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ABSTRACT

Based on a needs assessment of intra-state and inter-state interconnection telecommunication services, the Virginia Public Telecommunications Council (VPTC) envisions a public service satellite system consisting of: (1) primarily broadband transceiver capacities to areas having state supported institutions of higher education, perhaps with common carrier supplied narrow-band extensions to various state agencies; and (2) narrow-band transceiver capacities located in areas lacking institutions of higher education but having a School Division Headquarters, with narrow-band extensions (common carrier supplied) to various state agencies. This system would interconnect directly with compatible transceivers within satellite range. Traffic protocols would be centrally managed from Richmond and coordinated with the national satellite operating authority. (DAG)

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NEW INTERCONNECTION TELECOMMUNICATIONS NEEDS IN VIRGINIA

After conducting a Needs Assessment of intra-state and inter-state interconnection telecommunications services which are, or should come to be, required by the numerous State agencies and institutions, the VPTC can summarize its tentative findings* as follows:

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*Largely excluded from this summary are conventional voice-grade CC0-supplied services except slow-speed data and facsimile transmission.

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BROADBAND SERVICES (In Priority Order)

Administrative Audio-video Conferencing and Interviewing

Virtually all State Agencies and institutions, especially those having field offices, installations or activities or those having significant inter-state contacts

Audio-video Instructional Programming

Higher Education* (Internal and via ETV)

Public Education (via ETV)

State Personnel Training (especially through State Personnel System)

High-speed Data (Including parallel telemetry signals)

Higher Education (Administrative, Research, CMI)

~~ADP (Acting for other agencies and institutions)~~

Highway (Traffic Counting and structural stress monitoring)

Environmental Agencies (Air and Water Monitoring)

Medical Institutions (Diagnostic Examinations)

High-speed Facsimile

Higher Education - Libraries

Certain agencies and institutions having field offices, installations or activities near appropriate facilities

ETV Entities (Curricular guides and psychometric instruments)

*Includes Medical, Dental and Nursing; pre-service and in-service.

BROADBAND SERVICES (Continued)

Public Television Networking

All ETV Entities (5-6 sites)

Video Site Monitoring (Only where feasibly extendable)

Environmental Agencies (Smoke Abatement, etc.)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)

Engineering and Buildings (Construction status compilations on VTR)

NARROWBAND SERVICES (In Priority Order)

Slow-speed Data

Virtually all agencies and institutions having field offices,
installations or activities
ADP (Acting for other agencies and institutions)

Alert and Alarm Signaling (Separate from CCO Systems)

State Police
Office of Emergency Services (Civil Defense)
Highway Department (Traffic Interruptions)

Emergency Voice Networking (Separate from CCO Systems)

State Police
Office of Emergency Services (Civil Defense)
Highway Department (Traffic Interruptions)

Telemetry Signaling

Highway (Traffic counting and structural stress monitoring)
Environmental Agencies (Air and Water Monitoring)
Medical Institutions (Diagnostic Examinations)

Servo Control Signaling

Highway Traffic Control (Computerized or manual)

NARROWBAND SERVICES - (Continued)

Slow-speed Facsimile

Virtually all agencies and institutions having field offices,
installations or activities

Public Radio Networking

All Public Radio Stations (10 Sites - Voice grade only)

Instructional Programming (Audio and/or Slow scan Video)

Higher Education (Internal and via radio)

~~Public Education (Largely via radio)~~

State Personnel Training (especially through State Personnel System)

Administrative Audio Conferencing

Virtually all agencies and institutions

Aural Monitoring

Environmental Agencies (Noise Control)

Video Site Monitoring (Slow scan)

Environmental Agencies (Smoke abatement, etc.)

