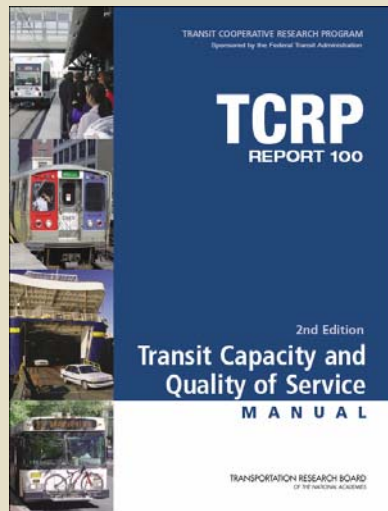


## Overview of the TCQSM, 2<sup>nd</sup> Edition

Paul Ryus  
Kittelson & Associates, Inc.



## Presentation Overview

- Brief introduction to the project
- TCQSM history
- TCQSM applications
- Questions to think about



## Project Overview

- Obtain user feedback on the TCQSM 2<sup>nd</sup> Edition (2003)
- Recommend additions, revisions, format
- Conduct gap-filling research
- Prepare TCQSM 3<sup>rd</sup> Edition
- Prepare information program



## TCQSM Webinar Series Objectives

- Provide background on TCQSM material for focus group and online survey participants
- Expand industry's awareness of the manual and its potential uses
- Lay groundwork for updated training material when the new manual is published (2013)

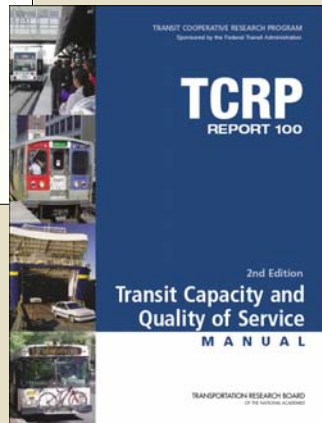
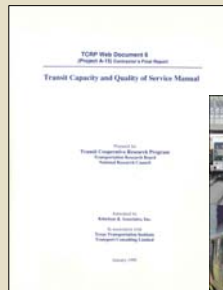


## Webinar Series Topics

- [Overview of the TCQSM 2<sup>nd</sup> Edition](#)
- Fixed Route Quality of Service
- Bus Transit Capacity
- Rail Transit Capacity
- Ferry Transit Capacity
- Stop, Station, and Terminal Capacity
- Demand Response Capacity and Quality of Service



## TCQSM History



## What is the TCQSM?

- Intended to be a fundamental reference document for transit practitioners and policy makers
- Compiles a wide variety of work in the transit field that had not been available previously in one place
- Can be used for:
  - Planning and designing transit service and facilities
  - Evaluating service quality from the passenger point of view
  - Estimating changes in speed and capacity resulting from system changes (new vehicles, fare media, etc.)
  - Much more

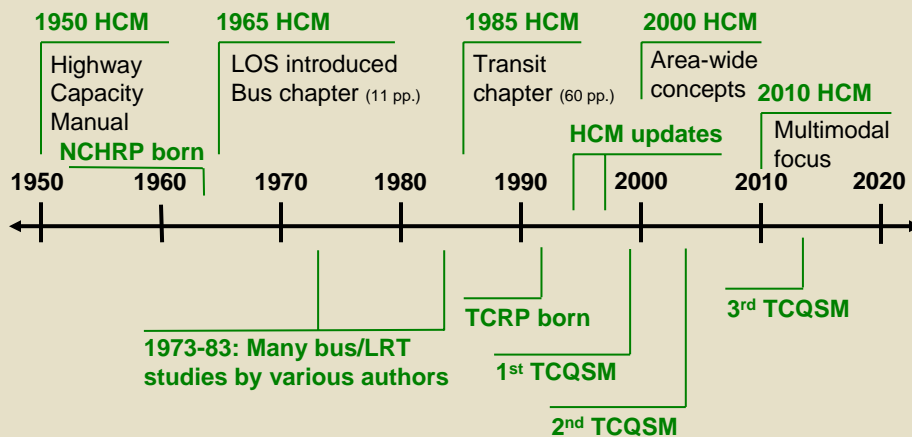


## What Isn't the TCQSM?

- Not a policy or standards document
  - Use in conjunction with relevant standards (e.g., fire code)
  - Provides a "level of service" (LOS) framework for measuring service quality, but doesn't specify what LOS to provide
- Doesn't address ridership estimation
  - However, impacts of quality of service changes on existing ridership are discussed
- Doesn't address cost impacts of service changes



