

STANDARDS 500 STREETS

A. GENERAL NOTES

1. All work and materials shall conform to the latest edition of the North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures unless otherwise specified in this Manual of Practice, the more stringent shall apply.
2. The contractor shall maintain two-way traffic at all times when working within existing streets. The contractor shall place and maintain signs, danger lights, barricades and furnish watchmen or flagmen to direct traffic in accordance with the Work Area Traffic Control Handbook (WATCH).
3. All asphalt cuts shall be made with a clean cut when preparing street surfaces for patching or widening strips.
4. Paper joints shall be used to seal the ends of an asphalt pour so that future extensions can be made without causing rough joints.
5. When placing asphalt against existing surfaces, a straight edge shall be used to prevent "humping" at that location.
6. Stone shall be primed if paving is not complete within seven days following stone base approval.
7. Surfaces shall be tacked when asphalt is being placed over existing asphalt streets or adjoining concrete, storm-drain and sanitary sewer structures.
8. In rolling and hilly terrains, sweeping of the stone base and/or application of a tack coat may be required near intersections. These requirements will be established by the City Engineer based on field conditions.
9. The contractor/developer shall provide core sampling, and test of asphalt by a certified independent testing lab at no cost to the City. Core samples shall be taken at a frequency and location established by the inspector but no less than three (3) samples. All asphalt shall have a minimum in-place density of 95% using Marshall Method.
10. All concrete shall have a minimum compressive strength of 3500 PSI at 28 days. The contractor shall prepare concrete test cylinders in accordance with Section 1000 of the NCDOT Standard Specifications at the direction of the project inspector. All equipment and cylinder molds shall be furnished by the contractor. It shall be the responsibility of the contractor to protect the cylinders until such time as they are transported for testing. Testing for projects shall be preformed by an independent testing lab, at no cost to the City. The contractor shall provide equipment and perform test on concrete for a maximum slump and air content as defined in Section 1000 of the NCDOT Standard Specifications. These results shall be performed at a frequency established by the inspector. Materials failing to meet specifications shall be removed by the contractor.
11. All concrete shall be cured with 100% Resin Base, white pigmented curing compound which meets A.S.T.M. Specifications C-309, Type 1, applied at a uniform rate of one (1) gallon to 400 square feet within 24 hours of placement of the concrete.



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12. Straight forms shall not be used for forming curb and gutter in curves.
13. All excess concrete on the front edge (lip) of gutter shall be removed when curb and gutter is poured with a machine.
14. All curb and gutter shall be backfilled with soil approved by the inspector within 72 hours after construction to prevent erosion.
15. All backfill shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and the material shall have no tendency to flow or behave in a plastic manner under tamping blows or proof rolling.
16. Materials deemed by the inspector as unsuitable for backfill purposes shall be removed and replaced with select backfill material.
17. All trenches in the street right-of-way shall be backfilled with suitable material immediately after pipe is laid. The fill shall be placed in layers not to exceed six (6) inches and each layer shall be compacted thoroughly.
18. Under no circumstances shall water be permitted to rise in backfilled trenches after the pipe has been placed.
19. Compaction requirements shall be attained by the use of mechanical compaction methods. Each six (6) inch layer of backfill shall be placed loose and thoroughly compacted into place.
20. All subgrade shall be compacted to 100% of the maximum density obtained with the Standard Proctor Test depth of eight (8) inches, and a density of 95% Standard Proctor for depths greater than eight (8) inches. All test shall be performed by developer at no cost to the City.
21. A canvas cover or other suitable cover shall be required for transporting plant mix asphalt during cool weather when the following conditions are present.
 - (a) Air temperature is below 60° F.
 - (b) Length of haul from plant to job is greater than five (5) miles.
 - (c) Other occasions at the inspector's discretion when a combination of factors indicate that material should be covered in order to assure proper placement temperature.
22. Concrete or asphalt shall not be placed until the air temperature measured at the location of the concreting operation is 35° F and rising by 10:00 A.M. Concrete or paving operations should be suspended when the air temperature is 40° F and descending. The contractor shall protect freshly placed concrete in accordance with Section 420 of the NCDOT Standard Specifications when the air temperature is at or below 35° F and the concrete has not obtained an age of 72 hours.



