the scale of the project's impact on the transportation system. Projects score based on the total number of person trips (driver trips + passenger trips + transit trips + bike trips + pedestrian trips) and daily trucks using the facility or asset, and overall benefit to multimodal trip making.

## Equity

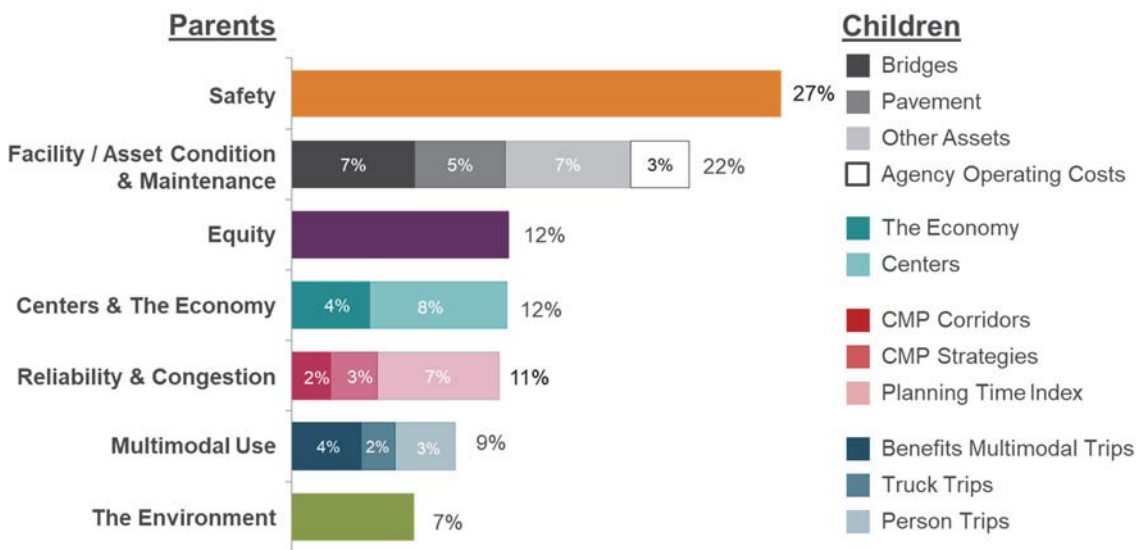
This criterion evaluates how the project serves under-represented and disadvantaged communities and other population groups with additional transportation needs. Projects score based on location in census tracts with high Indicators of Potential Disadvantage (IPD) communities, including population assessment within the census tract; no score for projects that increase vehicle speeds above 30 miles per hour (mph) or traffic volumes in tracts with above-average or well-above-average IPD scores.

## The Environment

This criterion relates to the LRP goal of limiting transportation impacts on the natural environment. Projects score by delivering high air quality benefits (per FHWA guidance) or incorporating environmentally friendly design principles.

After defining the Benefit Criteria, a decision-making tool was used to weigh them, as shown in the Parent and Child Criteria Weighting chart. Each candidate project evaluated for the Pennsylvania TIP received a total benefit score, equal to the sum of the weight multiplied by the rating for each criterion. The tool compared the project’s estimated total state and federal cost to the total score, as a benefit-cost ratio. The tool provided a ranking of projects with the highest total benefit points, benefit-cost ratios, and cost-benefit per total users. When candidate projects are added to the Pennsylvania TIP as part of the update process, the RTC makes the recommendation, and ultimately the DVRPC Board makes the final decision to determine TIP project selections. Although no new candidate projects were added to the Draft FY2021 Pennsylvania TIP due to funding limitations, all candidate projects were evaluated with the Benefit Criteria to inform the decision-making process.

### Parent and Child Criteria Weighting



## TIP Evaluation Criteria and Measures

The following table details each of the proposed criteria rating scales, including “TIP+” criteria that apply only to LRP system expansion candidate projects.