Highway Department (Traffic Flow)

Forestry (Fire Monitoring)

We envision in Virginia a PUBLIC SERVICE SATELLITE SYSTEM which consists of:

- (a) primarily, broadband transceiver capacities in those 31 Virginia "locality clusters" having state-supported institutions of higher education, perhaps with common-carrier-supplied (or radio-spectrum) narrow-band extensions to each nearby School Division Headquarters, DMV local office, Highway Department Depot, State Hospital facility, local hospital, Corrections installation, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, Public Telecommunications Entity*, public radio station**, State Police Headquarters as well as the principal sites of local government and local law enforcement administration. In those 8 localities where there are several institutions of higher education in close vicinity, broadband links can be used to inter-connect them with the nearby transceivers. (There are 16 such installations in all).

- (b) perhaps also, narrow-band transceiver capacities in all or certain of those ~~52 Virginia "locality clusters" lacking an institution of higher education~~ but having a School Division Headquarters, with common-carrier-supplied (or radio spectrum) narrow-band extensions to each nearby DMV local office, Highway Department Depot, State Hospital facility, local hospital, Corrections installation, State-owned radio station, Health Department Office, Welfare Office, Environmental Monitoring facility, Employment Office, State Police Headquarters as well as the principal sites of local government and local law enforcement administration.

*The five regional Public Telecommunications Entities would actually provide suitable broadband links from their Master Control Rooms to and from the closest transceiver sites.

**Similarly, CPB-qualified public radio stations in Richmond, Norfolk, Roanoke, Harrisonburg and Fairfax would provide high-fidelity, audio-bandwidth links to and from their own Control Rooms.

N.B. Broadband and/or narrowband extensions could also often be accomplished through local CATV systems.

The regional multiplexing broadband facilities would be employed to receive, send and relay duplexed video (cinematized), high fidelity or voice-grade audio (including various slow-scan video formats), high-speed and slow-speed data (including facsimile, telemetry, servo and alarm signals).

The local limited-multiplexing narrowband capacities would be employed to receive, send and relay duplexed voice-grade audio (including certain slow-scan video formats) and slow-speed data (including facsimile, telemetry, servo and alarm signals).

BTP terminal systems would include:

Video Monitors and/or recorders
High-fidelity Audio Monitors and/or recorders
High-speed Facsimile Print-outs and/or copiers
High-speed Computer Inter-faces
Parallel Telemetry Mechanisms and recorders

NTP terminal systems would include:

Slow-scan Video Monitors and/or recorders
Audio Monitors and/or recorders
Slow-speed Facsimile Print-outs and/or copiers
Slow-speed Computer inter-faces (including Teletypewriters)
Alarm Mechanisms
Telemeters and/or signal recorders
Servo Control Mechanisms

Concomitant Origination Systems would include:

Video Cameras and Mixers
Audio-video recorders/playback machines
Microphones and Audio Processors/Mixers
Audio recorder/playback machines and Rate Change Devices
Facsimile Encoders (Micro-form and other)
Teletypewriters
Keypunchers and Readers
Cathode-ray writers and similar electro-optical device systems
Data recorder/playback machines
Environmental Sensors and Meters (Heat Light, Chemical, etc.)
Stress and pressure sensors and meters
Signal Activators (Manual and programmed)
Computers (Digital or Analog)
Medical Sensor Instruments

The envisioned Broadband interconnection system would likely require:

- (a) 2 hours of broadband single-channel service between 8 a.m. and 5 p.m. each workday.
- (b) 2 hours of broadband single-channel service between 5 p.m. and 11 p.m. each weeknight.
- (c) 2 hours of broadband single-channel service between 11 p.m. and 8 a.m. each day.

If double-channel broadband capacities were made available, overall time requirements might be halved.

Narrowband requirements would be:

- (a) 24 hour instant access to an emergency channel
- (b) 10 minutes per hour on a data conditioned channel (to be used largely in a polling, share-time mode for critical update relaying)
- (c) 2 continuous hours in the 8 a.m. - 5 p.m., 5 p.m. to 11 p.m. and 11 p.m. to 8 a.m. time periods each day.
- (d) 1 minute in every 5 for relay of telemetered data on a conditioned channel (to be used in a polling, share-time mode)

All figures are minimums.

