



Library and Archives Canada

Guidelines on File Formats for Transfer



Guidelines on File Formats for Transfer

1. Effective Date

These Guidelines have been approved by the Senior Director General and Chief Information Officer, Digital Services Sector, and take effect on March 4, 2025.

2. Application

These Guidelines provide advice on the file formats to be used when transferring digital material to Library and Archives Canada (LAC). Specifically, digital archival records, digital publications, or web resources.

These Guidelines apply to all persons and organizations transferring digital material to LAC (hereinafter referred to as “content providers”).

These Guidelines do not contain information on creation, migration and capture standards. The Treasury Board Secretariat (TBS) has issued [Guidance on Digital File Formats](#) (2024) which addresses recommended file formats for creation of digital material in order for GC institutions to be in compliance with requirements under the [Policy on Service and Digital](#) (2020) including [Appendix J: Standard on Systems that Manage Information and Data](#) (2022). LAC also has issued [Digitization Guidelines](#) that may be useful for GC institutions who are digitizing their analogue records.

These Guidelines do not give information on the generation of metadata during the record creation and management by GC institutions. See LAC’s [Operational Standard for Digital Archival Records’ Metadata](#).

These Guidelines do not outline how to achieve the actual physical or electronic transfer of digital material. For this process, content providers are asked to discuss the logistics of the transfer with the LAC representative responsible for the transfer.

These Guidelines supersede the *Guidelines on File Formats for Transferring Information Resources of Enduring Value* (2014).

3. Definitions

See [Appendix A](#).

4. Context

These Guidelines are part of LAC’s [Preservation Policy Framework](#) (2022) and [Policy on Digital Preservation](#) (2024). The Framework and Policy mandates that digital material acquired and managed by LAC be accessible over time, and that

consideration be given to digital preservation requirements and resource capacity. The sustainability of digital material should therefore be a consideration in all acquisition activities.

File formats are specific patterns or structures that organize and define data. Some formats contain only one stream of uncompressed data, others may contain codecs to encode and compress the data and others may support several streams of media.

In addition to file formats, there are also container or encapsulating formats. These formats can contain and support various types or layers of data and metadata. Each of these formats may be handled by different programs, processes, or hardware but for the data stream to be interpreted properly, the information must be wrapped together.

The ability to preserve and use digital information is at risk if the computer hardware and software needed to access the information are no longer available or if the format specifications are not obtainable. The use of appropriate file formats is therefore critical to sustainable long-term preservation. Due to a mix of technical and practical issues, certain file formats are more suitable for preservation.

In accordance with sections 8 (2), and 10 of the *Library and Archives of Canada Act*, and section 2 (a) and (b) of the *Legal Deposit of Publications Regulations*, these Guidelines outline the appropriate file formats for submission to LAC of digital publications affected by Legal Deposit. While the *Library and Archives of Canada Act* section 10 (4) entitle LAC to collect all or any published versions and formats of a given title, LAC's preferred file formats for accessibility and preservation are defined within these Guidelines.

In accordance with sections 7, 12 and 13 of the *Library and Archives of Canada Act*, these Guidelines outline the appropriate digital formats that support any agreements between LAC and Government of Canada (GC) institutions for the transfer of digital archival records. Where such a transfer is governed by an existing records transfer agreement that specifies a digital format other than what is outlined in these Guidelines, GC institutions must consult with LAC prior to preparing the transfer.

These Guidelines will also apply to other acquisition agreements in which LAC representatives specify the file formats for transfer.

5. Purpose

These Guidelines identify the number and types of submittable file formats to those in which LAC has reasonable confidence that they can be preserved and made accessible over time, supporting sustainability of preservation actions and long-term access.

Adherence to these Guidelines will allow LAC to achieve the following:

- Acquisition of file formats identified as being sustainable when feasible.

- Ensuring long-term access to digital material in LAC’s collection.
- Alignment with good international practice in digital preservation.

6. Approach

The following criteria are considered when evaluating the sustainability of a given format¹:

Principle	Criteria
Transparency and openness of format	The degree to which the format is proprietary vs. open and the degree to which the full file format specification is freely available.
Adoption as a preservation standard	The extent to which the format has been formally adopted by national libraries, archives, and other memory institutions internationally.
Stability and compatibility	The degree to which the format is: <ul style="list-style-type: none"> • Backward and forward compatible. • Protected against file corruption. The relative frequency of updated or replacement versions of the format over time.
Format external dependencies and interoperability	The requirements for the use of the format. The degree to which the format relies on a particular hardware or software.

7. Instructions

These Guidelines identify broad content categories covering all digital material acquired by LAC and provide a listing of the “preferred” and “accepted” file formats for each category.

The file formats covered in this document have been divided into the following content categories² and subcategories:

- Text
- Presentations
- Email

¹ See [Appendix B](#): References (for resources LAC consulted on file format sustainability).