## Timeline



## Research Problem Statement: TCQSM 1st Edition

- The transportation profession lacks a consolidated and generally accepted set of transit-capacity and quality-of-service definitions, principles, practices, and procedures for planning, designing, and operating vehicles and facilities.
- This is in contrast to the *Highway Capacity Manual* that defines quality of service and presents fundamental information and computational techniques related to quality of service and capacity of highway facilities.
- In the absence of a comparable, authoritative document, the case for transit service in a multimodal decision environment is weakened. Therefore, there is a need for a *Transit Capacity and Quality of Service Manual*.

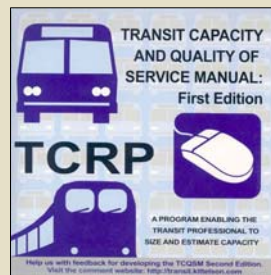
## Research Objectives: TCQSM 1st Edition

- Define the content of a comprehensive TCQSM
- Provide transit input to the HCM 2000
- Develop a research plan for completing the TCQSM
- Complete TCQSM portions for which information is available and produce an interim document
- Conduct research on one or more high-priority research topics growing out of the research agenda
  - QOS framework
  - Consistent procedure for collecting bus & light rail dwell time data



## TCQSM 1<sup>st</sup> Edition

- Published as *TCRP Web Document 6* in January 1999
- Due to TCRP budget cuts & decision to develop a 2<sup>nd</sup> Edition, it had a limited distribution, mainly CD-ROM and online



## 1<sup>st</sup> Edition Outline

- Introduction and Concepts
- Bus Transit Capacity
- Rail Transit Capacity
- Terminal Capacity
- Quality of Service
- Glossary

## Research Problem Statement: TCQSM 2<sup>nd</sup> Edition

- The First Edition of the TCQSM is a start toward providing the transportation industry with a transit companion to the *Highway Capacity Manual*
- Despite the contribution of the First Edition of the TCQSM, there are still gaps in coverage
- Before the document can acquire stature, the gaps must be addressed and the professional community must be heard through a testing and public comment period

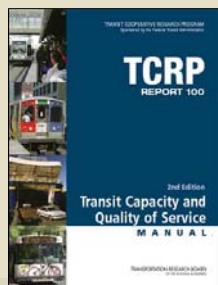
## Research Objectives: TCQSM 2nd Edition

- Develop an updated TCQSM, filling gaps in the current edition and expanding and enhancing the scope
- Add material addressing:
  - Quality of service and capacity implications of service for people with disabilities
  - Passenger service times
  - System availability and coverage
  - Other characteristics
    - Ferry capacity
    - Minor rail mode capacity (e.g., aerial trams)



## TCQSM 2<sup>nd</sup> Edition

- Published as *TCRP Report 100*
- Print, CD, and online versions available
- TCRP's best-selling document





## 2<sup>nd</sup> Edition Outline

- Introduction and Concepts
- Transit in North America
- Quality of Service
- Bus Transit Capacity
- Rail Transit Capacity
- Ferry Capacity
- Stop, Station & Terminal Capacity
- Glossary
- Index



## TCQSM 3<sup>rd</sup> Edition Research Objectives

- The TCQSM presents a framework for evaluating and planning public transportation systems. The objective of this research is to develop a 3<sup>rd</sup> Edition that:
  - Identifies and fills gaps in the current Manual
  - Reflects the latest transit capacity and quality-of-service applications and research
  - Improves the usefulness and relevance of the Manual for practitioners, policy makers, and other public transit stakeholders.