NOTE: It is presumed that Narrowband facilities would be devised and used only where, and to the extent that, CCO-supplied circuits or conventional microwave or radio links are unavailable, more expensive, significantly less reliable, or technically inferior.

SYSTEM REACH

The envisioned intra-and-inter-state Interconnection System should be designed to allow any Virginia Transceiver to interconnect directly with any other technically compatible transceiver within satellite range but under strict traffic protocols which are managed from a central organizational point in Richmond and which are in turn fully integrated with overall traffic configurations determined by the national satellite operating authority.

STRUCTURAL OUTLOOK

The VPTC believes that there is strong merit in the concept that the five Public Telecommunications Entities in Virginia become jointly the principal intra-state operators of the public service satellite system elements described herebefore, interfacing them where logical with CCO and state-owned radio-spectrum or computer facilities. Such an arrangement might best be effected by having the entities incorporate with the VPTC (acting on behalf of the Commonwealth government) as an ADDED VALUE NETWORK ORGANIZATION (AVNO). In this way, the interconnection system would be "synergized" through the regular accessing of media production, storage, maintenance, design, and management resources.

The AVNO, centered at Richmond, would be responsible for clearing and implementing all intra-state and inter-state switching protocols with the national satellite operating organization.

Probable BROADBAND TRANSCEIVER POINTS ("Locality Clusters" Showing Community Colleges, College, University Campuses, and Telecommunications Entities Within)

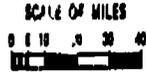
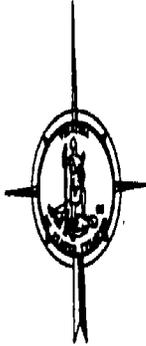
- | | |
|--|------------------------|
| 1 - Richmond U(2) + CC(2) + WCVE/WCVW + FM | 28 - Wytheville CC |
| 2 - Norfolk U + C + CC(3) + WHRO + FM | 29 - Blacksburg* U + C |
| 3 - Wallops Island CC | 30 - Dublin* CC |
| 4 - Newport News* C + CC | 31 - Martinsville CC |
| 5 - Franklin CC | |
| 6 - Gloucester County* (Glenns) CC | |
| 7 - Williamsburg C | |
| 8 - Richmond County (Warsaw) CC | |
| 9 - Dinwiddie County (Petersburg) C + C + CC | |
| 10 - Alberta CC | |
| 11 - Farmville C | |
| 12 - Keysville* CC | |
| 13 - Fredericksburg C + CC | |
| 14 - Fairfax (Annandale) CC(3) + U + WTVT + FM | |
| 15 - Loudon County (Leesburg)* CC | |
| 16 - Middletown CC | |
| 17 - Harrisonburg C + WVPT + FM | |
| 18 - Augusta County (Weyers Cave)* CC | |
| 19 - Charlottesville U + CC | |
| 20 - Lexington C | |
| 21 - Clifton Forge CC | |
| 22 - Danville CC | |
| 23 - Lynchburg CC | |
| 24 - Roanoke CC + WBRA/WSVN + FM | |
| 25 - Abington CC | |
| 26 - Wise C (+ WSVN?) | |
| 27 - Richlands CC | |

*These seven points might be combined with others, reducing the number of BTPs to 24.