² Web content is not currently a content category as LAC actively harvests the web content that it seeks to acquire and preserve. Normally, LAC does not accept pre-harvested web content from content providers. For more information, see LAC’s [Web and Social Media Preservation Program](#).

- Still images
 - Digital photographs
 - Scanned text
- Digital audio
- Digital moving images
 - Digital cinema
 - Digital video
- Geospatial
- Computer Aided Design
- Data sets

The transfer file formats are identified as either:

- Preferred for transfer; or
- Acceptable for transfer.

Preferred formats are those formats that are readily usable and have been identified by LAC as possessing a high degree of long-term sustainability. These formats require little or no immediate preservation action to achieve appropriate levels of preservation and to ensure the content remains accessible.

Acceptable formats are those that meet some but not all of the sustainability principles outlined in section 6. These formats may require LAC to perform some preservation actions on ingest to ensure their long-term sustainability.

As a general rule, LAC will only accept file formats for transfer listed in these Guidelines. Content providers are responsible to ensure that digital material are in a preferred or acceptable file format at the time of transfer. LAC reserves the right to refuse any file that is not in a preferred or acceptable file format and to request the migration of the files to a preferred or acceptable format. Digital material may be exempted from compliance on a case-by-case basis after consultation with LAC representatives from the functional area responsible for acquisition and preservation.

8. Preferred and acceptable file formats for transfer

Please see [Appendix C](#) for a list of LAC's preferred and acceptable file formats for transfer.

File formats are organized by content category and listed as either acceptable or preferred. Formats are listed by name and include a reference to the relevant specification that defines appropriate encoding methods. Where required, the format category tables include a column that specifies the codec that must be used with each format. Content providers must submit files that comply with both the format and codec that are listed.

The formats in each section are organized alphabetically and do not imply an order of preference for any given format. LAC always prefers to receive a preferred file

format over an acceptable file format if both exist; however, if only an acceptable file format exists, there is no need for the content provider to migrate the content to a preferred file format prior to transfer.

In some cases, the content provider must take additional steps to ensure that files are accessible for long-term preservation by:

- Deactivating file level encryption;
- Deactivating digital rights management technologies;³
- Embedding in each file all fonts necessary to interpret the information;⁴
- Providing a copy of special software and/or technical documentation needed to access the file⁵
- Providing metadata⁶ either embedded within the file itself or in an accompanying digital file.

9. Roles and responsibilities

Responsibility for administering and maintaining these Guidelines rests with the Director, Digital Collections Operations.

Directors and LAC staff involved in the acquisition and preservation of digital material are responsible for communicating, operationalizing, and facilitating understanding of these Guidelines for content providers.

Content providers are to follow these Guidelines and consult with LAC on any matters that may impede their ability to comply with these Guidelines.

10. Monitoring, evaluation and review

The Director, Digital Collections Operations Division, is responsible for maintaining this Guideline, for monitoring the application, and for reporting on compliance.

Evaluation and review of these Guidelines will be undertaken every three (3) years by representatives of the branches responsible for acquisition and preservation, or earlier as required.

11. Consequences

While strongly recommended, compliance with this Guidelines remains optional

³ This is a requirement for publications submitted to LAC on Legal Deposit, in accordance with the [Legal Deposit of Publications Regulations, section 2 \(a\)](#). For all other content types, this applies only if the creator has the legal right to do so.

⁴ If the creator has the legal right to do so.

⁵ This is a requirement for publications submitted to LAC on Legal Deposit, in accordance with the [Legal Deposit of Publications Regulations, section 2 \(b\)](#).

⁶ This is a requirement for publications submitted to LAC on Legal Deposit, in accordance with the [Legal Deposit of Publications Regulations, section 2 \(b\)](#). Certain bibliographic metadata standards may be necessary. Contact LAC to discuss metadata requirements prior to transfer.

unless otherwise stated. Some consequences of non-compliance with these Guidelines are those that impact the sustainability, accessibility, and digital preservation of digital material transferred to LAC.

12. Information

Please address any questions about these Guidelines to:

Director, Digital Collections Operations Division
Digital Services Sector
Library and Archives Canada
550 de la Cité Boulevard
Gatineau, Québec
K1A 0N4

Appendix A: Definitions

Acceptable format [format acceptable]: a file format that meets some but not all of LAC's sustainability principles. This format may require LAC to perform some preservation actions on ingest to ensure long-term sustainability.

Access [accès]: Access occurs when clients can find, identify, view, obtain and use holdings.

Accessible [accessible]: Digital material is accessible when physical, technological and geographical barriers to the content are removed and when it can be used by as many people as possible.

Acquisition [acquisition]: Acquisition is the process of adding publications and records to LAC's documentary heritage collections. Acquisition occurs when LAC formally gains control over publications and records for their long-term preservation, and subsequently assumes the responsibility for the management of its metadata and for its use by future generations. For clarity, documentary heritage acquired by LAC is Crown property.

Bitmap [matrice de bits]: an image created from a series of bits and bytes that form pixels. Each pixel carries a value that defines a bits/bytes colour or greyscale. Such images are also known as raster images.