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23. The contractor shall do that which is necessary to control erosion and to prevent sedimentation damage to all adjacent properties and streams in accordance with the appropriate City/County Soil Erosion and Sedimentation Control Ordinance. Water standing within the project shall be prevented.

24. All soil/mud stains on concrete shall be removed by contractor after backfilling, seed and straw is finished.

25. Concrete wasted during truck or mixer washing shall be placed in a location approved by the City inspector. In no case shall waste be dumped in or around storm drainage structures, creeks, utility appurtenances or on asphalt surfaces.

26. All trucks shall be properly covered per NCDMV regulations.

B. Standards of Street Design

1. Public Streets	Local			Collector		
	Level	Rolling	Hilly	Level	Rolling	Hilly
a. Terrain Classification	0-8%	8.1-15%	15+%	0-8%	8.1-15%	15+%
b. Min. Sight Distance (ft.)	200	150	110	250	200	150
c. Maximum Grade	6%	10%	12%	4%	8%	10%
d. Design Speed (mph)	30	25	20	35	30	25
e. Minimum Radius (ft.)	250	150	90	350	250	175
f. Min Tangent between Reverse Curves	50	50	50	100	100	100
g. K values (crest/sag)	$2\frac{8}{35}$	$2\frac{0}{20}$	$1\frac{5}{20}$	$4\frac{5}{45}$	$2\frac{8}{35}$	$2\frac{0}{20}$

Note: Use of Level or Hilly terrain criteria not permitted without prior approval of the City Engineer.

2. Intersections

	Level	Rolling	Hilly
a. Terrain Classification	0-8%	8.1-15%	15%+
b. Vert. Alignment within 50ft. (of street intersection)	1%	3%	4%
c. Minimum Angle of Intersection	75°	75°	75°
d. Min. Curb & RW Radius (ft.)			
1. Local	20	20	20
2. Collector	30	30	30
e. Min. Street Offsets for adjacent intersections (ft.)			
1. Local	125	125	125
2. Collector	200	200	200

Note: Use of Level or Hilly terrain criteria not permitted without prior approval of the City Engineer.

3. Design criteria for arterial streets shall be established by the City Engineer on a case by case basis using the latest edition of The American Association of State Highway and Transportation Officials (AASHTO) "A Policy on Geometric Design of Highways and Streets" and/or NCDOT Roadway Design Manual.

4. Intersection corner - 10' x 70' sight triangle shall be provided at intersections. Additional sight distance requirements may be required by the NCDOT or the City of Morganton Development and Design Services Department.



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C. GRADING

1. Proposed street right-of-way shall be graded to their full width as shown on cross sections.
2. Fill embankments shall be formed of suitable material placed in successive layers not to exceed more than six (6) inches in depth for the full width of the cross-section including the width of the slope area. No stumps, trees, brush, rubbish or other unsuitable materials or substances shall be placed in the embankment. Each successive six (6) inch layer shall be thoroughly compacted by a sheepfoot tamping roller, 10-ton power roller, pneumatic-tired roller, or other methods approved by the City Engineer. Embankments over and around all pipe culverts shall be of select material, placed and thoroughly tamped and compacted as directed by the City Engineer or his representative.

D. ROADWAY BASE

1. All roadways shall be improved with a base course to the required width of the roadway.
2. The material for stone base course shall conform to the requirements of Section 1010 of the NCDOT Standard Specifications. Construction methods shall conform to Section 520.
3. The stone base shall be compacted to 100% of the maximum density obtainable with the Modified Proctor Test by rolling with ring or tamping roller or with a pneumatic tired roller with a minimum weight of ten tons. When completed, the base course shall be smooth, hard, dense, unyielding and well bonded.
4. In lieu of a stone base course, a bituminous concrete base course, type HB may be substituted. Construction shall conform to the requirements of Section 640 of the NCDOT Standard Specifications.
5. Bituminous concrete base course, type HB, shall be used in widening strips less than five (5) feet in width.