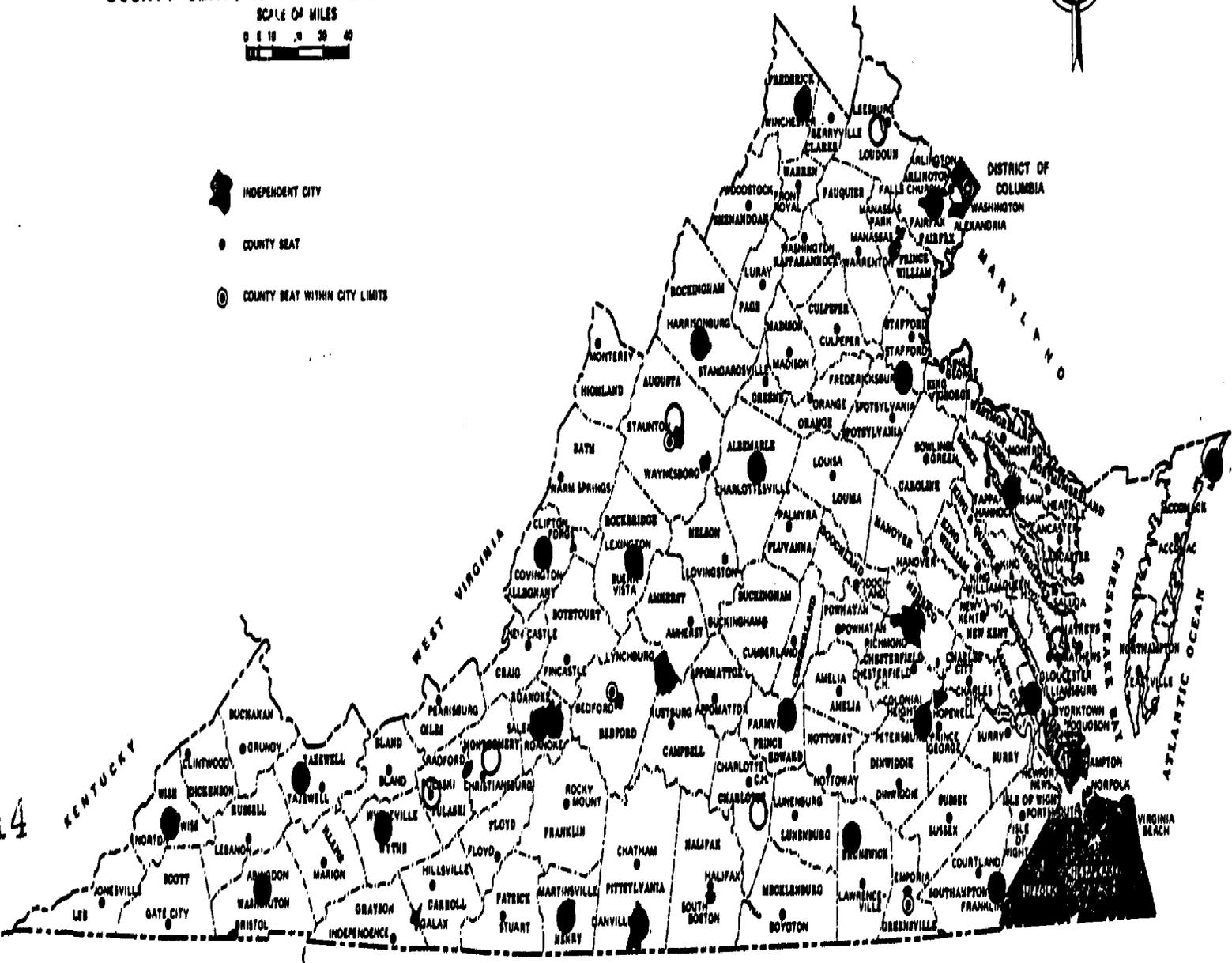
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DEPARTMENT OF HIGHWAYS AND TRANSPORTATION TRAFFIC AND SAFETY DIVISION COUNTY SEATS AND INDEPENDENT CITIES

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- INDEPENDENT CITY
- COUNTY SEAT
- COUNTY SEAT WITHIN CITY LIMITS



LIKELY BROADBAND TRANSCEIVER POINTS

OPTIONAL BROADBAND TRANSCEIVER POINTS



Possible, additional Narrowband Transceiver Points ("Locality Clusters")

(It is likely that transceivers will not be needed at all points identified below)

- 1 - Northampton County
- 2 - Suffolk
- 3 - Isle of Wight County
- 4 - Surry County
- 5 - Lancaster - Northumberland Counties
- 6 - King and Queen - Middlesex Counties
- 7 - Sussex County
- 8 - Essex County
- 9 - Westmoreland County
- 10 - King George County
- 11 - Caroline County
- 12 - Hanover County
- 13 - Greensville County
- 14 - Mecklenburg County
- 15 - Nottoway County
- 16 - Amelia County
- 17 - Powhatan County
- 18 - Goochland County
- 19 - Louisa County
- 20 - Fluvanna County
- 21 - Buckingham County
- 22 - Appomattox County
- 23 - Charlotte County
- 24 - Halifax County
- 25 - Franklin County