Codec [codec]: hardware or software capable of encoding and/or decoding a data stream for transmission. When used with digital audio or video, the term codec refers to the digital signal encapsulated in a wrapper.

Container format [format contenant]: a format that can contain and support various types or layers of audio, video, still imagery and their associated metadata. For the data stream to be properly interpreted, the information must be encapsulated or wrapped together. The wrapper refers to a particular way of storing and synchronizing data content into a single file.

Content providers [fournisseur de contenu]: All persons and organizations transferring digital material to Library and Archives Canada – these include publishers, Government of Canada Institutions and private donors.

Compression [compression]: the encoding of information using fewer bits than in the original. There are two forms of data compression – lossless and lossy. A lossless compression technique discards no information. It looks for more efficient ways to represent data, while making no compromises in accuracy. Lossy compression accepts some degradation in the data to achieve smaller file sizes. Because of this degradation in quality, lossy compression should be avoided.

Computer Aided Design (CAD) [Conception assistée par ordinateur (CAO)]: vector programs used to create animations that represent two- and three-dimensional

surfaces of inanimate objects. CAD and vector graphics programs can output binary and XML formats.

Data sets [ensemble de données]: data stored in defined fields such as databases and spreadsheets.

Database formats [format de base de données]: organized collections of data that conform to a logical structure. Database formats are determined by data models that describe specific data structures used to model an application and generally include navigational, relational, and hybrid models.

Digital audio [audio numérique]: file formats that encode recorded sound as machine readable files by converting acoustic sound waves into digital signals. Digital audio formats are generally composed of both a wrapper format and an encoding method or codec. Audio file stream encodings are independent of the audio container file format.

Digital cinema [cinéma numérique]: both born-digital cinematic productions and digital moving image files created by digitizing motion picture film.

Digital material [contenu numérique]: A broad term encompassing digital surrogates created as a result of converting analogue materials to digital form (digitization), and "born digital" for which there has never been and is never intended to be an analogue equivalent.

Digital moving images [image en mouvement numérique]: a sequence of bitmap digital images displayed in rapid succession at a constant rate, giving the appearance of movement. Digital moving image file formats function as containers or wrappers to provide storage areas for any moving image essence, associated audio essence (if present), as well as metadata. Moving image essence data contained within a given wrapper file format is encoded for playback using a specific codec. The parameters of the codec employed determines the presence and method of compression that was used to store the digital moving image data within the wrapper. This category includes two subcategories: digital cinema and digital video.

Digital preservation [préservation numérique]: Digital preservation is all actions taken to slow deterioration of or prevent damage to the collections, and to ensure that its access, use and meaning, and its capacity to be accepted as evidence of what it purports to publish and record, are maintained over time.

Digital photographs [photo numérique]: both still photographs produced by digital cameras as well as scanned images of photographic prints, slides, and negatives.

Digital rights management technologies [technologies de gestion des droits numériques]: technologies to prevent unauthorized use or reproduction of digital content and devices.

Digital video [vidéo numérique]: both born-digital video and digital files created by digitizing video from an analog source.

Email [courriel]: electronic communication transmitted over the Simple Mail Transfer Protocol (SMTP) between two or more accounts. Email is composed of a header, message body and attachments. The header is structured metadata that establishes the provenance of the record. Data that must be present is: sender name and address; names and addresses of all recipients; sent date; and, received date. The message body is the intellectual content of the message. Attachments are any additional objects sent with the email.

Encapsulating format [format d'encapsulation]: see container format.

Encryption [chiffrement]: the use of an algorithm to render a file unreadable. A decryption key is required to undo the work of the algorithm.

End-of-record marker [indicateur de fin de document]: in a file it varies in accordance with the operating system this is used to create the file. In a MAC OS environment, a carriage return (CR - ASCII code 0x0D) is placed at the end of a record. In a DOS or Windows OS environment a CR+ a Line Feed (LF - ASCII code 0x0A) is placed at the end. In UNIX only a LF appears at the end.

File format [format de fichier]: specific pattern or structure that organizes and defines data. Some formats contain only one stream of uncompressed data, others may contain codecs to encode and compress the data, and others may support several streams of media.

Geospatial data [données géospatiales]: data may be contained within a database to enable analysis across the datasets (e.g. geo-database), united within a complex file format structure where one geospatial file is comprised of several distinct, but related, formats (e.g. shapefile), or contained within a single file (e.g. GML).

Metadata [métadonnées]: Information used to contextualize, manage, preserve and provide access to records.

Migration [migration]: the movement of digital information from one software/hardware environment/storage medium or file format to another as standards and technology evolve. Ensures continuity of information contained in file formats over time.

Preferred format [format favorisé]: a file format that is readily usable and has been identified by LAC as possessing a high degree of long-term sustainability. This format requires little or no immediate management to achieve appropriate levels of preservation.

Presentation format [format présentation]: a format that conveys graphical information to audiences as a slide show.