## TCQSM's Relationship to the HCM 2000

- FTA/industry desire for a companion transit document to the HCM that would eventually gain the same stature
  - HCM's level-of-service (LOS) system often used to define minimum roadway operating standards
  - Not meeting roadway LOS standards is a justification for investments to restore operations to the desired level
  - TCQSM's LOS framework uses the same A-to-F scale with which decision-makers are often already familiar



## Relationship to the HCM 2010

- HCM has a multimodal focus
  - No separate all-inclusive transit, bicycle, pedestrian chapters
  - Non-auto material presented throughout the HCM, alongside auto-related material
- TCQSM treated as a "companion document"
  - HCM users referred to the TCQSM for information and methods on transit capacity and transit-specific quality of service
    - Technical transit material generally removed from the HCM
    - Frequent cross-references to the TCQSM
  - Transit quality of service still included in the Urban Streets chapters in a multimodal context

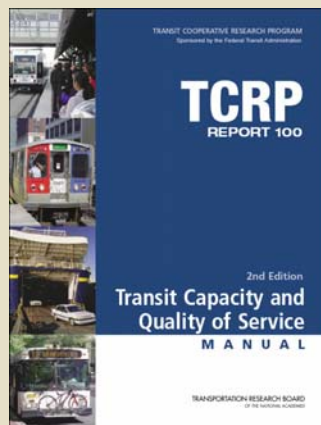


## 2010 HCM Organization

- **Four-volume format**
  - Volume 1 (print) presents basic concepts
    - On-street transit concepts included where appropriate
    - HCM Primer chapter designed for non-technical users
  - Volumes 2 and 3 (print) present detailed capacity, speed, and LOS calculation methods
    - Equations, example problems
  - Volume 4 (electronic only) presents supplemental material
    - Supplemental chapters on special-interest topics
    - Technical Reference Library
    - Applications Guide (process of applying HCM)
    - Post-2010 updates



## TCQSM Applications



## Transit Capacity & Quality of Service Committee

- Standing committee of the Transportation Research Board that is charged with:
  - Maintaining the TCQSM
  - Identifying research needs in the committee's area of interest
- Prior to the development of the TCRP A-15C project, the Committee undertook a volunteer effort to identify TCQSM usage



## Process Used to Identify TCQSM Applications

- Internet searches
- Applications by TCQS committee members & their organizations
- TRB papers reviewed by the committee
- 53 distinct applications identified
- Volunteer effort (not as thorough as a research project literature review) that provides insights into how the manual has been used



## TCQSM Usage by Topic Area

- Quality of service (37)
- Capacity (11)
- Both (5)



## TCQSM Usage by Topic Area

- Quality of service (37)
- Capacity (11)
- Both (5)



## TCQSM Usage by Application

- Transit/transportation planning (19)
  - Long-range planning, existing conditions analysis (12)
  - Alternatives analysis, EIS (5)
  - Short-range planning (2)
- Theoretical paper (e.g., new measures) (9)
- Research/field study using current measures (7)
- Policy paper (5)
- Source of data or definitions (5)
- Other (8)

## Observations (1)

- Most long-range planning applications have looked only at existing conditions (i.e., a report card)
  - Evaluating future conditions for different alternatives would help inform comparisons and alternative selection
  - TCQSM does not provide tools for estimating future reliability
  - Long-range plans typically do not estimate future transit demand (required to evaluate crowding and need for additional frequency)
  - A masters thesis (Zuehlke, 2007) using Atlanta regional model data, found that auto travel times were generally overestimated and transit travel times were generally underestimated, leading to unreliable assessments of transit-auto travel time differences

## Observations (2)

- Much difference of opinion on how to measure QOS
  - Individual, separate measures vs. combined, single measure
  - Different measures for the same aspect of QOS
    - Speed (e.g., % of posted speed) instead of travel time difference
    - Excess wait time instead of on-time performance
    - Combination of coverage & frequency
  - Report performance measure values instead of LOS letters
  - Report LOS numbers instead of letters (avoid “grade” connotation)
  - Passenger point-of-view vs. agency point-of-view