- 26 - Patrick County
- 27 - Floyd County
- 28 - Carroll County
- 29 - Grayson County
- 30 - Smyth County
- 31 - Scott County
- 32 - Lee County
- 33 - Russell County
- 34 - Dickenson County
- 35 - Buchanan County
- 36 - Bland County
- 37 - Giles County
- 38 - Craig County
- 39 - Bedford County
- 40 - Botetourt County
- 41 - Amherst County
- 42 - Nelson County
- 43 - Cumberland County
- 44 - Bath County
- 45 - Highland County
- 46 - Madison County
- 47 - Page County
- 48 - Shenandoah County
- 49 - Warren-Rappahannock Counties
- 50 - Culpeper County
- 51 - Stafford County
- 52 - Fauquier County

PHASING PRIORITIES

Assuming the demonstrated cost-effectiveness of the capacities and facilities to be involved at each installation phase, the VPTC tentatively anticipates the following priority schedule for the development of the interconnection system envisioned:

- (a) Main BTP at Richmond interconnected through satellite to comparable State BTPs elsewhere (but especially in the East) and BTPs at Norfolk, Roanoke and Fairfax (4 BTPs)
- (b) BTPs at Harrisonburg and Wise (2 BTPs)
- (c) BTPs at Danville, Fredericksburg, Wallops Island, Williamsburg, Farmville, Abingdon, and Charlottesville (7 BTPs)
- (d) BTPs at Franklin, Warsaw, Petersburg, Alberta, Middletown, Lexington, and Wytheville (7 BTPs)
- (e) BTPs at Clifton Forge, Lynchburg, Richlands, Martinsville, Blacksburg*, Newport News*, and Leesburg* (4-7 BTPs)
- (f) BTPs at Keysville*, Weyers Cave*, Dublin* and Glenss* (up to 4 BTPs)
- (g) NTPs at Greensville County, Halifax County, Lee County, Highland County, Louisa County, Culpeper County, Grayson County, Lancaster-Northumberland Counties (8 NTPs)
- (h) Other NTPs as required (up to 44 NTPs)

*Engineering studies might obviate need for these BTPs by extending broadband services from other locality clusters nearby.

AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY
OF NEW INTERCONNECTION SERVICES

Division of State Planning & Community Affairs
State Water Control Board
Office of Emergency Services
Council On Higher Education
Department of Highways & Transportation
Division of Automated Data Processing
Air Pollution Control Board
State Library
Department of Health
Department of Purchases & Supply
Department of Community Colleges
Highway Safety Division
State Corporation Commission
Department of Mental Health & Mental Retardation
Department of Corrections
Department of Welfare
Division of Motor Vehicles
Department of Education
Division of Engineering & Buildings
Employment Commission
Virginia Institute of Marine Science
State Police
State Forestry Service
VPI & State University
Medical College of Virginia - Health Science Division

AGENCIES DIRECTLY PARTICIPATING IN NEEDS ASSESSMENT SURVEY

University of Virginia

University of Virginia Hospital

Central Virginia ETV Corporation

Shenandoah Valley ETV Corporation

Blue Ridge ETV Association, Incorporated

Hampton Roads ETV Association, Incorporated

WVWR - FM Radio

WRFK - FM Radio

WMRA - FM Radio

Common Carrier Telephone Companies of Virginia

PUBLIC INSTITUTIONS

■ Four-Year Colleges and Universities

- 1 Christopher Newport College, Newport News
- 2 Clinch Valley College, Wise
- 3 George Mason University, Fairfax
- 4 Longwood College, Farmville
- 5 Madison College, Harrisonburg
- 6 Mary Washington College, Fredericksburg
- 7 Norfolk State College, Norfolk
- 8 Old Dominion University, Norfolk
- 9 Radford College, Radford
- 10 University of Virginia, Charlottesville
- 11 Virginia Commonwealth University, Richmond
- 12 Virginia Military Institute, Lexington
- 13 Virginia Polytechnic Institute and State University, Blacksburg
- 14 Virginia State College, Petersburg
- 15 The College of William and Mary, Williamsburg