E. ROADWAY SURFACE

1. All roadways shall be improved with a surface course to the required width of the roadway.
2. Plant mixed asphalt shall conform in all aspects to Section 645 of the NCDOT Standard Specifications (S 9.5B). A prime coat shall be applied when the base has been in place for seven (7) days or more. The compacted surface shall not be less than one and one-half (1 ½) inched thick.
3. Inspector shall be notified prior to use of recycled asphalt.

REFERENCES

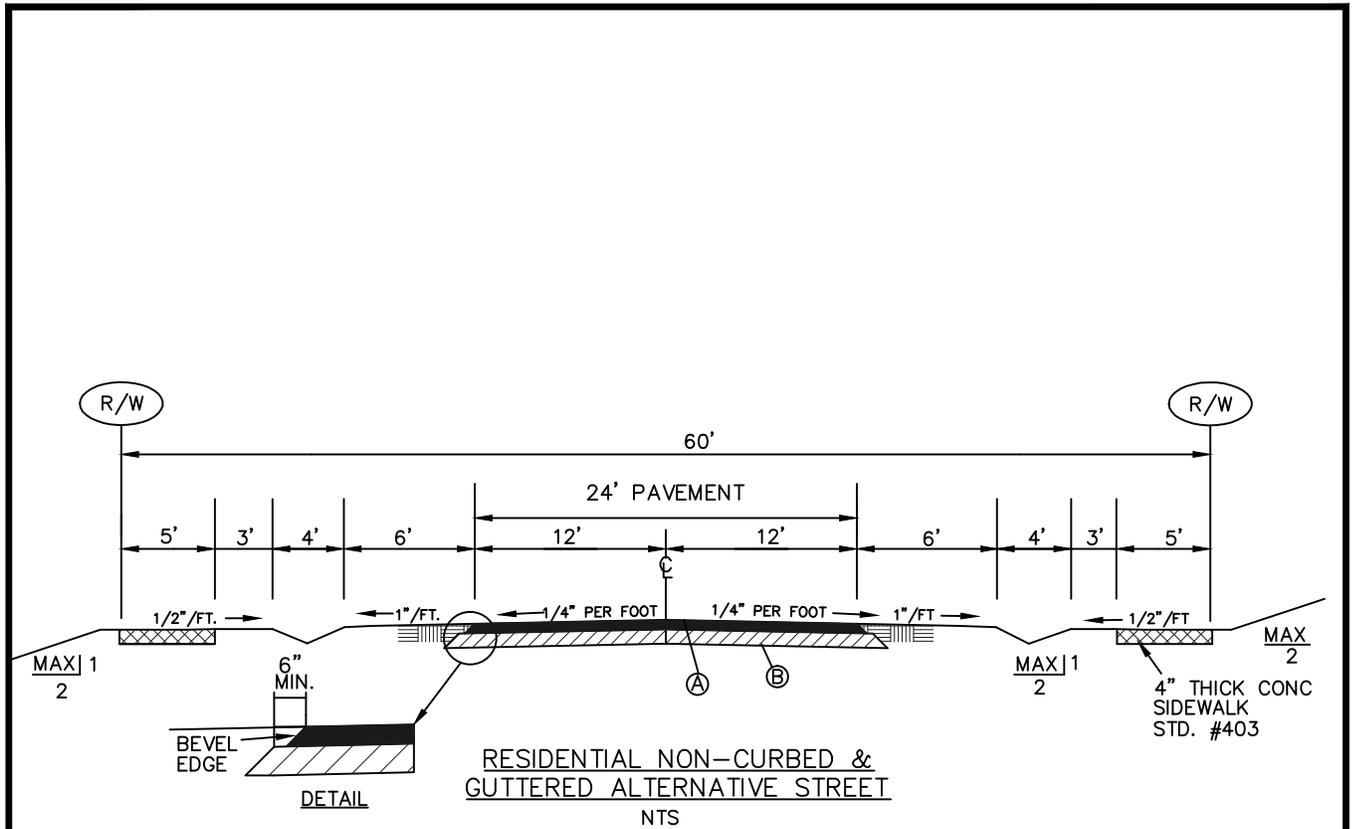
1. North Carolina Department of Transportation, Standard Specifications for Roads and Structures, Latest Edition
2. American Association of State Highway and Transportation Officials, 1990, A Policy on Geometric Design of Highways and Streets.
3. North Carolina Department of Transportation, Roadway Design Manual, Latest Edition
4. North Carolina Department of Environment, Health, and Natural Resources, Erosion and Sediment Control Planning and Design Manual, Latest Edition