## TIP and TIP+ Criteria Rating Scale Summary

Parent Criteria	Child Criteria	Data Source	Rating Scale (each Parent/Child criteria can score up to 1 point)
Multimodal Use: 9%	Person Trips: 37%	Roadway Management System (RMS), Transit Ridership Data, Bike/Ped Counts	<p>Person Trips = Driver Trips + Passenger Trips + Transit Trips + Bike Trips + Ped Trips.</p> <p>Driver Trips = Facility Length (if <math>\geq 1</math>) <math>\times</math> Annual Average Daily Traffic <math>\div</math> Average Trip Length [from most recent DVRPC Household Travel Survey].</p> <p>→ New facilities to use data from macro- or microsimulation results. If no results available, score = 0.</p> <p>Passenger Trips = Driver Trips <math>\times</math> (Average Vehicle Occupancy – 1) [from most recent DVRPC Household Travel Survey].</p> <p>Transit Trips = [for all bus and trolley routes along road segment] <math>\Sigma</math> Daily Transit Riders <math>\times</math> Average Transit Trip Length <math>\div</math> Transit Route Length.</p> <p>→ New facilities to use data from macro- or microsimulation results. If no results available, score = 0.</p> <p>Bike and Pedestrian Trips = Bike/Ped Counts along Road Segment.*</p> <p>→ Project with Highest Person Trips = 1 point; for all other projects Person Trips <math>\div</math> Highest Person Trips.</p>
	Daily Trucks: 21%	RMS	<p>TIP: 1 point if the average road segment has more than 1,000 trucks per day; 0.6 points if average segment has more than 500 trucks; 0.4 points if average segment has more than 250 trucks; 0.2 points if average segment has more than 100; and 0.1 points if average segment has more than 50 trucks.</p> <p>TIP+: 1 point if the average road segment has more than 5,000 trucks per day; 0.6 points if average segment has more than 2,500 trucks; 0.4 points if average segment has more than 1,000 trucks; 0.2 points if average segment has more than 250; and 0.1 points if average segment has more than 100 trucks.</p>
	Benefits Multimodal Trips: 42%	Project Type and Description	<ul style="list-style-type: none"> <li><input type="checkbox"/> Significant Trip Length Reduction (new transit line, Circuit Trail Network, protected bike lane, more than two miles of bike lanes or sidewalks, new gridded road segments with three lanes or fewer and intersections spaced no more than every 600 feet, makes difficult to fill gap in ped/bike facility network, transit signal priority, doubling tracks/sidings, multimodal transfer hub) = 1 point.</li> <li><input type="checkbox"/> Moderate Trip Length Reduction (shorter new bike/ped facilities, interconnected signal systems timed for speeds under 30 mph, transit station enhancements, new transit vehicles, real-time transit information, park-and-ride facilities, bikesharing programs, bike/ped safety, traffic calming, or pick-up and drop-off zones) = 0.85 points.</li> <li><input type="checkbox"/> Slight Trip Length Reduction (access management/channelization, streetscapes, rehabilitation of existing bike/ped facilities, Americans with Disabilities Act improvements, or carsharing programs) = 0.7 points.</li> <li><input type="checkbox"/> No Change (reconstruction, rehabilitation, and maintenance projects; safety improvements, roundabouts, roadway realignment, real-time traveler information, traffic monitoring, incident management/emergency response, or electric charging stations) = 0.5 points.</li> <li><input type="checkbox"/> Slight Trip Length Increase (intersection improvements that increase crossing distance, interconnected signal systems timed for speeds above 30 mph, new transit parking facilities, intelligent transportation systems, center turn lanes, turning lanes, or minor SOV capacity-adding projects in CMP) = 0.3 points.</li> <li><input type="checkbox"/> Moderate Trip Length Increase (minor roadway expansion projects in LRP, or active traffic management strategies) = 0.15 points.</li> <li><input type="checkbox"/> Significant Trip Length Increase (major regional roadway expansion projects in LRP, major SOV capacity-adding projects in CMP, or flex lanes) = 0 points.</li> </ul>