□ Community and Two-Year Branch Colleges

- 16 Blue Ridge Community College, Weyers Cave
- 17 Central Virginia Community College, Lynchburg
- 18 Dabney S. Lancaster Community College, Clifton Forge
- 19 Danville Community College, Danville
- 20 Eastern Shore Community College, Wallups Island
- 21 Germanna Community College, Fredericksburg
- 22 J. Sargeant Reynolds Community College, Richmond
- 23 John Tyler Community College, Chester
- 24 Lord Fairfax Community College, Middletown
- 25 Mountain Empire Community College, Big Stone Gap
- 26 New River Community College, Dublin
- 27 Northern Virginia Community College
 - Alexandria
 - Annandale
 - Loudoun
 - Manassas
 - Woodbridge
- 28 Patrick Henry Community College, Martinsville
- 29 Paul D. Camp Community College, Franklin
- 30 Piedmont Virginia Community College, Charlottesville
- 31 Rappahannock Community College
 - (a) Warsaw
 - (b) Glens
- 32 Southside Virginia Community College
 - (a) Christanna Campus - Albemarle
 - (b) John H. Daniel Campus - Keyesville
- 33 Southwest Virginia Community College, Richlands
- 34 Thomas Nelson Community College, Hampton
- 35 Tidewater Community College
 - (a) Frederick Campus - Portsmouth
 - (b) Virginia Beach Campus - Camp Pendleton
 - (c) Chesapeake Campus - Chesapeake
- 36 Virginia Highlands Community College, Abingdon
- 37 Virginia Western Community College, Roanoke
- 38 Wyrheville Community College, Wyrheville
- 39 Richard Bland College, Petersburg