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PAVEMENT SCHEDULE

- Ⓐ 2" BITUMINOUS CONCRETE SURFACE COURSE, TYPE S 9.5 B TO BE PLACED IMMEDIATELY UPON FINAL PREPARATION OF ABC STONE BASE.
- Ⓑ 6" COMPACTED AGGREGATE BASE COURSE, COMPACTED TO 100% OF MAXIMUM DENSITY

NOTE:

1. RIGHT-OF-WAY WIDTH SHALL BE 60FT. MINIMUM OR AS REQUIRED.
2. PAVEMENT WIDTH SHALL BE 24FT.
3. CURB AND GUTTER NOT REQUIRED.
4. SIDEWALK WIDTH SHALL BE 5FT. AND LOCATED AT EDGE OF RIGHT-OF-WAY.
5. CUT AND FILL SLOPES SHALL BE MAXIMUM 2:1.
6. DESIGN SPEED SHALL BE 35 M.P.H.
7. RATE OF VERTICAL CURVE AS DETERMINED BY ENGINEER.
8. MINIMUM CUL-DE-SAC RIGHT-OF-WAY RADIUS SHALL BE 60FT.
9. MINIMUM CUL-DE-SAC PAVEMENT RADIUS SHALL BE 32FT.
10. MINIMUM CENTERLINE CURVE RADIUS SHALL BE 150FT.
11. MAXIMUM GRADE SHALL BE 12%.
12. SHOULDER SLOPE SHALL BE 1" PER FOOT. SHOULDER WIDTH SHALL BE 6FT.
13. DITCH CROSS SECTIONAL AREA (SQ.FT.) SHALL EQUAL QUANTITY IN cfs DIVIDED BY VELOCITY IN fps FOR 10 YR. STORM.
14. MAXIMUM SLOPE, DITCH LINE SHALL BE 6% FOR VEGETATED DITCHES, FOR GREATER SLOPES THE DITCH SHALL BE PAVED OR PIPED WITH ALL PAVED DITCHES & PIPES SUFFICIENT CAPACITY TO CARRY 10 YR. STORM RUN-OFF.
15. INLETS SHALL BE INSTALLED AT ALL LOW POINTS IN DITCHES, AND AT THE END OF PAVED DITCHES WITH DESIGN FLOW OF THE DITCH AS APPROVED BY THE CITY ENGINEER.
16. ALL WORK AND MATERIALS SHALL MEET N.C.D.O.T. STANDARDS AND SPECIFICATIONS.

NOT TO SCALE



RESIDENTIAL NON-CURBED &
GUTTERED ALTERNATIVE STREET

STD. NO.

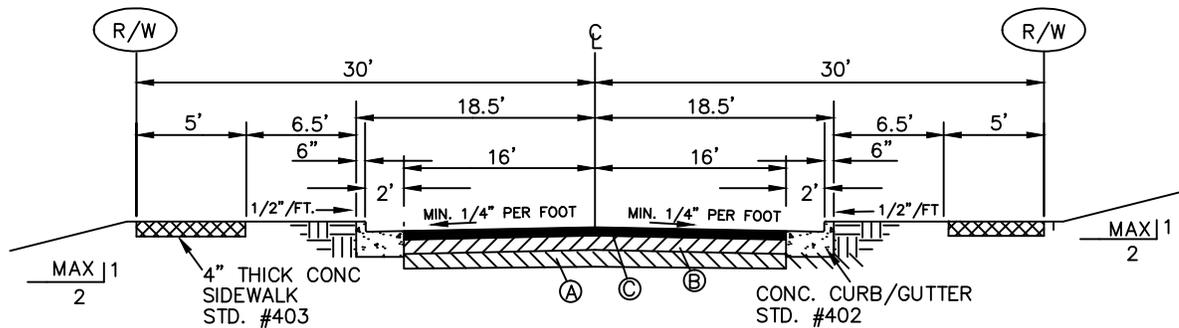
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2-LANE / CURB & GUTTER
NTS