Parent Criteria	Child Criteria	Data Source	Rating Scale (each Parent/Child criteria can score up to 1 point)
Equity: 12%	—	IPD	If project increases vehicle speeds above 30 mph or traffic volumes in tracts with above-average or well-above-average IPD Composite Value = 0 points. For all other projects, Equity Population Score = $\Sigma$ [For all census tracts project is located in] Census Tract Population $\times$ IPD CV $\div$ 36. → Project with Highest Equity Population Score = 1 point; for all other projects: Equity Population Score $\div$ Highest Equity Population Score.
Reliability and Congestion: 11%	CMP Strategies: 22%	CMP	CMP 1.0 points if project implements a Very Appropriate strategy in the project's primary CMP corridor (as identified by CMP Database); 0.5 points if it utilizes an Appropriate Strategy; and 0.25 points if the project incorporates an Appropriate Everywhere Strategy.
	CMP Corridors: 19%	CMP	CMP Corridor Score = (project length in priority corridor $\times$ 100% + project length in congested corridor $\times$ 75% + project length in emerging corridor $\times$ 25%) $\div$ total project length.
	Reliability: 59%	Level of Travel Time Reliability (LOTTR)/ Transit On-Time Performance	<p><b>Roads and Surface Transit:</b> PTI &gt;3.0, 1 Point; PTI &lt;1.5, 0 points; else Rating = (PTI - 1.5) <math>\div</math> 1.5.* [PTI = 95% travel time <math>\div</math> Free-Flow Travel Time].</p> <p><b>Transit Routes with dedicated Right-of-Way (ROW): On-Time Performance (OTP):</b> If (OTP) &lt;75%, 1 point; else 4 <math>\times</math> (1 - OTP).</p> <p>New or extended system expansion projects (instead of above scoring; widening existing roads can use "Roads and Surface" scoring above): How fully has the project been studied? Study must have "build" recommendation in order to score points below.</p> <p><input type="checkbox"/> <b>Roads:</b> Based on the respective PennDOT or NJDOT project database. This criterion gives credit for the highest authorized phase. Each preceding phase must also have been authorized (e.g., a project would not receive credit for authorized Utility or ROW unless it had previously been authorized for Final Design). Authorized for Construction = 1 point; Authorized for Utility or ROW = 0.75 points; Authorized for Final Design = 0.5 points; Authorized for Preliminary Engineering = 0.25 points; or Concept Development, Feasibility Study, or Corridor Plan with microsimulation = 0.125 points.</p> <p><input type="checkbox"/> <b>Fixed Transit Routes:</b> If the project has a completed Environmental Impact Statement = 1 point; a completed FTA Alternatives Analysis (Full Alternatives Analysis) = 0.75 points; a feasibility analysis or non-FTA alternatives analysis (Conceptual AA) = 0.5 points; a sketch-level planning study (Sketch Plan) = 0.25 points.</p>
Centers and the Economy: 12%	Economic Impacts: 36%	Project Sponsor, RTC, DVRPC	<p><input type="checkbox"/> Project is located in a municipality that meets Economic Development Administration funding eligibility requirements (per capita income or unemployment, consistent with Comprehensive Economic Development Strategy) = 0.67 points.</p> <p><input type="checkbox"/> Project is located within a half-mile of a major regional visitor attraction or major-county-identified economic development project = 0.33 points.</p>
	Centers: 64%	Connections 2045 Centers, Freight Centers, Transit Score Index	<p>Up to a max of 1 point:</p> <p>+ (100% <math>\times</math> Project length within quarter-mile or inside Planning or Freight Centers + 100% <math>\times</math> project length in high transit score areas + 75% <math>\times</math> project length in medium-high transit score areas + 50% <math>\times</math> project length in medium transit score areas)/total project length.</p> <p>+ 0.25 points if project improves or maintains a facility that links two or more regional Planning or Freight Centers.</p>