Preservation [préservation]: Preservation is all actions taken to slow deterioration of or prevent damage to the collections, and to ensure that its access, use and meaning, and its capacity to be accepted as evidence of what it purports to publish and record, are maintained over time.

Raster image [image matricielle]: see bitmap.

Scanned text [texte numérisé]: a photograph of a printed page produced by either a digital camera or scanner.

Spreadsheets [feuille de calcul]: tables made up of columns and rows that contain cells of data. Relationships between cells can be pre-defined as mathematical formulas.

Still images [image fixe]: files that are sampled and bitmapped as a grid of rectangular dots, picture elements (pixels) or points of color.

Sustainability [durabilité]: Sustainability is the quality of meeting the needs of the collections and their current users without outstripping LAC's resource capacity or compromising the needs of future users.

Text [texte]: there are two general types of text: plain and formatted. Formatted text files contain encoded ASCII data and format definitions that display the information in a defined pattern. Plain text files contain encoded ASCII or Unicode data that has no formatting or layout code to influence the presentation of the data.

Vector graphics [graphique vectoriel]: digital images made up of object-oriented images that use the geometry of points, lines, curves and polygons to represent images.

Wrapper [contenant]: see container format.

Appendix B: References

Library of Congress. Recommended Formats Statements
<https://www.loc.gov/preservation/resources/rfs/>. Accessed February 19, 2025.

Library of Congress. *Sustainability of Digital Formats*.
<http://www.digitalpreservation.gov/formats/>. Accessed February 19, 2025.

National Archives and Records Administration. *NARA Bulletin 2014-04 Format Guidance for the Transfer of Permanent Electronic Records*.
<https://www.archives.gov/records-mgmt/bulletins/2014/2014-04.html>. Accessed February 19, 2025.

National Archives (UK). *File formats for transfer*.
<https://www.nationalarchives.gov.uk/information-management/manage-information/digital-records-transfer/file-formats-transfer/>. Accessed February 19, 2025.

Open Preservation Foundation. International Comparison of Recommended File Formats. <https://openpreservation.org/resources/member-groups/international-comparison-of-recommended-file-formats/>. Accessed February 19, 2025.

Smithsonian Institution Archives. Recommended Preservation Formats for Electronic Records. <https://siarchives.si.edu/what-we-do/digital-curation/recommended-preservation-formats-electronic-records>. Accessed February 19, 2025.

Appendix C: List of preferred and acceptable file formats for transfer

C.1 Text Formats

Preferred Formats	Format Specifications
American Standard Code for Information Interchange Text (ASCII Text)	ISO/IEC 646:1991, <i>Information technology – ISO 7-bit coded character set for information interchange</i> : http://www.iso.org/iso/catalogue_detail.htm?csnumber=4777
Electronic Publication (EPUB3)	<i>International Digital Publishing Forum EPUB Version 3</i> : http://idpf.org/epub/30
Open Document Text Format (ODF)	ISO/IEC 26300-1:2015 - <i>Information technology – Open Document Format for Office Applications (OpenDocument) v1.2 – Part 1: OpenDocument Schema</i> : https://www.iso.org/standard/66363.html
Portable Document Format/Archival (PDF/A-1)	ISO 19005-1:2005, <i>Document management – Electronic document file format for long-term preservation – Part 1: Use of PDF 1.4 (PDF/A-1)</i> : http://www.iso.org/iso/catalogue_detail?csnumber=38920
Portable Document Format/Archival (PDF/A-2)	ISO 19005-2:2011, <i>Document management – Electronic document file format for long-term preservation – Part 2: Use of ISO 32000-1 (PDF/A-2)</i> : http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=50655
Unicode Text	RFC 3629: <i>UTF-8, A Transformation Format of ISO 10646</i> : http://tools.ietf.org/html/rfc3629 RFC 2781: <i>UTF-16: An Encoding of ISO 10646</i> : http://www.ietf.org/rfc/rfc2781.txt
Acceptable Formats	Format Specifications
Electronic Publication (EPUB2.0.1)	<i>International Digital Publishing Forum EPUB Version 2.0.1</i> : http://idpf.org/epub/201
Microsoft Word 97-2003 Binary Document Format	<i>Microsoft Office Word 97-2003 binary file format specification [*].doc</i> :

(doc)	https://download.microsoft.com/download/0/B/E/0BE8BDD7-E5E8-422A-ABFD-4342ED7AD886/Word97-2007BinaryFileFormat(doc)Specification.pdf
Microsoft Word Office Open XML (docx)	[MS-OI29500]: Office Implementation Information for ISO/IEC 29500 Standards Support: http://msdn.microsoft.com/en-us/library/ee908652%28v=office.12%29
Portable Document Format (PDF)	ISO 32000-1:2008, Document management - Portable document format - Part 1: PDF 1.7: http://www.iso.org/iso/catalogue_detail.htm?csnumber=51502