PAVEMENT SCHEDULE

- Ⓐ 8" COMPACTED AGGREGATE BASE COURSE
- Ⓑ 2" BITUMINOUS CONCRETE S 12.5 B COURSE
TO BE PLACED IMMEDIATELY UPON FINAL
PREPARATION OF ABC STONE BASE.
PLANT MIX TO MEET N.C.D.O.T. SPECIFICATIONS.
- Ⓒ 2.5" BITUMINOUS CONCRETE SURFACE COURSE,
TYPE S 9.5 B TO BE PLACED FOLLOWING PLACEMENT
OF H-BINDER COURSE.

NOTE:

1. RIGHT-OF-WAY WIDTH SHALL BE 60FT. MINIMUM OR AS REQUIRED.
2. PAVEMENT WIDTH SHALL BE 32FT. EXCEPT 41FT. BACK TO BACK 200FT. FROM INTERSECTION (36FT. PAVEMENT WIDTH).
3. CURB AND GUTTER SHALL BE 30".
4. SIDEWALK WIDTH SHALL BE 5FT. AND LOCATED AT EDGE OF RIGHT-OF-WAY.
5. CUT AND FILL SLOPES SHALL BE MAXIMUM 2:1.
6. DESIGN SPEED SHALL BE 35 M.P.H.
7. RATE OF VERTICAL CURVE AS DETERMINED BY ENGINEER.
8. MINIMUM CUL-DE-SAC RIGHT-OF-WAY RADIUS SHALL BE 50FT.
9. MINIMUM CUL-DE-SAC PAVEMENT RADIUS SHALL BE 40FT. MEASURED FROM BACK OF CURB.
10. MINIMUM CENTERLINE CURVE RADIUS SHALL BE 230FT.
11. MINIMUM GRADE SHALL BE 5%.
12. MAXIMUM GRADE SHALL BE 8%.
13. ALL WORK AND MATERIALS SHALL MEET N.C.D.O.T. STANDARDS AND SPECIFICATIONS.

NOT TO SCALE



COMMERCIAL / INDUSTRIAL
STREET CROSS-SECTIONS

STD. NO.

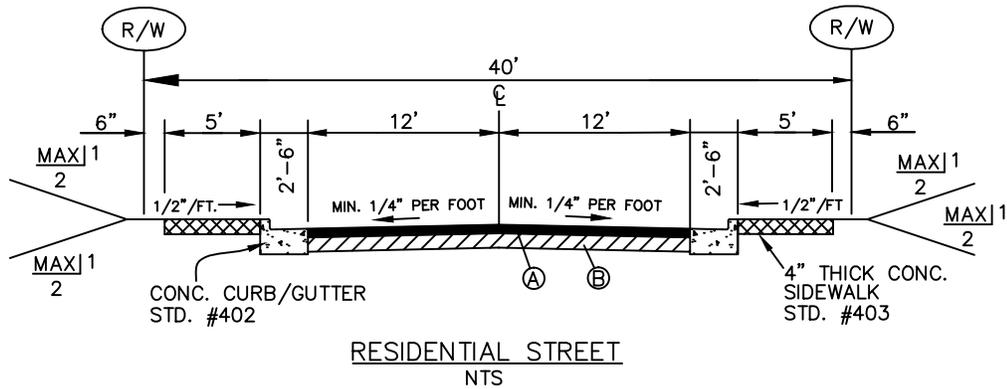
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PAVEMENT SCHEDULE