PRIVATE INSTITUTIONS

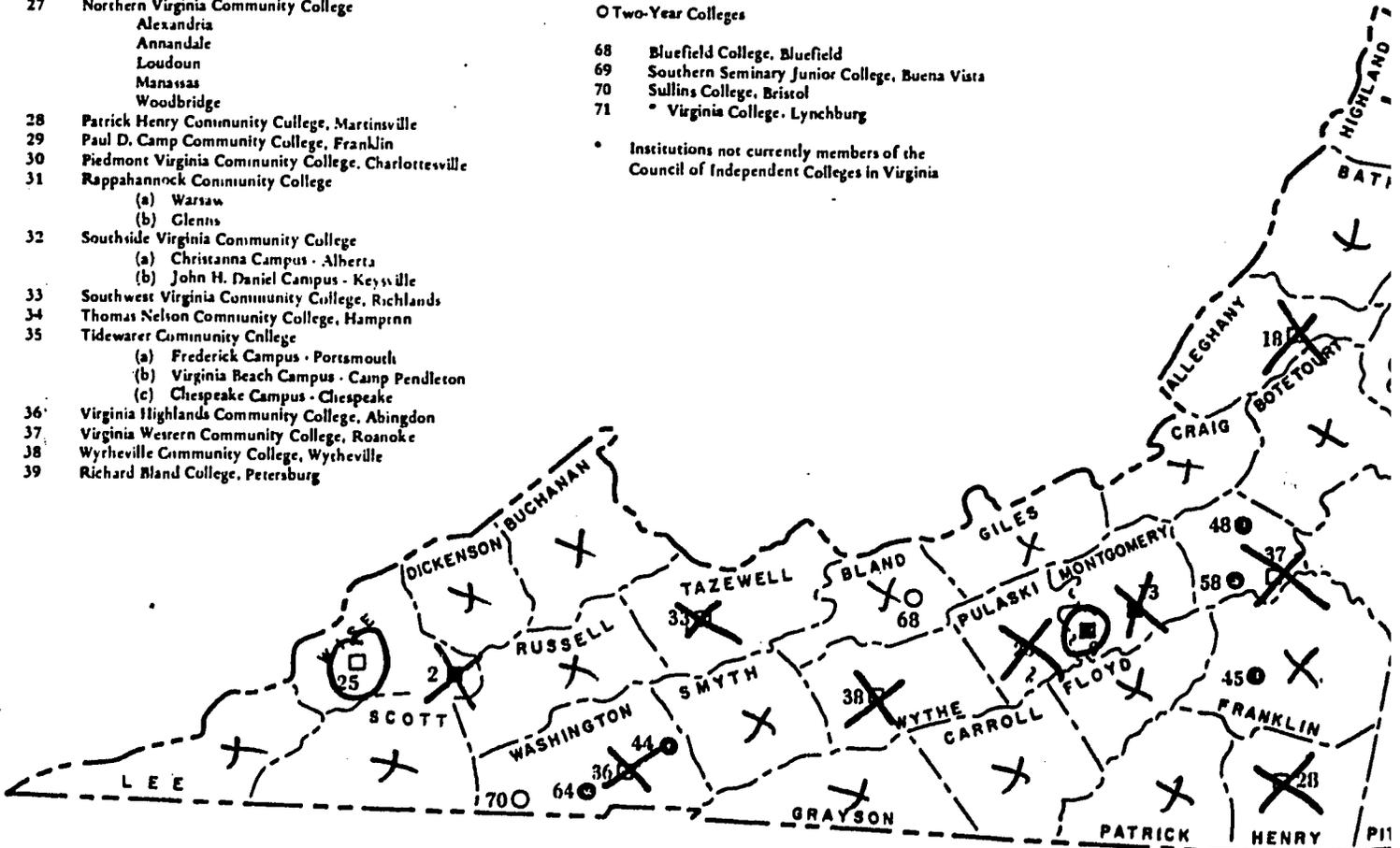
● Four-Year Colleges and Universities

- 40 Averett College, Danville
- 41 Bridgewater College, Bridgewater
- 42 Eastern Mennonite College, Harrisonburg
- 43 Eastern Virginia Medical School, Norfolk
- 44 Emory and Henry College, Emory
- 45 Ferrum College, Ferrum
- 46 Hampden-Sydney College, Hampden-Sydney
- 47 Hampton Institute, Hampton
- 48 Hollins College, Hollins College
- 49 Institute of Textile Technology, Charlottesville
- 50 Liberty Baptist Church, Lynchburg
- 51 Lynchburg College, Lynchburg
- 52 Mary Baldwin College, Staunton
- 53 Marymount College of Virginia, Arlington
- 54 Presbyterian School of Christian Education, Richmond
- 55 Protestant Episcopal Theological Seminary in Virginia, Alexandria
- 56 Randolph-Macon College, Ashland
- 57 Randolph-Macon Woman's College, Lynchburg
- 58 Roanoke College, Salem
- 59 Saint Paul's College, Lawrenceville
- 60 Shenandoah College and Conservatory of Music, Winchester
- 61 Sweet Briar College, Sweet Briar
- 62 Union Theological Seminary in Virginia, Richmond
- 63 University of Richmond, Richmond
- 64 Virginia Intermont College, Bristol
- 65 Virginia Union University, Richmond
- 66 Virginia Wesleyan College, Norfolk
- 67 Washington and Lee University, Lexington

○ Two-Year Colleges

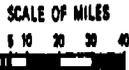
- 68 Bluefield College, Bluefield
- 69 Southern Seminary Junior College, Buena Vista
- 70 Sullins College, Bristol
- 71 Virginia College, Lynchburg

• Institutions not currently members of the Council of Independent Colleges in Virginia