C.2 Presentation Formats

Preferred Formats	Format Specifications
OpenDocument Presentation Format (odp)	ISO/IEC 26300:2006, Information technology - Open Document Format for Office Applications (OpenDocument) v1.0: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43485
Portable Document Format Archival (PDF/A-1)	ISO 19005-1:2005, Document management - Electronic document file format for long-term preservation - Part 1: Use of PDF 1.4 (PDF/A-1): http://www.iso.org/iso/catalogue_detail?csnumber=38920
Acceptable Formats	Format Specifications
Microsoft PowerPoint 1997-2007 Binary Format (ppt)	[MS-PPT]: PowerPoint (.ppt) Binary File Format (.xls) Structure: http://msdn.microsoft.com/en-us/library/cc313106(v=office.12).aspx
Microsoft PowerPoint Office Open XML Format (pptx)	[MS-OI29500]: Office Implementation Information for ISO/IEC 29500 Standards Support: http://msdn.microsoft.com/en-us/library/ee908652%28v=office.12%29

C.3 Email Formats⁷

Preferred Formats	Format Specifications
Internet Message Format (EML)	Internet Message Format: http://www.ietf.org/rfc/rfc2822.txt Multipurpose Internet Mail Extensions (MIME): http://tools.ietf.org/html/rfc2045 http://tools.ietf.org/html/rfc2046 http://tools.ietf.org/html/rfc2047 http://tools.ietf.org/html/rfc4288 http://tools.ietf.org/html/rfc4289 http://tools.ietf.org/html/rfc2049
MBOX Email Format	MBOX Email Format: https://tools.ietf.org/html/rfc4155 Multipurpose Internet Mail Extensions (MIME): http://tools.ietf.org/html/rfc2045 http://tools.ietf.org/html/rfc2046 http://tools.ietf.org/html/rfc2047 http://tools.ietf.org/html/rfc4288 http://tools.ietf.org/html/rfc4289 http://tools.ietf.org/html/rfc2049
Acceptable Formats	Format Specifications
Microsoft Outlook Item Message Format (MSG)	<i>[MS-OXMSG] Microsoft Outlook Item (.msg) File Format:</i> http://msdn.microsoft.com/en-us/library/cc463912(v=exchg.80).aspx
Microsoft Personal Folders Format (PST)	<i>[MS-PST]: Outlook Personal Folders (.pst) File Format:</i> http://msdn.microsoft.com/en-us/library/ff385210%28v=office.12%29.aspx

⁷ Email attachments are considered a component of the email and therefore the attachment does not have to meet the transfer standards specified by the format category that the attachment alone would fall under.

C.4 Formats for Still Images

This content category contains two subcategories: digital photographs and scanned text.

C.4.1 Digital Photographs

Preferred Formats	Format Specifications
Tagged Image File Format (TIFF), lossless	<i>TIFF, Revision 6.0, Final -- March 22, 2002. Link via Internet Archive:</i> https://web.archive.org/web/20180810205806/https://www.adobe.io/content/udp/en/open/standards/TIFF/jcr_content/contentbody/download_1370394226/file.res/TIFFphotoshop.pdf
JPEG 2000 (JP2), lossless	ISO/IEC 15444-1:2024 - <i>Information technology – JPEG 2000 image coding system – Part 1: Core coding system:</i> https://www.iso.org/standard/87632.html
Portable Network Graphics (PNG)	ISO/IEC 15948:2004, <i>Information technology - Computer graphics and image processing -- Portable Network Graphics (PNG): Functional specification:</i> http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=29581
Acceptable Formats	Format Specifications
JPEG File Interchange Format (JFIF) with Joint Photographic Experts Group (JPEG) compression	ISO/IEC 10918-5:2013, <i>Information technology – Digital compression and coding of continuous-tone still images: JPEG Interchange File Format:</i> http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=54989 ISO/IEC 10918-1:1994, <i>Information technology – Digital compression and coding of continuous-tone still images: Requirements and guidelines:</i> http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=18902
Digital Imaging and Communications in Medicine (DICOM)	ISO 12052:2017 - <i>Health informatics – Digital imaging and communication in medicine (DICOM) including workflow and data management:</i> https://www.iso.org/standard/72941.html
Digital Negative (DNG), with preview JPEG image included	<i>Digital Negative (DNG) Adobe's version 1.6.0.0:</i> https://helpx.adobe.com/content/dam/help/en/photoshop/pdf/dng_spec_1_6_0_0.pdf
Graphics Interchange Format (GIF)	<i>Graphics Interchange Format (sm) Version 89a:</i> http://www.w3.org/Graphics/GIF/spec-gif89a.txt