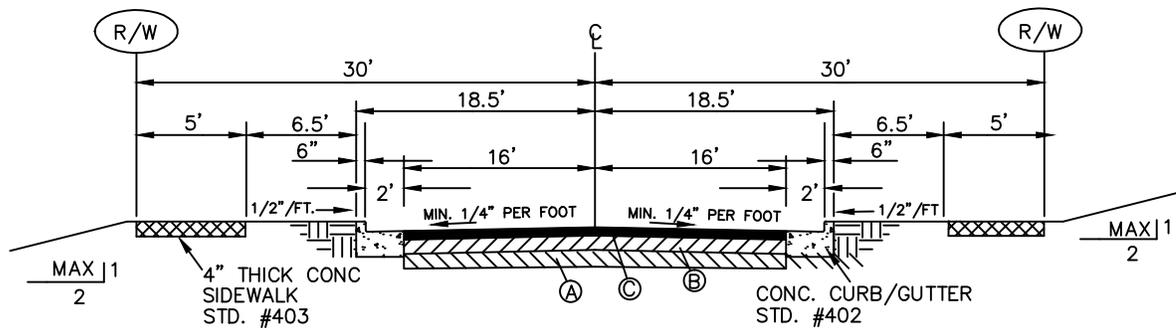
- Ⓐ 2" BITUMINOUS CONCRETE SURFACE COURSE, TYPE S 9.5 B TO BE PLACED IMMEDIATELY UPON FINAL PREPARATION OF ABC STONE BASE.
- Ⓑ 6" COMPACTED AGGREGATE BASE COURSE, COMPACTED TO 100% OF MAXIMUM DENSITY

NOTE:

1. RIGHT-OF-WAY WIDTH SHALL BE 40FT. MINIMUM OR AS REQUIRED.
2. PAVEMENT WIDTH SHALL BE 24FT. AND DOES NOT INCLUDE WIDTH OF CURB AND GUTTER.
3. CURB AND GUTTER SHALL BE 30".
4. SIDEWALK WIDTH SHALL BE 5FT. AND LOCATED ADJACENT TO BACK OF CURB.
5. CUT AND FILL SLOPES SHALL BE MAXIMUM 2:1.
6. DESIGN SPEED SHALL BE 35 M.P.H.
7. RATE OF VERTICAL CURVE AS DETERMINED BY ENGINEER.
8. MINIMUM CUL-DE-SAC RIGHT-OF-WAY RADIUS SHALL BE 40FT.
9. MINIMUM CUL-DE-SAC PAVEMENT RADIUS SHALL BE 37FT. MEASURED FROM BACK OF CURB.
10. MINIMUM CENTERLINE CURVE RADIUS SHALL BE 150FT.
11. MAXIMUM GRADE SHALL BE 12%.
12. ALL WORK AND MATERIALS SHALL MEET N.C.D.O.T. STANDARDS AND SPECIFICATIONS.

NOT TO SCALE

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COLLECTOR STREET
NTS

PAVEMENT SCHEDULE

- Ⓐ 8" COMPACTED AGGREGATE BASE COURSE
- Ⓑ 2" BITUMINOUS CONCRETE S 12.5 B COURSE
TO BE PLACED IMMEDIATELY UPON FINAL
PREPARATION OF ABC STONE BASE.
PLANT MIX TO MEET N.C.D.O.T. SPECIFICATIONS.
- Ⓒ 2.5" BITUMINOUS CONCRETE SURFACE COURSE,
TYPE S 9.5 B TO BE PLACED FOLLOWING PLACEMENT
OF H-BINDER COURSE.

NOTE:

1. RIGHT-OF-WAY WIDTH SHALL BE 60FT. MINIMUM OR AS REQUIRED.
2. PAVEMENT WIDTH SHALL BE 32FT.
3. CURB AND GUTTER SHALL BE 30".
4. SIDEWALK WIDTH SHALL BE 5FT. AND LOCATED AT EDGE OF RIGHT-OF-WAY.
5. CUT AND FILL SLOPES SHALL BE MAXIMUM 2:1.
6. DESIGN SPEED SHALL BE 35 M.P.H.
7. RATE OF VERTICAL CURVE AS DETERMINED BY ENGINEER.
8. MINIMUM CENTERLINE CURVE RADIUS SHALL BE 230FT.
9. MINIMUM GRADE SHALL BE .5%.
10. MAXIMUM GRADE SHALL BE 8%.
11. ALL WORK AND MATERIALS SHALL MEET N.C.D.O.T. STANDARDS AND SPECIFICATIONS.

NOT TO SCALE



COLLECTOR STREET
CROSS-SECTIONS

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