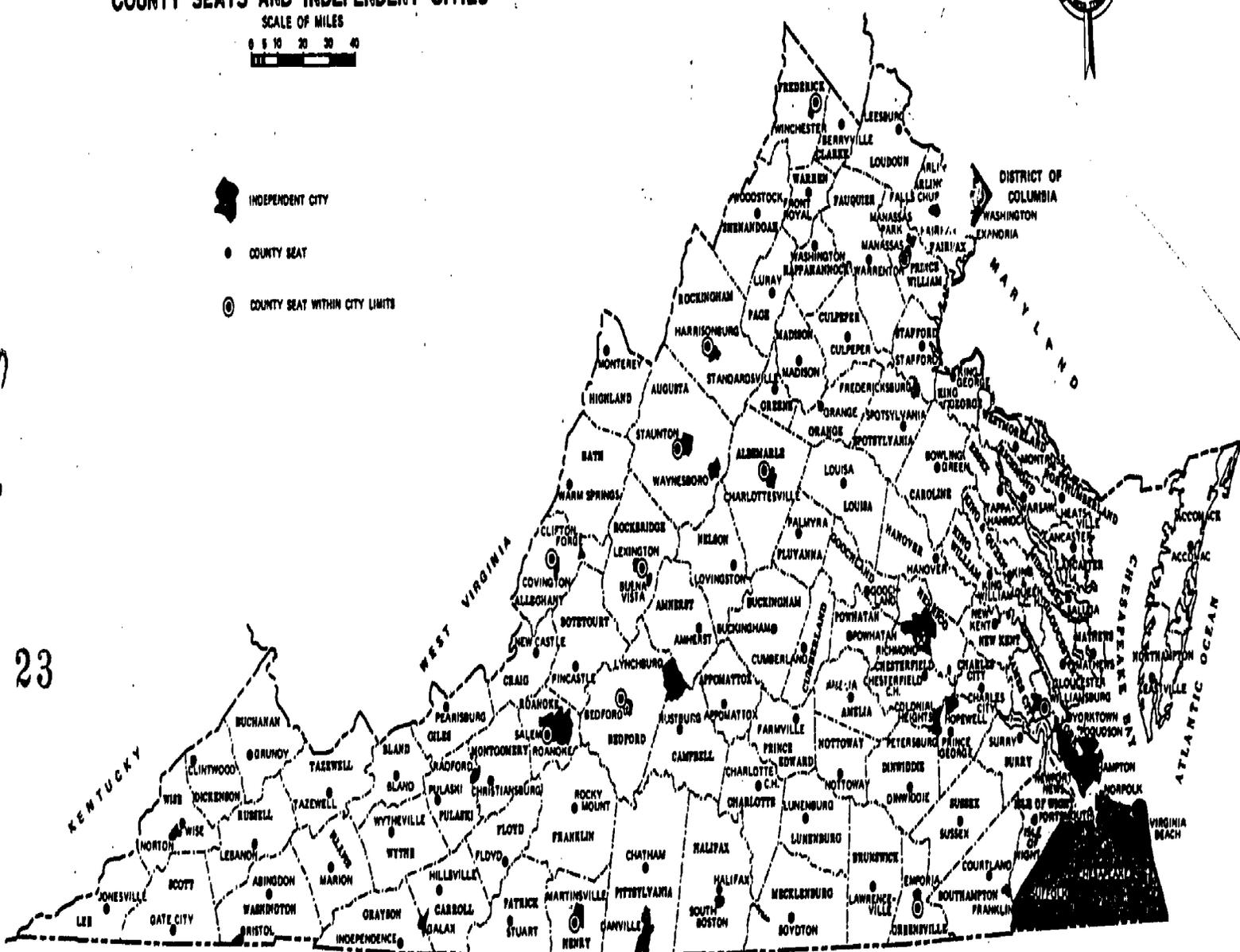
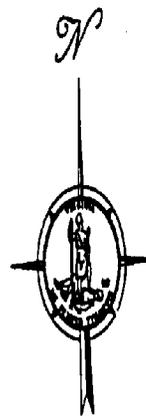


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TENNESSEE

NORTH CAROLINA

24