C.4.2 Scanned Text

Preferred Formats	Format Specifications
JPEG 2000 (JP2), lossless	ISO/IEC 15444-1:2024 - <i>Information technology – JPEG 2000 image coding system – Part 1: Core coding system</i> : https://www.iso.org/standard/87632.html
Portable Document Format/Archival (PDF/A), lossless	ISO 19005-1:2005, <i>Electronic document file format for long-term preservation – Part 1: Use of PDF 1.4 (PDF/A-1)</i> : http://www.iso.org/iso/catalogue_detail?csnumber=38920
Tagged Image File Format (TIFF), lossless	<i>TIFF, Revision 6.0, Final -- March 22, 2002. Link via Internet Archive:</i> https://web.archive.org/web/20180810205806/https://www.adobe.io/content/udp/en/open/standards/TIFF/_jcr_content/contentbody/download_1370394226/file.res/TIFFphotoshop.pdf
Acceptable Formats	Format Specifications
JPEG File Interchange Format (JFIF) with Joint Photographic Experts Group (JPEG) compression	ISO/IEC 10918-5: 2013, <i>Information technology – Digital compression and coding of continuous-tone still images: JPEG File Interchange Format (JFIF)</i> : http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=54989 ISO/IEC 10918-1:1994 <i>Information technology – Digital compression and coding of continuous-tone still images: Requirements and guidelines</i> : http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=18902
Plain text in combination with one of the above image formats	ISO/IEC 8859-1: 1988, <i>8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1</i> : http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=28245

C.5 Digital Audio Formats

Preferred Formats	Acceptable Codecs	Format Specifications
Broadcast Wave (BWF)	Linear Pulse Code Modulated Audio (LPCM)	<p>European Broadcast Union (EBU). Technical Specification of the Broadcast Wave Format (BWF) – Version 1: http://web.archive.org/web/20091229093941/http://tech.ebu.ch/docs/tech/tech3285.pdf</p> <p>Specification of the Broadcast Wave Format (BWF) - Version 2.0: https://tech.ebu.ch/docs/tech/tech3285.pdf</p>
Acceptable Formats	Acceptable Codecs	Format Specifications
Audio Interchange Format (AIFF)	Linear Pulse Code Modulated Audio (LPCM)	<p>Audio Interchange File Format: "AIFF" A Standard for Sampled Sound Files Version 1.3: https://www.mmsp.ece.mcgill.ca/Documents/AudioFormats/AIFF/Docs/AIFF-1.3.pdf</p>
Moving Pictures Expert Group (MPEG) MPEG-1 Layer 3, MPEG-2 Layer-3 (MP3)	MP3enc, Lame	<p>ISO/IEC-11172-3: 1993, Information technology – Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s – Part 3: Audio: http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=22412</p> <p>ISO/IEC 13818-3:1998 Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio: http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=26797</p>
MPEG-4 AAC Advanced Audio Coding (AAC)	n/a	<p>ISO/IEC 14496-3:2019 - Information technology – Coding of audio-visual objects – Part 3: Audio: https://www.iso.org/standard/76383.html</p>
WAVEform Audio (WAV)	Linear Pulse Code Modulated Audio (LPCM)	<p>Multimedia Programming Interface and Data Specifications 1.0: https://www.mmsp.ece.mcgill.ca/Documents/AudioFormats/WAVE/Docs/rifmci.pdf</p>

C.6 Formats for Digital Moving Images

This content category contains two subcategories: digital cinema and digital video.

C.6.1 Digital Cinema

Preferred Formats	Acceptable Codecs	Format Specifications
Digital Cinema Distribution Master (DCDM)	n/a	<p><i>Digital Cinema Initiatives, DCI Specification, DCSS Version 1.4.3, 2023 :</i> https://www.dcinovies.com/specification/</p> <p>ST 428-1:2019 - <i>SMPTE Standard - D-Cinema Distribution Master — Image Characteristics :</i> https://pub.smpte.org/pub/st428-1/st428-1-2019.pdf</p>
Digital Moving Picture Exchange Bitmap (DPX)	Uncompressed	<p>ST 268-1:2014 - <i>SMPTE Standard - File Format for Digital Moving-Picture Exchange (DPX):</i> https://my.smpte.org/s/product-details?id=a1BVR0000007Nen2AE</p>
Acceptable Formats	Acceptable Codecs	Format Specifications
Digital Cinema Package (DCP) Unencrypted Interop or SMPTE compliant	JPEG 2000 (as outlined by the DCI specifications)	<p><i>Digital Cinema Initiatives, DCI Specification, DCSS Version 1.4.3, 2023:</i> https://www.dcinovies.com/specification/</p>