Parent Criteria	Child Criteria	Data Source	Rating Scale (each Parent/Child criteria can score up to 1 point)
Facility/Asset Condition and Maintenance: 22%	Bridges: 31%	Bridge Asset Management System Rating	Bridge Improvement Score (BIS) = 1 × bridge deck area with deck/super/sub/culvert rating of 3 or less or a posted or weight-restricted bridge deck area + 0.8 × bridge deck area with deck/super/sub/culvert rating of 4 + 0.6 × (TIP) bridge deck area not in poor condition but will have its useful life extended or (TIP+) bridge deck area with a superstructure, substructure, or culvert rating of 5. → Highest BIS = 1 point; for all other projects BIS ÷ Highest BIS.
	Pavement: 23%	Pavement Asset Management System Rating	Pavement Improvement Score (PIS) = 1 × lane miles with an International Roughness Index (IRI) of ≥220 + 0.8 × lane miles with an IRI of ≥170 + 0.6 × (TIP) lane miles not in poor condition but will have useful life extended or (TIP+) lane miles with an IRI of ≥150. Local roads with Present Serviceability Rating (PSR) can be substituted for local road segments with no IRI data: 1 × lane miles with PSR ≤1.5 + 0.8 × PSR ≤2.0 + 0.6 × lane miles with PSR >2 but will have useful life extended. On 100-point scales, multiply PSR thresholds by 20. → Highest PIS = 1 point; for all other projects PIS ÷ Highest PIS.
	Other: 31%	Other Asset Management Systems (Incl. Transit)	<input type="checkbox"/> 1 point if the improvement brings the asset from a poor condition into a state of good repair. <input type="checkbox"/> 0.6 points if the project extends the useful life of a facility/asset not in poor condition.
	Agency Operating Costs: 15%		<input type="checkbox"/> <b>PUBLIC AGENCY OPERATING COSTS:</b> Project significantly increases agency operating costs (e.g., major new facilities) = 0 points; project somewhat increases agency operating costs (i.e., minor new facilities, such as signals) = 0.25 points; no change in agency operating costs = 0.5 points; project somewhat reduces agency operating costs (i.e., design cost savings, roundabouts in place of signals, stormwater infrastructure) = 0.75 points; project significantly reduces agency operating and maintenance costs (i.e., improved infrastructure condition, new transit route or transit improvements that increase farebox recovery rate above 100 percent) = 1 point.
The Environment: 7%	—	Project Sponsor/ Project Scope	<p><b>UP TO A MAX OF 1 POINT:</b></p> <input type="checkbox"/> <b>OXIDES OF NITROGEN (NOx) MEDIAN COST-EFFECTIVENESS FOR EMISSION REDUCTIONS:</b> 1) 1.0 point for idle reduction programs, heavy vehicle diesel engine replacements, park-and-ride facilities or programs, transit service expansion, bike/ped improvements; or incident management programs, intermodal freight improvements, employee transit benefits, transit amenity enhancements, carsharing programs, and extreme-temperature cold-start technologies. 3) 0.75 points for traditional ridesharing programs (not Transportation Network Companies) and intersection improvements, subsidized transit fares, bikesharing programs, and electric charging stations. 5) 0.5 points for roundabouts. <input type="checkbox"/> <b>GREEN DESIGN: 0.5 POINTS FOR INCORPORATING ANY ITEM FROM ONE OF THE BULLETS BELOW (UP TO 1 POINT):</b> <input type="checkbox"/> Green design: bioswales/rain gardens, tree trenches, vegetated medians (more than just grass)/vegetated curb bump-outs, naturalized stormwater basins. <input type="checkbox"/> Green or recycled materials: use of warm-mix asphalt, long-life pavement materials, pervious pavement, or smog-absorbing concrete; use of recycled materials (fly ash, glass, plastic, etc.); or project supports or enhances recycling efforts. <input type="checkbox"/> Reduced environmental impact: alternative energy generation (solar, wind, regenerative braking); climate adaptability/resiliency components; enhanced habitat connectivity or wildlife crossings, rehabilitating assets/facilities instead of replacina.