## Observations (3)

- Few examples of agencies setting standards based on LOS
- Virtually no usage of demand-response LOS found
- QOS material appears to be more widely used than capacity material

## Observations (4)

- Considerable international interest
  - Material from Australia, Brazil, Canada, Columbia, Ireland, Mexico, South Korea, and Thailand included in the review
  - World Bank usage
  - TCQSM reportedly translated into Chinese and French

## Observations (5)

- Some signs of TCQSM becoming the authoritative document that was originally intended
  - Use by New York MTA Inspector General, New York City Comptroller
  - Strong support by Florida DOT
  - Use by FTA in New Starts process
  - Referenced in other guidance documents as the source of information on transit capacity & QOS
  - 2010 HCM gives it equal status with AASHTO Policy on Geometric Design (“Green Book”), Manual on Uniform Traffic Control Devices, and Highway Safety Manual
  - Used in university-level public transportation classes



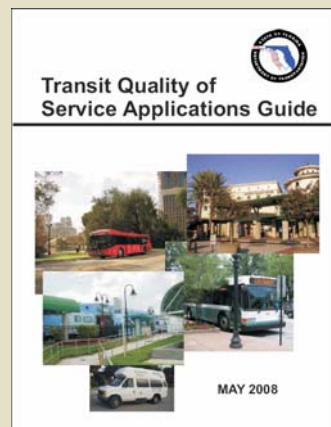
## Highlights (1)

- **Seattle Transit Plan**
  - Used TCQSM as basis for determining performance measures for higher-frequency bus routes
  - Used LOS numbers (+3, +2, +1, -3, -6, -9) instead of letters
    - Positive numbers = "Pass"
    - Negative numbers = "Fail", take action
  - Some measures changed (e.g., speed instead of transit-auto travel time)
  - Monitoring process established and carried out



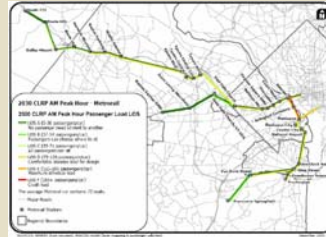
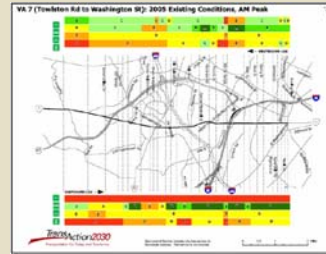
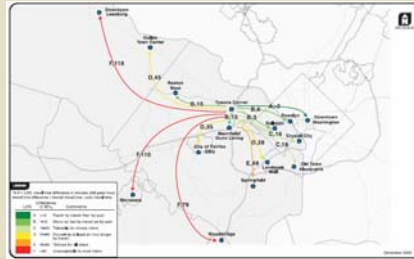
## Highlights (2)

- **Florida DOT**
  - Until 2008, required Florida MPOs to evaluate transit QOS as part of long-range plan updates
  - Florida Quality/Level of Service Handbook uses TCQSM as the basis for its transit LOS measure, but combines several factors into one measure
  - Sponsored two research projects on estimating transit travel time using regional model data
  - Developed a "Transit QOS Applications Guide"



## Highlights (3)

- Northern Virginia 2030 Transp. Plan
  - Evaluated both existing and future alternative transit LOS for the five-county study area
  - Transit included as part of a multimodal evaluation of seven corridors



Northern Virginia Transportation Authority



## Questions to Think About



## Questions to Think About

- What is required for the TCQSM to be more widely used?
  - Content changes?
    - New and/or revised topics
    - Change in amount of emphasis given concepts versus methodologies
  - Format changes?
  - Greater industry awareness?
  - Other things?
- What would you like to use it for that you aren't currently using it for?

## We Want Your Input on the TCQSM!

- Take our online survey to help shape the 3<sup>rd</sup> Edition's content
- Stay involved with the project
  - Give us your e-mail address after completing the survey and we'll keep you informed of future opportunities to provide input
- Do you go to the Transportation Research Board's Annual Meeting?
  - Attend the meeting of the Transit Capacity and Quality of Service Committee (AP015)