C.6.2 Digital Video

Preferred Formats	Acceptable Codecs	Format Specifications
Audio Video Interleaved Format (AVI)	Uncompressed 4:2:2	AVI RIFF File Reference: http://msdn.microsoft.com/en-us/library/ms779636.aspx
Material Exchange Format (MXF) OP1a	JPEG 2000 lossless compression	ST 377-1:2019 - SMPTE Standard - Material Exchange Format (MXF) — File Format Specification: https://pub.smpte.org/latest/st377-1/st377-1-2019.pdf ISO/IEC 15444-1:2024 - Information technology — JPEG 2000 image coding system — Part 1: Core coding system: https://www.iso.org/standard/87632.html
Quicktime (MOV)	Uncompressed 4:2:2	QuickTime File Format Specification : https://developer.apple.com/documentation/quicktime-file-format
Acceptable Formats	Acceptable Codecs	Format Specifications
Audio Video Interleaved Format (AVI)	JPEG 2000 DV-NTSC AVC/H.264	AVI RIFF File reference: http://msdn.microsoft.com/en-us/library/ms779636.aspx ISO/IEC 15444-1:2024 - Information technology — JPEG 2000 image coding system — Part 1: Core coding system: https://www.iso.org/standard/87632.html Microsoft NTSC DV-AVI File reference: http://msdn.microsoft.com/en-us/library/windows/desktop/dd407250%28v=vs.85%29.aspx H.264 : Advanced video coding for generic audiovisual services (itu.int): https://www.itu.int/rec/T-REC-H.264

MPEG-2 Video (MPEG2)	n/a	ISO/IEC 13818-2:2013, <i>Information technology - Generic coding of moving pictures and associated audio information Part 2: Video</i> : http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=61152
MPEG 4	AVC/H.264	ISO/IEC 14496-14:2020 - <i>Information technology — Coding of audio-visual objects — Part 14: MP4 file format</i> : https://www.iso.org/standard/79110.html <i>H.264 : Advanced video coding for generic audiovisual services (itu.int)</i> : https://www.itu.int/rec/T-REC-H.264
QuickTime File Format (MOV)	JPEG 2000 DV-NTSC AVC/H.264 Apple ProRes Avid DNxHD	<i>QuickTime File Format Specification</i> : https://developer.apple.com/documentation/quicktime-file-format ISO/IEC 15444-1:2024 - <i>Information technology — JPEG 2000 image coding system — Part 1: Core coding system</i> : https://www.iso.org/standard/87632.html <i>H.264 : Advanced video coding for generic audiovisual services (itu.int)</i> : https://www.itu.int/rec/T-REC-H.264 <i>Apple ProRes White Paper October 2020</i> : https://www.apple.com/final-cut-pro/docs/Apple_ProRes_White_Paper.pdf <i>ST 2019-1:2016 - SMPTE Standard - VC-3 Picture Compression and Data Stream Format</i> : https://pub.smpte.org/latest/st2019-1/st2019-1-2016.pdf
Windows Media Video 9 File Format (WMV)	VC-1	<i>Advanced Systems Format (ASF) Specification (archive.org)</i> : http://web.archive.org/web/20140419205228/http://msdn.microsoft.com/en-us/library/bb643323.aspx

		<i>ST 421:2013 - SMPTE Standard - VC-1 Compressed Video Bitstream Format and Decoding Process:</i>
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<https://my.smppte.org/s/product-details?id=a1BVR0000007Nfz2AE>

C.7 Geospatial Formats

Preferred Formats	Format Specifications
Band Interleaved by Line (BIL)	<p><i>BIL, BIP, and BSQ raster files:</i></p> <p>http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=2915&pid=2910&topicname=BIL, BIP, and BSQ raster files</p>
Band Interleaved by Pixel	<p><i>BIL, BIP, and BSQ raster files:</i></p> <p>http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=2915&pid=2910&topicname=BIL, BIP, and BSQ raster files</p>
Band Interleaved Sequential (BSQ)	<p><i>BIL, BIP, and BSQ raster files:</i></p> <p>http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?id=2915&pid=2910&topicname=BIL, BIP, and BSQ raster files</p>
Digital Elevation Model (DEM)	<p><i>USGS - National Geospatial Data Standards - Digital Elevation Model Standards (archive.org)</i></p> <p>https://web.archive.org/web/20130217021915/http://nationalmap.gov/standards/demstds.html</p>
Environmental Systems Research Institute (ESRI) Arc/Info ASCII Grid	<p><i>ESRI ASCII Raster Format:</i></p> <p>https://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/esri-ascii-raster-format.htm</p> <p>http://webhelp.esri.com/arcgisdesktop/9.1/index.cfm?id=886&pid=885&topicname=ASCII%20to%20Raster%20(Conversion)</p> <p>https://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/esri-ascii-raster-format.htm</p>
Environmental Systems Research Institute (ESRI) Shapefile (SHP)	<p><i>ESRI Shapefile Technical Description:</i></p> <p>http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf</p>
GeoTiff	<p><i>GeoTiff Format Specification, Version 1.8.2, Revision 1.0, 2000:</i></p> <p>http://geotiff.maptools.org/spec/geotiffhome.html</p>