\* Where data is available



Parent Criteria	Child Criteria	Data Source	Rating Scale (each Parent/Child criteria can score up to 1 point)
Safety: 27%	—	New Jersey Department of Transportation (NJDOT) and Pennsylvania Department of Transportation (PennDOT) Crash Databases, Crash Modification Factors Clearinghouse (CMF), FHWA-Proven Safety Counter-measure	<p><b>UP TO A MAX OF 1 POINT:</b></p> <p><b>A. SAFETY STRATEGY (HIGHEST SCORING PROJECT COMPONENT BELOW):</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>FHWA-proven safety countermeasure and four- or five-star rating CMF clearinghouse crash reduction factor (CRF) &gt;30 = 0.6 points:</b> roundabouts, corridor access management, extend yellow change intervals, or dedicated left- and right-turn lanes at intersections.</li> <li><input type="checkbox"/> <b>Four- or five-star rating CMF clearinghouse CRF &gt;30 = 0.5 points:</b> upgrade railroad (RR) crossing signs to flashing lights, install gates at RR crossings with signs, install a traffic signal or convert to all-way stop control, change to protected left turn, improve angle of channelized right-turn lane, install automated speed enforcement or red-light cameras, install speed humps, reduce/decrease lane width, provide intersection illumination, traffic calming, widen narrow shoulders, or install a “Vehicles Entering When Flashing” system.</li> <li><input type="checkbox"/> <b>FHWA-proven safety countermeasure and four- or five-star rating CMF clearinghouse CRF &gt;15 = 0.4 points:</b> median and pedestrian crossing islands in urban and suburban areas, road diets, longitudinal rumble strips and stripes on two-lane roads, pedestrian hybrid beacons, median barrier, or backplates with retroreflective borders.</li> <li><input type="checkbox"/> <b>Four- or five-star rating CMF clearinghouse CRF &gt;15 = 0.3 points:</b> improve roadway lighting (including light-emitting diode [LED] upgrade), install intersection conflict warning systems, install variable speed limits, reduce posted speed limit/mean speed, implement automated speed enforcement system, install advanced yield or stop markings and signs, or increase all red clearance intervals.</li> <li><input type="checkbox"/> <b>FHWA-proven safety countermeasure and four- or five-star rating CMF clearinghouse CRF &gt;0 = 0.2 points:</b> safety edge, walkways, enhanced delineation and friction for horizontal curves, or roadside design improvement at curves.</li> <li><input type="checkbox"/> <b>Four- or five-star rating CMF clearinghouse CRF &gt;0 = 0.1 points:</b> install adaptive traffic signal control, resurface pavement, provide flashing beacons at stop-controlled intersections, install red-light indicator lights, median treatment for ped/bike safety, install dynamic speed feedback sign, implement systemic signing and marking improvements at stop-controlled intersections, install pedestrian countdown timer; improve signal visibility (increased signal lens size, new backplates, reflective tape to existing backplates, box span signals, or additional signal heads).</li> <li><input type="checkbox"/> <b>Transit projects = 0.4 points</b> for greater safety benefit.</li> </ul> <p><b>B. LOCATION/CRITICALITY (TIP: ONLY SCORES IF POINTS AWARDED FOR “A” ABOVE, UP TO A MAX OF 0.4 POINTS FOR ROAD PROJECTS; TIP+: SCORES REGARDLESS OF WHETHER OR NOT POINTS AWARDED FOR “A” ABOVE):</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Pennsylvania Roads</b> = Project is located on a Highway Safety Network Screening segment with an expected crash (XS) reduction rating greater than 4 or project located in census tracts identified through DVRPC’s Crashes and Communities of Concern analysis = 0.4 points; project is located on a Highway Safety Network Screening segment with an XS reduction rating greater than 0.8, or project is located on and clearly responds to a DOT-identified high-crash location issue, or project is located in current city of Philadelphia High-Injury Network = 0.2 points; project is located on a Highway Safety Network Screening segment with an XS reduction rating greater than 0, or project is located on a DOT-identified high-crash location = 0.1 points.</li> <li><input type="checkbox"/> <b>New Jersey Roads</b> = Project is located on a New Jersey HSIP Eligible State or Local Road (Intersections, Ped. Intersections, High-Risk Rural Roads, Ped Corridors) with a state rating to be determined, DVRPC rating of 100 or less or a county rating of 20 or less; or comes from a Road Safety Audit, Congestion and Crash Site Analysis Program locations, or project located in census tracts identified through DVRPC’s Crashes and Communities of Concern analysis = 0.4 points; project is located on a New Jersey HSIP Eligible State or Local Road = 0.2 points.</li> <li><input type="checkbox"/> <b>Transit</b> = If project is a safety-critical project that helps meet safety performance measures identified by PTASP = 0.6 points.</li> </ul>

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