Geography Markup Language (GML)	ISO 19136-1:2020 - <i>Geographic information – Geography Markup Language (GML) – Part 1: Fundamentals</i> : https://www.iso.org/standard/75676.html <i>Geography Markup Language - Open Geospatial Consortium (ogc.org)</i> : https://www.ogc.org/standard/gml/
Keyhole Markup Language (KML)	KML - <i>Open Geospatial Consortium (ogc.org)</i> : https://www.ogc.org/standard/kml/
Acceptable Formats	Format Specifications
Canadian Council on Geomatics Interchange Format (CCOGIF)	Canadian Council on Geomatics, Standard File Exchange Format For Digital Spatial Data, Version #2.3, October 1994
Digital Lines Graphics – Level 3 (DIG-3)	<i>USGS - National Geospatial Data Standards - Digital Line Graph Standards (archive.org)</i> : https://web.archive.org/web/20130217031339/http://nationalmap.gov/standards/dlgstds.html
Environmental Systems Research Institute (ESRI) Export Format (E00)	Reverse engineered specification, Arc/Info Export (E00) Format Analysis: http://avce00.maptools.org/docs/v7_e00_cover.html
Geospatial PDF	ISO 32000-1:2008, <i>Document management – Portable document format – Part 1: PDF 1.7</i> : http://www.iso.org/iso/catalogue_detail.htm?csnumber=51502
International Hydrographic Organization (IHO) S-57	<i>IHO Transfer Standard for Digital Hydrographic Data. Edition 3.1 - November 2000 Special Publication No. 57</i> : https://iho.int/uploads/user/pubs/standards/s-57/31Main.pdf https://iho.int/uploads/user/pubs/standards/s-57/31Main.pdf
TerraGo GeoPDF	<i>Open Geospatial Consortium Inc. OGC 08-139r2</i> : http://portal.opengeospatial.org/files/?artifact_id=33332

C.8 Computer Aided Design Formats

Preferred Formats	Format Specifications
AutoDesk's Drawing File	<p><i>Open Design Specification for .dwg files:</i> https://www.opendesign.com/files/guestdownloads/OpenDesign_Specification_for_.dwg_files.pdf</p>
AutoDesk's Drawing Interchange File Format/Data eXchange Format (DXF)	<p><i>DXF Format:</i> https://help.autodesk.com/view/ACD/2022/ENU/?guid=GUID-235B22E0-A567-4CF6-92D3-38A2306D73F3</p> <p><i>ASCII DXF Files:</i> https://help.autodesk.com/view/ACD/2022/ENU/?guid=GUID-20172853-157D-4024-8E64-32F3BD64F883</p>
Acceptable Formats	Format Specifications
Portable Document Format/ Engineering (PDF/E)	<p>ISO 24517-1:2008, <i>Document management - Engineering document format using PDF - Part 1: Use of PDF 1.6 (PDF/E-1):</i> http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=42274</p>
Standard for the Exchange of Product Model Data (STEP)	<p><i>ISO 10303-21:2016, Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure:</i> https://www.iso.org/standard/63141.html</p> <p><i>ISO 10303-28:2007, Industrial automation systems and integration -- Product data representation and exchange -- Part 28: Implementation methods: XML representations of EXPRESS schemas and data, using XML schemas:</i> http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=40646</p>

C.9 Formats for Data Sets

Tabular data from databases and spreadsheets must meet the following requirements:

- Each record must contain an end-of-record marker;
- Each field within a file must be defined with the same fixed width;
- Each record must be defined with the same logical record length;
- All fields within a record in a database, or tuples in a relational database, should have the same logical format;
- A record should not contain nested repeating groups of data;
- Every file must be accompanied by documentation that specifies the field names and the field definitions⁸.

Preferred Formats	Format Specifications
American Standard Code for Information Interchange Text (ASCII Text)	ISO/IEC 646:1991, <i>Information technology - ISO 7-bit coded character set for information interchange</i> : http://www.iso.org/iso/catalogue_detail.htm?csnumber=4777
Comma Separated Value (CSV)	<i>Common Format and MIME Type for Comma-Separated Values (CSV) Files</i> : http://tools.ietf.org/html/rfc4180
Acceptable Formats	Format Specifications
dBASE Table File Format (DBF)	<i>Data File Header Structure for the dBASE Version 7 Table Files</i> : http://www.dbase.com/Knowledgebase/INT/db7_file_fmt.htm
Extended Binary Coded Decimal Interchange Code (EBCDIC)	<i>IBM EBCDIC Code Page 0037</i> : https://public.dhe.ibm.com/software/globalization/gcoc/attachments/CP00037.txt
Microsoft Excel Office Open XML	[MS-OI29500]: <i>Office Implementation Information for ISO/IEC 29500 Standards Support</i> : http://msdn.microsoft.com/en-us/library/ee908652%28v=office.12%29
Microsoft Excel 97 Binary Document Format (xls)	[MS-XLS]: <i>Excel Binary File Format (.xls) Structure</i> : http://msdn.microsoft.com/en-us/library/cc313154(v=office.12).aspx
OpenDocument Format Spreadsheet (ODS)	ISO/IEC 26300:2006, <i>Information technology - Open Document Format for Office Applications (OpenDocument) v1.0</i> : http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43485

⁸ Please clarify the specific documentation requirements for data sets with the LAC representative responsible for the transfer.